Bundle of documents for Oral hearings commencing from 19 August 2024 in relation to the Queen Elizabeth University Hospital and the Royal Hospital for Children, Glasgow

Bundle 27

Miscellaneous Documents

Volume 7

SCOTTISH HOSPITALS INQUIRY

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Minutes of the
NHS GREATER GLASGOW AND CLYDE
BOARD INFECTION CONTROL COMMITTEE
held on
Monday 28th July 2014 at 12.00noon in
Conference Room, Southern General Hospital

Present:

Dr Jennifer Armstrong (Chair)	Board Medical Director
Ms Rosslyn Crocket	Board Nurse Director
Dr David Stewart	Lead Director, Acute Medical Services
Mr Tom Walsh	Infection Control Manager
Mr Kenneth Fleming	Head of Health and Safety
Ms Sandra McNamee	Assistant Director of Nursing, Infection Control
Dr Rosie Hague	Consultant Paediatrician
Ms Suzanne Clark	Lay Representative
Ms Liz McGovern	Specialist Pharmaceutical Public Health
Ms Lorna Murray	Corporate Facilities Manager

In Attendance
Ann Lang (minutes)

Apologies received:
Dr Andrew Seaton Ms Pamela Joannidis Dr Catherine Chiang
Ms Mary Anne Kane

Item		Action
1.	**Welcome and Apologies** Dr Armstrong welcomed everyone to today's meeting and apologies were received from the above mentioned.	
2.	**Minutes of the meeting held on 19 May 2014** The minutes of the previous meeting were agreed as an accurate record.	
3.	**Matters arising** • Chapter 2 – National IPC Manual Sandra McNamee reported that Infection Control are reviewing the HPS Transmission Based Precautions Model Policy and meetings have been arranged for August with clinicians from disciplines where the greatest change to practice will be required. The Transmission Based Precautions meetings have been split into two sub groups i.e. Adult and Paediatrics. Dr Armstrong asked for this to be carry forward to the next meeting but emphasised the need to come to a position as soon as possible. • SABs Update Sandra McNamee advised that she is looking at the two action plans for Acute and the action plan issued after a review of the processes surrounding this by PWC. She commented on some of the points in the action plan from PWC and stated that PWC's first action was to develop a draft policy. She said that she has been liaising with Margaret Connolly and this will be presented to the Acute Clinical Governance Committee for ratification after a final consultation exercise. The PVC and CVC care plans and posters are in place. An awareness campaign and rolling programme is ongoing in sectors and this includes the hospital at night staff. Ward sweeps on the practice of PVC and CVCs are taking place. Training has been matched to the proposed policy and is being delivered. She advised that all actions had been completed with the exception of the policy.	

Item	Action

In the Acute action plan the Patient Information has been completed. Sandra reported that the CRT has been modified and the returns are included in the directorate monthly reports. She said she is also hoping to include patient stories in the directorate reports. Data was sent to HPS for analysis and they completed a site analysis which highlighted GRI and IRH as being slightly higher than the other sites and as a consequence the PVC campaign was started at these sites first. Sandra also commented that we are working with Tissue Viability looking at vascular ulcers and their potential impact on SABs.

Dr Stewart said the action plan was discussed at the Acute Infection Control Committee and he said they will go back over the action plan.

Sandra McNamee updated the group on the SAB figures from the latest HPS report. For the first quarter Sandra reported that NHSGGC had 26.3 cases per 100,000 occupied bed days. For the second quarter she reported that we are above this and the estimate is that our rate will be 29 cases per 100,000 AOBDs. As of today there are 24 cases with no particular areas to highlight. She did comment that there is a high proportion of contaminated cultures in Women & Children directorate with a rise of 8%. She said that Infection Control are looking into this and will provide support as requested.

In ECMS Joyce Brown advised that all SABs are looked into and the ones relating to device related are looked into in detail. She said they are also looking into community onset cases and the length of antimicrobial prescribing.

Dr Armstrong asked to be notified of high numbers of SABs as soon as possible and said there needs to be more of an early warning system in place. Tom Walsh replied that Infection Control monitor the number of SABs every day. He said that Infection Control now also receives the acute occupied bed days and stated that this helps to analyse the data better and is more closer to being accurate. Sandra suggested that the number of SABs could be added to the weekly report.

4. Standing Agenda Items

4.1 HAI Reporting Template (HAIRT) June 2014

The June 2014 HAIRT was distributed with the agenda.

There were three outbreaks included in this report. Sandra McNamee confirmed that the outbreaks were in Philipshill, GRI and Western Infirmary. She reported that the SSI rate for knee arthroplasty and repair of neck of femur procedures is slightly higher.

4.2 Q&P HAI Report – No Update

Tom Walsh advised that there was no update report since the last meeting.

4.3 IC Implementation Plan 2014/15 – June Update

A copy of the Infection Prevention & Control Implementation Plan for June 2014 was distributed with the agenda. Sandra McNamee reported that she had met with Joyce Brown and Mary Anne Kane to discuss electronic environmental audits. At the meeting it was agreed that the infection control environmental audit will now be postponed until the new structure is in place. Tom Walsh stated that he had discussions with a company to have an electronic tool for infection control and domestics to have joint audit of working. He said he is liaising with Mary Anne Kane on this on the cost of this as putting all three audits on the same IT platform would have some organisational benefits.

Item		Action
	The SSI monitoring tool on ICNET has been switched on and Sandra McNamee reported that this is running well. Dr Armstrong asked why HEI, Water and Decontamination which are mentioned in the Implementation Plan are the remit of BICC. Tom Walsh stated that clinical advice regarding these items would be the remit of Infection Control. She also said we need to distinguish between On the Move and Organisational Review in the Implementation Plan and asked to have a process in place to look at all the new rooms at Southern General Hospital. In relation to the new hospital Dr Armstrong asked if infection control were involved in the Commissioning Group. Tom Walsh confirmed that Fiona McCluskey is liaising with Sandra on this and Sandra advised that she has nurses sitting on the groups that they have been asked to be involved in. Rosslyn Crocket asked Tom and Sandra to ensure that they are part of the Commissioning Group. Dr Armstrong asked for an update to be provided at the next BICC meeting and for this to be an agenda item at future meetings. Tom asked what the procedure is for the migration of departments and was informed that Grant Archibald is chair of the On the Move Programme Board and David Loudon is in charge of the Commissioning Group. Tom agreed to email David Loudon.	**TW**
	With regards to the dental hospital Dr Armstrong asked for this to be included in the audit section. Sandra McNamee stated that she has a nurse that spends one day per week at the dental hospital and that all directly managed dental services are audited in the same way as other wards and departments in GGC.	
4.4	**Policies** SOP Cleaning of Near Patient Equipment Sandra McNamee updated the group and reported that the policies issued were updates on existing policies. A copy of the above policy was distributed with the agenda and Rosslyn Crocket commented that she did not realise that nurses were still doing some of the cleaning work. Sandra stated that the domestics will be doing the cleaning at the new SGH and that this might inform what happens in other areas of the board. Lorna Murray also stated that they are looking to update all the job descriptions for FM staff to be more generic. Once the new SGH is opened Sandra said the policy can be updated to reflect the changes and Lorna advised that the new policy will be rolled out to other sites. The committee agreed to approve the policy. SOP Twice Daily Clean of Isolation Rooms A copy of the above policy was distributed with the agenda and the Committee agreed to approve the policy. Whooping Cough (Pertussis) Policy Rosie Hague raised the issue regarding the change of practice regarding the use of FFP3 masks and said that discussions have not taken place with clinicians on the implications of this. At a meeting with HPS Rosie commented that agreement was reached and a paragraph would be included with the Transmission Based Precautions and Rosie volunteered to do this. Tom reported that Professor Williams and Pamela Joannidis are to meet with HPS to discuss this and Rosie Hague confirmed this has been arranged for 18th August.	

Item		Action
	Sandra stated that if this policy is not agreed we will have an out of date policy and Tom suggested extending the extant policy for a couple of months. The committee agreed to delay this policy and Dr Armstrong urged people to reach agreement on this. Liz McGovern stated that nebulisers are not mentioned or included in the decontamination policy and Sandra agreed to look at this but commented that it is not possible to list all the equipment used in patient areas.	**SMcN**
	Respiratory Syncytial Virus (RSV) Parent Guidelines A copy of the RSV Parent Guidelines was distributed with the agenda and the Committee agreed to approve the parent guidelines.	
5.	**Exception Reports and Updates**	
5.1	**vCJD Group** As there was no representative at the meeting there was nil to update.	
5.2	**Antimicrobial Utilisation Committee** The minutes of the last Antimicrobial Utilisation Committee were distributed with the agenda. Liz McGovern updated the group to say that since the last meeting the new Vancomycin Prescribing Admin and Monitoring Chart for Adults and Patients has been issued.	
5.3	**Acute Infection Control Committee (AICC)** The minutes of the Acute Infection Control Committee held in May were distributed with the agenda. Also distributed was a copy of the agenda for the last meeting in July as the minutes were not available for this meeting.	
5.4	**Partnership Infection Control Support Group (PICSG)** The minutes of the Partnership Infection Control Support Group held in May were distributed with the agenda. Also a copy of the agenda for the latest meeting in July was distributed with the agenda.	
5.5	**Recent Outbreaks/Incidents** Sandra McNamee reported that there have been six wards closed with norovirus in July. Two at the Beatson, three at GRI and one at Stobhill but there are no wards closed at present.	
5.6	**Water Safety Group** The committee noted that the Water Safety Policy has been approved and it was agreed to take this item off the agenda.	
6.	**New Business / Documents Received**	
6.1	**Annual Infection Prevention and Control Report 2013/14** A copy of the above report was distributed with the agenda and Dr Armstrong and Rosslyn Crocket advised that they had a few comments to make on the report and asked for the report to be updated.	

Item	Action

6.2 HPS Quarterly Reports – SABs/CDI
Sandra McNamee reported that for the first quarter our board is slightly higher for CDI but still well within the NHS Scotland HEAT target. She stated that for quarter two NHSGGC reported 24.1 CDI cases and the national target to achieve is 32 cases.

6.3 Decontamination – Management of Endoscopy Incidents
This item was discussed at the last Acute Infection Control Committee. Professor Williams and Dr Whitehead are to produce a SOP for managing incidents and there will also be input from HPS. Professor Williams and Dr Whitehead will also deal with any incidents and if there are any technical issues these will be passed to Decontamination to deal with. Professor Williams is to chair the national group and will lead on this.

6.4 Infection Control Environmental Audit
This item was discussed earlier in the meeting.

6.5 CDI HEAT Target – Empirical Prescribing Indicator AMT Report
Dr Armstrong asked for this item to be carried forward to the next meeting. She did comment that two hospitals were mentioned in the report and these included Glasgow Royal Infirmary and Inverclyde Royal Hospital.

6.6 Surveillance of Surgical Site Infection Annual Report 2014
A copy of the above report was distributed with the agenda.

7. Update from Public Health Protection Unit
A copy of the update from Public Health Protection Unit was distributed to the committee but Dr Chiang was unable to attend this meeting to update the group.

8. AOCB
Dr Armstrong notified the committee that she has requested PWC to carry out an audit of Infection Control. She said she has asked for this in light of moving to different organisational arrangements and will let people know what sites/people they will be visiting.

Dr Armstrong asked for the PWC report to be brought to the next BICC meeting in October. Tom Walsh also advised that when the Terms of Reference for PWC have been completed he will forward these to the group. **TW**

9. Date and Time of Next Meeting
The next meeting has been arranged for Monday 6 October 2014 at 12 noon and will be held in the Conference Room, Southern General Hospital.

2014 Meeting Dates

Date (2014)			Time	Venue
Monday	06	October	12noon – 2pm	Conference Room, Southern General Hospital
Monday	01	December	12noon – 2pm	Conference Room, Southern General Hospital

Wednesday 29 April 2015
at 1.30 pm

Room LO/A/010, New Lab Block, SGH

PRESENT

Chair	TW	Infection Control Manager
Tom Walsh		
Sandra McNamee	SMcN	Associate Nurse Director (Infection Control)
Lynn Pritchard	LP	Lead Infection Control Nurse, South East
Gillian Bowskill	GB	Senior Infection Control Nurse, South East
Clare Mitchell	CM	Lead Infection Control Nurse, South West
Kate Hamilton	KH	Lead Infection Control Nurse, North East
Joan Higgins	JH	Lead Infection Control Nurse, Clyde
Susie Dodd	SD	Lead Infection Control Nurse, North West
Pamela Joannidis	PJ	Nurse Consultant, Infection Control
Dr Linda Bagrade	LB	ICD, Clyde
Dr Alison Balfour	AB	ICD, Partnerships
Dr Teresa Inkster	TI	ICD, North
Dr Christine Peters	CP	ICD, South
Dr Aleks Marek	AM	ST4

In Attendance
Ann Lang (Minutes) PA Infection Control

Apologies Received
Professor Craig Williams Dr Pauline Wright Ann Kerr
Professor Andrew Smith

Item	Action
1. Welcome & Apologies Tom welcomed everyone to today's meeting. Apologies were received from the above mentioned.	
2. Minutes of SMT Meeting held on 25 March 2015 The minutes of the previous SMT meeting held on 25 March 2015 were accepted with the following amendments:- Page 7, Item iv, 2nd para – should include lab and maternity staff and not just maternity.	
Actions C/F • Craig to write to the chair of the Neonatal SAB Group regarding typing of SABs in NICU.	
Actions Update • Craig spoke with Norman Lannigan regarding the decolonisation regime. Linda commented that medical staff are saying that there is no evidence regarding 5 days. It was agreed the ICDs would write a paper regarding 5 or 10 days for decolonisation.	**ICDs**

Item	Action
• Pamela advised at the last Lead Nurse meeting they asked for Campylobacter to be put back on the alert list on ICNET. She said that she would ask Ann Kerr to ask the Data Team to update this. • Craig has written to HPS and Bryan Jones regarding the HPS AMR Alerts. In the correspondence he stated that if there were any factual inaccuracies this would be a microbiology issue and not an infection control issue. • The meeting with Anne Cruickshank has been changed from 7th to 28th May.	**PJ**
STANDING ITEMS	
3. Matters Arising There were no matters arising that were not on the agenda.	
4. Sector Update	
i) Geographical Sector Update (encl) The IC Sector Updates were distributed with agenda.	
• **Clyde (Joan Higgins)** • Joan reported 3 SABs were identified in March which were HAIs. • Also 3 HAI Clostridium difficile cases were identified in Ward 26 at RAH in March. SICPs audit and education was carried out and a terminal clean of the ward was carried out on 27th March. • A ward at IRH was closed in March with suspected norovirus.	
• **North East (Kate Hamilton)** • Kate reported 3 MSSA cases in NICU with all the same spa type. No further cases have been identified since 18th March. A meeting was held with clinicians and some of the doctors have changed some of their practice. • 2 incidents of chickenpox were identified at PRM. Kate advised that a [redacted] had been diagnosed with chickenpox following readmission to PRM and had been an in-patient in PRM the 48 hours before spots appeared. A [redacted] was also identified in the Day Care Unit and a contact list of patients was obtained.	
South West (Clare Mitchell) • Clare reported 4 babies with MSSA in NICU at SGH. Two of the babies were in the bed next to each other. She said that they looked at equipment and staff training. Pamela also stated that they looked at the heaters and ventilation and there appears to be no linkage with these. Christine commented that the audit and hand hygiene audits for the ward were good. She said that they were going to look into this and provide more training and also to check the spa types. • In the labour suite Clare reported that the ventilation went down for 36 hours and with the temperature rising a contingency plan was put in place. Christine stated that Infection Control was not informed of this right away and an external company had to be brought in to provide trays with water. Joan advised that in RAH they have to bring in portable units every year to cool patients down. Tom said that he will raise this at the next AICC meeting.	**TW**

Item	Action

- **North West (Susie Dodd)**
  - Susie reported that the SPC chart for was in control. She said that there were 6 CDI cases in GGH. All patients are well and waiting on results.
  - Ward 3C was closed with norovirus.
  - There were 5 SABs reported in March with 4 of these HAIs. She said the CVC compliance in renal was better with a rate of 100%.
  - Two severe CDI cases were listed in the report for March. Susie reported that one patient has been discharged and the other patient has improved.
  - In ITU Susie advised of an Influenza A death.
  - There was an outbreak of Influenza A in the Renal Unit at Vale of Leven and the ward was reopened on 11th March.
  - In G3 there has been 2 CDI cases in two weeks and typing is awaited.
  - Cumbrae ward at Drumchapel closed with confirmed norovirus from 14th to 23rd April.
  - Ward 3C was closed from 1st – 10th April, reopened and then closed again from 18th – 27th April with norovirus.
  - Susie reported a high number of Influenza B in the West Sector.
  - An outbreak of Influenza was reported in B7 and all patients were nursed in the one bay and there are no other patients giving cause for concern except for one patient who has respiratory symptoms. An outbreak meeting has been convened for tomorrow.
  - At the end of March there was a flood in level 7 at GGH when a mains pipe burst.
  - Susie reported a flood in the Western Infirmary two days ago.

- **South East (Lynn Pritchard)**
  - Lynn reported one ward closed at the end of March with another 3 wards closed.
  - At the beginning of March Lynn advised they had 2 SABs and to date they have had 8 SABs and 3 unknowns.
  - One patient had suspected MRSA PVL and has now been discharged.
  - Lynn commented that the number of alerts is reducing.

5. HAIRT Report

A copy of the report for April was distributed with the agenda and noted.

6. Q&P HAI Report

Nil to update.

7. IC Implementation Plan Progress

The IC Implementation Plan update for April was distributed with the agenda and Sandra provided an update.

She reported that she has updated the document with the comments received and the comments received from Andrew Smith will be updated in the next version. Sandra advised that there are a few items to be finalised e.g. organisation arrangements, waiting on government recommendations in relation to the Vale of Leven Inquiry and awaiting the CEL regarding surveillance.

Sandra asked if there is anything that could be included to let her know as these could be included as new initiatives.

Item	Action
8. Sub-Groups/ Short Life Working Groups Update:	
i) Water Safety Group Pamela provided an update on the Water Safety Group. She said that an authorised engineer had been appointed. Three documents including the SOP for Pseudomonas has been issued for comments. Pamela reported that the Policy and Scheme of Delegation is being reviewed. Alison commented that a contractor has been carrying out testing and Tom thought he would be reporting to the group. Tom, Craig and Pamela met with Mary Anne Kane to discuss the testing carried out by the contractor. The contractor carries out legionella testing and Craig asked for a note of where he carried out the testing. Alison stated that the work he carries out is not in line with our policy and Craig advised that Mary Anne agreed that we to justify the testing. At the last Clyde Water Safety Group Joan mentioned that Alan Gallacher is advising testing in areas outwith what should be done.	
ii) Theatre Maintenance & Management Group The last meeting of the group had been cancelled. Tom reported that there was no validation data for the theatres at SGUH. Clare stated that the theatres in labour suite had not been validated for 15 months. Tom asked Clare to get clarification on this from Jim McFadden. Kate to send Ann a copy of the most recent theatre validation spreadsheet.	**KH**
iii) Infection Control Policy Group Pamela reported that there were four policies going to the next BICC meeting which include Hand Hygiene, Scabies, MRSA and CDI. She said that there have been problems with access to the IPC website and asked if there were still problems to let her know. Linda advised that some of the links have changed in the C-diff Policy and it was agreed that Pamela and Kerry would check the links in the documents every six months. Joan stated that the stickers for the severity scores will need to be amended. In Ortho at RAH Joan advised that every patient is being screened on admission and after discussion it was agreed that Joan would ask this area to stop screening ortho patients.	**PJ**
iv) Education Group/OLM Workstream Lynn advised that the group are reviewing the presentations. The OLM meeting for this month was cancelled. Lynn said the Service Leads met today to discuss the Statutory Mandatory training. From the feedback received for this training Lynn advised that the infection control sessions have been positive with some negative feedback. Sandra commented that Learnpro can provide quarterly data on all training modules and 5,500 people have completed the SICPs module.	

Item	Action
v) Decontamination Group The last Decontamination Group meeting was last week. Kate said that she is to meet with Craig to look at the terms of reference to address the HAI standards. She said that they had met with Alan Stewart and once sites close there should be no local decontamination of scopes outwith the service provided by the Central Decontamination Unit.	
vi) Person Centred Care Joan updated on the meeting held last week. She said that they are putting a poster together and will meet with a few SCNs to discuss the staff questionnaire. Also they are going to look at the PVC/CVC Care Plan to see if they can engage with staff. Joan said to start with they are going to ask 5 patients in all wards if they have seen the patient information leaflet regarding PVC and will feedback the results to the wards. Kate commented that she found the information leaflets available varied across wards.	
vii) CPE Group The last meeting of the group was held on 21st April. Pamela, Craig, Kate and Lee Macready attended this meeting and one of the actions from this meeting is that a pilot is to be started in ITU at SGH in June. Following on from this Pamela reported that they will look at ITUs in RAH and GRI to find out if they can audit in these areas. A meeting is to be arranged with Nitish and Marian Lamont to determine if patients can be tagged on Trak with CPE and to look at ICNET to trigger a patient with CPE. In Golden Jubilee Hospital Lynn reported that they swab patients and no patient has refused a rectal swab. Pamela stated that the pre assessment areas to not have suitable accommodation to carry out rectal swabs. Pamela advised that she will issue the notes of the meeting to SMT.	**PJ**
9. Project Update:	
i) ICNET Update As Ann was unable to attend this meeting Tom said that she will provide an update at the next meeting. Ann to organise training on ICNET for the ICDs.	**AK**
ii) MRSA Screening / KPIs Nil to update.	
iii) SAB HEAT Target With regards to SABs Sandra reported that the final outcome from HPS is due to be issued in June/July and she said it will be interesting to see how community cases are identified. Tom advised that the SAB group composition and focus will be different due to the new geographical structure.	
iv) SPE Audits Pamela reported that training on the new audit tool is being rolled out to Senior Charge Nurse and Lead Nurses and more dates have been planned. She said that she will ask Eugene for a copy of the presentation.	**PJ**

Item		Action
v)	**Transmission Based Precautions** Pamela confirmed that she will resend the document on Transmission Based Precautions. At the national steering group Pamela said that she represented the network and some boards voiced concern that they were not compliant using PPE for AGPs. A meeting was held yesterday and Pamela advised that they discussed the AGP list of Appendix 14 of the SICPs Policy. She said that Lisa Ritchie and Jackie McIntyre are going to look at the list again and maybe revise the table. A Short Life Working Group was set up which included ID clinicians and they are now looking at the process for agreeing this. Pamela advised that Lesley Shepherd is part of this group and HPS have asked for a copy of the minutes of this working group.	**PJ**
vi)	**New Build – Adult Hospital / Children's Hospital** Adult Hospital A couple of items still outstanding include reassurance of the isolation of the water supply and Tom said that the issue of the theatre validation data is outstanding. Children's Hospital In the new hospital Tom heard that the dental unit is not the regular specification. Alison Rae from Paediatric Dentistry has escalated this to the project team. Christine asked if the window leak in the new hospital had been reported. There was also a perceived problem with the ventilation in the CT scan room. Tom agreed to email the project team.	**TW**
10.	**Finance Report** Tom reported that we are £58,000 underspent in the budget.	
11.	**On The Move** With regards to office accommodation Clare's team are moving into new accommodation on Friday and Lynn's team will move over gradually until the Victoria Infirmary closes. Tom said that he and Sandra met with Jonathan Best, Anne Harkness and Marie Farrell to discuss Infection Control. He said that they seemed reassured that there will be doubling up on reporting for the first couple of months. Tom and Sandra are to meet with David Stewart to discuss what the recommendations are for AICC. He suggested that maybe Lead Nurses and ICDs be on this committee. The Vale of Leven will now come under South Clyde and the beds that were in GGH (except for the Beatson) will now come under Anne Harkness remit. The changes to the Infection Control team will take place on 1st July. Linda asked if Facilities were mirroring the directorate structure and Tom said that he will confirm this. Tom said that Shelley Court at GGH is being knocked down and alternative accommodation is being looked at for the West team. The team based at the Western Infirmary will move to Yorkhill site.	

Item		Action
	As wards are being moved to the new hospital this weekend Tom, Sandra, Craig and Pamela are on call over the weekend. Sandra reported that she will receive a list of patients with infections and will pass this to Fiona who will organise separate ambulances for these patients. Sandra said that she will include the ICDs to the Friday report.	
12.	**Clinical Governance Related Guidance** Copies of the latest Clinical Governance Related Guidance notes were issued with the agenda.	
	INFECTION CONTROL GOVERNANCE	
13.	**IC Official Responses (Complaints / FOIs / PQs / Legal Enquiries)** The FOI on the subject of legionella testing at GGH is in the hands of the Central Legal Office. Tom reported that a tweet regarding the cleaning of the screens for outpatients in the new hospital was received and feedback was being provided to Scottish Government.	
14.	**Patient Experience** Nil to update.	
	COMMUNICATIONS/ FEEDBACK	
15.	**Events/ Representation Feedback** The network is being reviewed and Tom commented that the HAI Task Force is being reconvened.	
16.	**Core and Divisional Team Brief** Copies of the latest Briefs have been issued.	
	NEW BUSINESS/ AGENDA ITEMS	
17.	**New Business**	
i)	**HEI Self Assessment** Pamela reported that the final document for the HEI Self Assessment is due to be released at the beginning of May for completion within six weeks.	
ii)	**VOL Inquiry Report** At the last BICC meeting it was agreed that this committee would have oversight of all the recommendations from the Vale of Leven Inquiry. Tom advised that when the final document is available he will send this to SMT.	
	ITEMS FOR NOTING	
18.	Meetings Update:	
i)	Lead Nurse Meeting At the last Lead Nurse meeting Sandra said they discussed validation and had a portfolio meeting today. Kate raised the point about the daily huddles that are being held in each of the hospitals. Sandra confirmed that if there were no wards closed there was no need to attend these.	

Item		Action
ii)	ICD Meeting At the ICD meeting the issue of decolonisation was discussed.	
iii)	Board Infection Control Committee No meetings have been held since last SMT.	
iv)	Acute Infection Control Committee No meetings have been held since last SMT.	
v)	Partnership Infection Control Support Group No meetings have been held since last SMT.	
19.	**Review of Actions and Decisions** • The ICDs to write a paper regarding 5 or 10 days for the decolonisation regimen in the MRSA Policy. • Pamela to ask Ann to ask the Data Team for Campylobacter to be put back on the alert list on ICNET. • Tom to raise at the next AICC meeting the issue regarding the ventilation in the labour suite. • Kate to send Ann a copy of the most recent theatre validation spreadsheet. • Pamela and Kerry to check the links in policy documents every six months. • Ann to organise training on ICNET for the ICDs. • Pamela to issue the notes of the last CPE Group meeting. • Pamela to ask Eugene for a copy of the training notes for the audit tool. • Pamela to resend the document on Transmission Based Precautions. • Tom to email the project team about the issues raised by Christine.	
21.	**Any Other Competent Business** • Kate reported that she received an email regarding a meeting with Facilities to discuss the risk assessments for recurring red audits. Sandra said that there was no need to attend this meeting as have new audit tool. • Alison stated that with regards to air sampling they are planning on centralising this. Craig commented that he is liaising with Brian Jones on this. Teresa advised that staff would need to be outwith area for an hour whilst it is being sampled. Tom said that he will raise this at the next Diagnostics meeting. • In Clyde Joan advised that advised that different sampling for norovirus is being carried out in sectors. She said that in Clyde they only send samples to virology in an outbreak situation. Kate stated that if a ward is closed they would ask that all samples are sent for testing. • Susie advised that VRE in Level 7 Renal continues to increase. She said the clinical team have asked what can be done and Susie reported that the area has been checked and nothing has changed in the environment.	**TW**

Item	Action

22. Date and time of next meeting

The next meeting is scheduled for Wednesday 27 May 2015 at 1.30pm, ADM2.16B Conference Room, Level 2, New Victoria ACH.

The dates for future meetings have been arranged as undernoted:

Date (2015)		Time	Venue
24	June	1.30pm – 3.30pm	ADM 2.16B Conference Room, New Vic ACH
29	July	1.30pm – 3.30pm	ADM 2.16B Conference Room, New Vic ACH
26	August	1.30pm – 3.30pm	Conference Room, Management Building, SGH
30	September	1.30pm – 3.30pm	ADM 2.16B Conference Room, New Vic ACH
28	October	1.30pm – 3.30pm	ADM 2.16B Conference Room, New Vic ACH
25	November	1.30pm – 3.30pm	Room L0/A/010, New Lab Block, SGH
16	December	1.30pm – 3.30pm	ADM 2.16B Conference Room, New Vic ACH

Wednesday 29th August 2012 at 1.00 pm

Meeting Room Function Suite,
Western Infirmary Hospital

PRESENT

Chair –

Tom Walsh	TW	Board Infection Control Manager
Sandra McNamee	SMcN	Assistant Director of Nursing (Infection Control)
Debbie Forsyth	DF	MRSA Screening Project Manager
Professor Craig Williams	CW	Co-ordinating Infection Control Doctor
Clare Mitchell	CM	Lead Infection Control Nurse, South East
Pamela Joannidis	PJ	Lead Infection Control Nurse, South West
Kirsty Ferguson	KF	Senior Infection Control Nurse, North East
Laura Imrie	LI	Lead Infection Control Nurse, North West
Dr Pauline Wright	PW	ICD, South
Joan Higgins	JH	Lead Infection Control Nurse, Clyde
Professor Andrew Smith	AS	Microbiologist, Glasgow Dental Hospital
Dr Nitish Khanna	NK	ICD, South
Dr Teresa Inkster	TI	ICD, North West
Dr Alison Balfour	AB	ICD, Partnerships

In Attendance
Ann Lang (Minutes) PA Infection Control

Apologies Received
Kate Hamilton

Item		Action
1.	**Welcome & Apologies** Tom Walsh welcomed everyone to the meeting and apologies were received from the above mentioned.	
2.	**Minutes and Actions of SMT Meeting held on 25 July 2012** The minutes of the previous SMT Meeting held on 25 July 2012 were agreed with the following amendment:- Page 3, South East Sector, last line should read 'a patient had been moved several times' instead of 'a few times'.	
3.	**Matters Arising**	
i)	**ESBL Process** Craig reported that Alasdair Leonard is leading on the national group. Final guidance should be issued in the next couple of weeks and Craig said he would forward this to the group.	**CW**
ii)	**Pseudomonas Monitoring (ICNET) / Alerts** Debbie advised that new guidance had been circulated since the last meeting and a paper from Nitish was circulated with the agenda. She said that alerts are ready to be created on ICNet. Craig advised that an SOP will be required and it was agreed that Craig and Pamela would meet to draft the SOP. Debbie and Nitish agreed to meet to discuss which alerts to amend on ICNET.	**CW/PJ** **DF/NK**

iii) Datix Monitoring

The datix reports are coming through to the Data Team and Debbie advised that this has been in place since 1st August 2012. She asked if the email to the Data Team could be standardised as some do not have the datix number included in them. Sandra said that this could be discussed at the next Lead Nurse meeting. She said that the RCA is the responsibility for directorates to complete but she said she will speak to the Lead Nurses to provide support to the directorates. Sandra offered to analyse the reports for ECMS. **SMcN**

With regards to PVCs Sandra said that she had spoken to the Heads of Nursing about the compliance rate of 30% following the recent audit by ICNs. Rory Farrelly asked for this report to be on the agenda for the AICC meeting.

Joan stated that her staff have been asked along to clinical team meetings and said she is happy for this to continue.

STANDING ITEMS

4. Sector Update

i) Geographical Sector Update

- **Clyde (Joan Higgins)**
  - Joan reported that H South, IRH SPC was out of control. She said that there were 3 c-diff cases in August and one patient is still in the ward. Craig advised Joan to chase up the typing for these patients. He agreed to contact John Coia and maybe to discuss this at the next AICC meeting. **CW**
  - Health at Heart showers have been removed.
  - Joan reported that there have been ten SSIs for caesarean sections during May and June. There have been a couple of meetings and one more meeting has been arranged. The last time a patient was identified was 7th July 2012.
  - A patient whose family have PVL MRSA delivered a baby at VOL and was admitted to RAH the following day. All patients have been discharged home.
  - An incident occurred in IRH Theatres where a used cystoscope was re-used on a patient without being processed first. A datix report has been generated.
  - Joan reported that a patient in DSU informed nursing staff that they should not give blood as they have received a blood transfusion in the past and made her a risk for CJD. Joan said that she spoke to HPS about this and was told to quarantine the instrument. It was agreed to raise this at the next CJD meeting and ask Kate how to quarantine instruments. Andrew Smith advised that the national CJD Group are working on how to quarantine instruments. Craig confirmed that he will speak to HPS as patients should be able to give blood if they are not on the high risk list. Andrew Smith commented that a patient last month said they could not give blood as they had dental treatment. **KH**

Item	Action
• **North East (Kirsty Ferguson)**	
• Kirsty reported that all SPCs were in control.	
• There were three cases of VRE reported in Ward 63, GRI. Each patient moved to single side room and twice daily cleans have been requested.	
• Kirsty reported three cases of MDR Acinetobacter in ICU, GRI. Increased cleaning has taken place and an environmental audit has been completed.	
• Two hospital acquired MRSA have been identified in a two week period. Cleaning has been increased on the ward and a hand hygiene audit will be carried out.	
• Teresa reported that there is a design fault with the negative pressure wounds as they are coming up as positive instead of negative. Teresa and Kate have raised this at their sector meetings. Tom said that he will raise this at the meeting with Mary Anne Kane. Teresa agreed to forward the information to Tom.	**TW** **TI**
• Joan asked if the testing for pseudomonas/legionella could be standardised in sectors and she asked if Tom could raise this at the meeting with Mary Anne.	**TW**
• **North West (Laura Imrie)**	
• No reports of SPCs above the upper control limit.	
• Laura reported that there is ongoing monitoring into L7R due to increased incidence of VRE. She said that weekly screens will stop next week. Patients are to be tagged on PMS and Laura asked if renal could tag the patients on their system as well. Debbie advised that a tag can also be put on Trakcare and Laura said that she will send Debbie the information for the patients.	**DF**
• At the Beatson Laura reported that the radiotherapy suite had issues with water leakage and had been closed for six months. Laura commented that Estates have not addressed where the water is coming from. Tom agreed to raise this at the next AICC meeting.	**TW**
• **South East (Clare Mitchell)**	
• All SPCs were in control.	
• Clare advised that there is one severe case of CDI that meets the criteria for Root Cause Analysis.	
• With regards to the patients with Group A Strep Clare reported that a meeting had taken place. She said that they looked at the casenotes for the patients and spoke to the Tissue Viability Nurse. She said the casenotes documented patients with signs of infection but no mention of wound swabs taken. She said movement of patients is an issue. A meeting with the clinical team has been arranged for next week. Sandra said she will raise this at the RAD Clinical Governance meeting.	**SMcN**
• Clare said she received a phone call about a patient with rift valley fever but that patient has since died.	
• **South West (Pamela Joannidis)**	
• Pamela reported that all SPCs were in control.	

Item	Action

- Two wards had severe CDI cases and the clinical review tool has been sent to the clinical team.
- Two patients in Yorkhill had MRSA following surgery. No new cases have been identified and both patients have now screened negative.
- Pamela reported she had met with Nitish to look at doing light surveillance for neurosurgery.
- Routine air sampling in BMT unit has been carried out following ventilation issues.
- Pamela reported that they were looking at the number of SABs for neonatal patients. She said that a meeting had been arranged with the consultant and medics and medics from PRM and Clyde attended this meeting.
- With regards to the PVC Care Bundle Pamela advised that only one ward was doing this and this has been flagged up to the clinical team. Pamela said that they have offered assistance with this.
- At Yorkhill Pamela reported that endoscopy procedures are being carried out in the endoscopy suite which does not have good air change.

5. HAIRT Update – August 2012

The HAIRT report for August was distributed with the Agenda. Tom stated that the report includes one ward that has breached their upper control limit.

A copy of the summary HAIRT report was also distributed with the agenda. Tom advised that this is forwarded to the Quality and Performance Committee which has now replaced the Clinical Governance Committee. The report includes any recent issues or outbreaks and will be issued to SMT when available.

6. IC Implementation Plan Progress

Sandra advised that there is no update to report.

Tom advised that Jennifer Armstrong said that she would like to come to a future SMT meeting to meet members. He said he has given her the dates for the October and November meetings and it is expected she will attend one of these.

7. Sub-Groups/ Short Life Working Groups Update:

i) Legionella Group/Pseudomonas Group

Tom reported that the Board Legionella Policy is in final draft and will combine legionella and pseudomonas. A meeting of the board wide Water Group has been arranged for 1st October and the agenda and draft terms of reference have been issued. Tom commented that this meeting will be co-chaired by Mary Anne Kane and will be administered by Facilities. The group will report to Board Infection Control Committee and through the Facilities Governance Committee. Andrew Smith asked if this includes partnership and dental. Tom agreed to check regarding legionella but said it does not include pseudomonas. He said that he will ensure Andrew is copied in on any guidance issued and will issue the policy to him. Tom also asked Andrew for any specific questions relating to dental.

TW

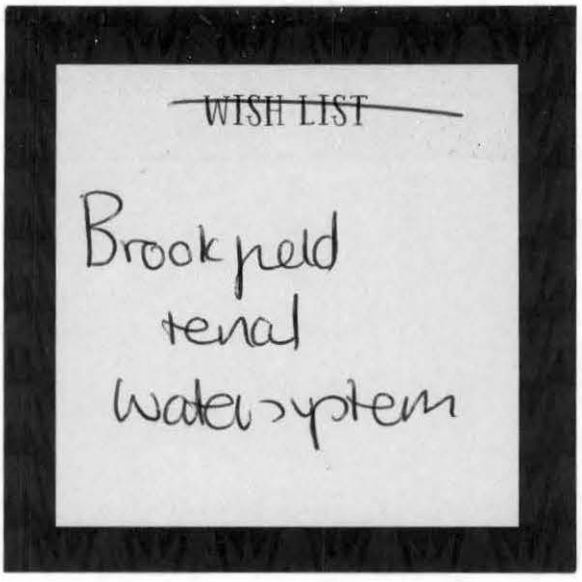
AS

Item		Action
	Clare commented that it would be useful to have a note of what clinical staff should do with regards to flushing. Tom advised that nominated leads will receive a letter from Alex McIntyre but this will not be issued until guidance has been sent out.	
ii)	**Theatre Ventilation Group** Clare reported that in the south Facilities are not getting access to theatres. Tom advised that if the PPM is more than two months overdue this will be escalated to the General Manager. If they are more than four months overdue it will be presented to the Acute Infection Control Committee as they have requested to have regular updates. It was agreed that Craig will provide an update at the next meeting.	**CW**
iii)	**CVC Policy Group** Tom stated that this group is chaired by Margaret Connolly and the group report to SPSP. He said that the policy is to go to the AICC meeting and commented that he will raise this with Andy Crawford when he meets him next week.	**TW**
iv)	**Infection Control Policy Group** Sandra reported that policies on TB, Chickenpox, Occupational Related Illnesses and a couple of SOPs were distributed to the committees for comments and will be presented to the next BICC meeting for approval. Sandra said that if anybody has any comments to let her know.	
v)	**Education Group** Laura reported that NES training is now on Learnpro. It was agreed that Elaine Boyd from NES would come along to the beginning of the next SMT meeting in September. Ann Lang to arrange.	**AL**
8.	**Project Update:**	
i)	**IT Project** Debbie reported that the icon for the Infection Control manual should be on all Citrix user accounts. An email has been issued to GGC employees to alert them of this icon and will appear as a Hot Topic on Staffnet. Sandra advised that she informed the Heads of Nursing that she is hoping to switch to the electronic manual by 30th September 2012. Andrew asked if this would be available for university staff also and Sandra suggested that a link to the manual could be put on the university website. With regards to ICNET Debbie advised that they have progressed the NG quote and are going for the third option which includes the joint study discount and reduced package (NG Lite). Tom commented that the annual maintenance cost for ICNET is £51,000 and a business case will be required following the expiration of our 3 year contract.	
ii)	**MRSA Project** Debbie reported that the KPIs for MRSA have been cancelled and will not now be in place until March 2013. HPS have suggested auditing in the meantime. Debbie advised that this will be the responsibility of directorates.	

Item		Action
iii)	**SAB HEAT Target** A summary of the changes to the Enhanced Surveillance Form was distributed with the agenda. Sandra said that this will be discussed at the next Lead Nurse meeting and asked the Lead Nurses to provide any comments. A final version will be brought back to the next SMT meeting.	**Lead Nurses**
iv)	**Prevalence Study** Sandra advised that the inspection team are looking at documentation to see if it states a patient has a catheter in and when this was inserted. It was agreed that this item can be deleted from the agenda.	
v)	**OLM Workstream** Debbie advised that there are three phases for the OLM workstream. She said that Shona is working on the historic mandatory data. The cleanliness champions requires to be tidied up and she will be looking at the training tracker content and the timeframe for this. Laura confirmed that NES are putting this on Learnpro. It was agreed that Debbie and Laura would meet to discuss.	**LI/DF**
vi)	**Faecal PCR Project** Sandra commented that Craig is waiting on the next norovirus season to start and said that a pilot of the faecal PCR will be starting in the south. Sandra agreed to send out the paper that was issued.	**SMcN**
vii)	**New Build Project** A meeting regarding the mechanical and ventilation at the new build is being consulted on and the meeting has been arranged for 17th September which Jackie Stewart will be attending.	
viii)	**Standard Infection Control Precautions** Nil to update.	
9.	**Finance Report** Tom reported that Infection Control are £19,000 overspent. It was agreed that meetings with Moira McCartney and Lead Nurses will be set up to discuss the Finance reports.	
	INFECTION CONTROL GOVERNANCE	
10.	**Risk Management / Risk Register** Tom thanked the group for their comments on the Risk Register. He said he has discussed this with Andy Crawford.	
11.	**Clinical Governance Related Guidance** The clinical governance related guidance was distributed with the agenda.	
12.	**IC Official Responses (Complaints / FOIs / PQs / Legal Enquiries)** Debbie advised that a FOI was received on the infection control risk relating to low levels of humidity.	

Item		Action
13.	**Patient Experience** Pamela reported that the results of the questionnaire survey were available. She said that she did some work with the public partners on what they want on boards relating to HEI. They requested that all % charts etc. should be removed. They also requested that with regards to the prevention leaflet if this could be available in other languages. Sandra advised that there are already two leaflets available on cedar which are the general leaflet and the laundry leaflet. She suggested that the leaflet could be put on the website to be available for anyone to access. Sandra reported that HEI have asked how we audit hand hygiene in volunteers and visitors and she said that Dr Armstrong asked how we can promote this. Pamela said that she is working with the community engagement team to work with public partners to promote hand hygiene. Sandra said she will contact Dan Connelly and try to work together on this.	**SMcN**
	COMMUNICATIONS/ FEEDBACK	
14.	**Events/ Representation Feedback** An email was issued from Scottish Information Research Network regarding funding available. Sandra reported that herself and Kate are attending the IPS Network in October. Clare reported that she has a poster at the conference on contaminated blood cultures. Andrew commented that he was at a conference on research of instruments which was presented by a representative of the national CJD Group.	
15.	**Core and Division Team Brief** Copies of the latest Briefs were issued. Tom reported that the Core Briefs are being issued more frequently as staff are to be informed of any press releases.	
	NEW BUSINESS/ AGENDA ITEMS	
16.	**Learning Lessons from HAI Outbreaks** A copy of a report from Evonne Curran was distributed with the agenda.	
	ITEMS FOR NOTING	
17.	**Meetings Update:**	
i)	**Board Infection Control Committee** There have been no meetings held since last SMT met.	
ii)	**Acute Infection Control Committee** There have been no meetings held since last SMT met.	
iii)	**Partnership Infection Control Support Group** There have been no meetings held since last SMT met.	

Item		Action
18.	**Review of Actions and Decisions** • Craig to forward to the group the final guidance for ESBL. • Craig and Pamela to meet to draft SOP on pseudomonas alerts. • Debbie and Nitish to meet to discuss alerts on ICNET. • Sandra to speak to Lead Nurses to provide support to directorates on datix issues. • Craig to contact John Coia regarding the c-diff cases at IRH. • Quarantine of instruments to be raised at next CJD meeting. • Teresa to forward Tom information on design faults with negative pressure wounds and Tom to raise this with Mary Anne Kane. • Tom to raise with Mary Anne that the testing for pseudomonas/legionella could be standardised. • Laura to send Debbie information for the VRE patients so that a tag can be put on Trakcare. • With regards to the issues with water in the radiotherapy suite Tom said that he will raise this at the next AICC meeting. • Sandra to raise at the RAD Clinical Governance meeting the casenotes for the patients with Group A Strep. • Tom to check if dental are to be part of legionella group and Andrew to forward Tom any specific questions. • Craig to provide an update to the next meeting on the Theatre Ventilation Group. • Tom to discuss the CVC Policy with Andy Crawford. • Ann Lang to invite Elaine Boyd to next meeting. • Lead Nurses to provide Sandra with any comments on the Enhanced Surveillance form. • Debbie and Laura to meet to discuss training tracker. • Sandra to issue the paper on Faecal PCR project. • Sandra to contact Dan Connelly regarding promoting hand hygiene for visitors. • Sandra to contact Andrew Smith regarding SOPs for the Infection Control Manual.	
19.	**Items Agreed** Nil to report.	
20.	**Any Other Competent Business** • Andrew asked if one of their SOPs could be part of the Infection Control Manual. Sandra reported that any Policy/SOP is forwarded to the AICC, PICSG and BICC for comments. Once comments have been updated the Policy/SOP is sent to the Board Infection Control Committee to be ratified. Sandra advised that after this it would need to be updated by someone. She said that she will discuss this further with Andrew.	**SMcN**
21.	**Date and time of next meeting** The next meeting has been scheduled for: • Wednesday 26 September 2012 • 1.00pm • Function Suite, Level 3, Western Infirmary.	


~~WISH LIST~~
Brookfield
rental
water system

MERCURY

Attention: Lead Document Controller

Project Name: New South Glasgow Hospitals
A&C Building

Project Address: Project Office
Hardgate road
Govan
Glasgow
G51 4SX

Submittal No.:	MER-XX-SL-TS-194
Re:	Renal Water Systems
Rev:	0
Date:	20-Nov-12

Brookfield MULTIPLEX BM

CONTRACTOR DOCUMENT REVIEW

A. ☐ No Comment

B. ☑ Noted subject to comments / corrections ... within 7 Business Days

C. ☐ Rejected – ... [redacted] ... Days

... 14/3/13

Dear Sirs,

Please find attached copy of the above mentioned Submittal as per the attached Submittal Form

Please revert with your comments/approval at your earliest convenience

Yours Sincerely,

Jack Whittam

NEW SOUTH GLASGOW HOSPITALS & LABORATORY PROJECT NEW ADULT & CHILDRENS HOSPITALS - DOCUMENT REVIEW				NHS
Representative Name	Date	Category	Signature	
		B	[redacted]	
Comment				
A No Comment B Processed Subject to Amendment C Subject To Amendment and Resubmit D Rejected. Amend the Submitted Info and Resubmit				

	MERCURY ENGINEERING	Technical Submittal Form
Project No.	GB1.0008	Submittal No. MER-XX-SL-TS-194
Project Title:	New South Glasgow Hospitals A&C Building	Category
		Rev: 0
		Date 20-Nov-12

Project No:	GB1.0008		
Submittal No:	MER-XX-SL-TS-194		
Drg/Spec Section:		Drawing	
Description:	Renal Water Systems	Technical	X

Enclosures	Rev	Description	Remarks
1	0	Adult Renal Purified Water System	
2	0	Childrens Renal Purified Water System	
3	0	Endoscopy Purified Water System	
4	0	PICU Renal Purified Water System	
5	0	Renal Concentrate System	

Comments/Notes
Johnson air vent to be installed where AAV is indicated, Pegler Yorkshire drain cock to be installed at high points to help with fill, flush, commissioning and future maintenance.

Issued by:	Jack Whittam
Received By:	

General Note : it must be possible to isolate the renal mains water supply from the remainder of the hospital in order to maintain supply in the event of treatment being required generally (eg chlorination

ELGA PROCESS WATER

New South Glasgow Hospitals (NSGH) Project: Technical Submission

For: Adult Renal Purified Water System

To: Mercury Engineering

Date: 15th November 2012

Client reference documents:	"SGH Renal Central Water Plant Specification Version 3.0" (12th February 2010) ZBP Document: ZBP-XX-XX-SP-500-104, Water Treatment Equipment Rev B, February 2012 Revised table of user demand points issued by ZBP, 13th April 2011
Client Drawings:	ZBP XX XX SC509 001 Rev 3
ELGA Drawings:	105285038-3001 Issue 2 105285038-3002 Issue 2 105285038-3003 Issue 2 105285038-3004 Issue 2

General

The following Technical Submission describes the Adult renal purified water system being supplied by ELGA Process Water for the NSGH project.

Incoming hot and cold water to be blended to 10 deg C to overcome the 4 degree C winter temperature

Treated water standard taken as being "UK Renal Association 4th Edition,2007 Clinical Practice Guidelines for Haemodialysis" and incorporating changes included within the 2009 update. Also ISO Working Document: "Guidance on the Preparation and Quality Management of Fluids for Haemodialysis and Related Theraples". We confirm that the renal purified water system provided by ELGA will consistently meet both standards.

Areas Supplied

This RO system supplies:

- **Inpatients Area (4th Floor):** 88 off dialysis stations in total. 28 off dialysis stations in simultaneous use, each requiring 1.5 litres per minute per station (2,520 litreshr-1)
- **Outpatients, Ready Use & Laboratory Area (2nd Floor):** 46 off dialysis stations in total with 40 simultaneous treatments. Each requiring 1.5 litres per minute per station (3,600 litreshr-1).
  All dialysis stations may be required to operate overnight. Requirement to heat sanitise one dialysis area whilst other area operates. Therefore, 2 off ring mains are included for, with an even division of points of use.

With points off each ring to workshops / ready to use stations in order to maximise resilience

Orbital House, Redwood Square, East Kilbride, G74 5PR, UK
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Web site: www.elgaprocesswater.com
Part of Veolia Water Systems Ltd. Registered in England and Wales No. 327847. Registered Office: Spring Bank House, High Street, Lane End, High Wycombe, Buckinghamshire, HP14 3JH, UK

VEOLIA WATER

ELGA PROCESS WATER

System Details

Item No.	Description	No. Off
1	Raw water thermostatic blending valve to allow a consistent 10 degree C	1
2	Raw water break tank. Capacity of 3.9m3	1
3	Raw water boost pump set in duty & standby configuration with auto changeover panel. To operate 12 hours on and off each. Standby pump to become duty pump on a pump trip signal. Pump set provided complete with pressure sustaining set. Model: Grundfos CRNE 15-6 – Motor 4.0kW Please refer to Grundfos catalogue, pages 8 and 13	1
4	**Duplex Water Softener / Scavenger:** 1 off Ionsoft 500 duplex water meter operated water softener / organic scavenger complete with glass reinforced plastic vessel, regeneration control valve, ion exchange material, soft water test kit, bypass shut off valve, solenoid valve, combined salt storage and measuring tank. Technical Performance: - Flow rate of 17m3 per hour per stream to accommodate the service flow and carbon filter backwash. Treated water hardness < 5 mg/l as $CaCO_3$ Inclusion of by-pass pipework for emergency situations. Please refer to attached data sheet	1
5	**Activated Carbon Filters:** 3 off PCF 300. Activated carbon filter in duty / duty arrangement. Complete with glass reinforced plastic vessel, and activated carbon filtration media. By passes to be fitted around each carbon filter for emergency situation. Regeneration by timeclock with manual over ride. Please refer to attached data sheet	3
6	**Central Control Panel:** Central control panel to ELGA Process Water standard. The panel will distribute power to all supplied items with 'supply on' indication and provide auto-changeover for the pumps.	1
	Process Plant to Supply 4th Floor Inpatients Area. 88 off points of use with 28 off in simultaneous use.	

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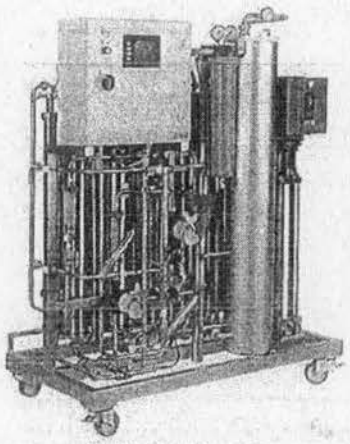
VEOLIA WATER

ELGA PROCESS WATER

1	**ELGA Modula 4 Twin Pass "TP" Reverse Osmosis Plant:** 2 off Twin Pass reverse osmosis system of all stainless steel construction, complete with on board stainless steel break tank and low noise submersible pump, membranes & housings, control system with data storage and status output, control valves and pipework. Each system is pre-piped, pre-wired, and pressure tested before despatch. Technical Performance: - Design Flow 1,500 litres/hr @ 10^0C per plant. Each twin pass plant is capable of maintaining full flow and quality with a single bank of membranes during an emergency situation. Please refer to attached data sheet  **Modula Twin Pass RO**	2

How is resilience (100%) achieved in the event of common fault (single component) eg control panel?

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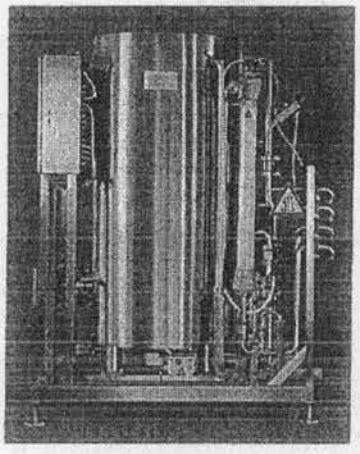
VEOLIA WATER

ELGA PROCESS WATER

2	**Heat Sanitisation & Ultrafiltration (NephroSafe):** Nephro Safe Skid mounted heat sanitisation and on board Ultrafiltration system. Containing 500 litres of treated water held at 60 degrees C. Electrical heating to 90 degrees C for heat sanitisation. Plant shall be of all stainless steel construction, with insulated tank and plc control. Additional facility to heat sanitise the dialysis machines. Heat sanitisable 0.05 micron ultrafilter mounted on the Nephro safe skid will ensure compliance with treated water standards at all times. Please refer to attached data sheet  Nephro Safe	1
3	**Media Panels for points of use:** 88 off media panels to ELGA Process Water standard with 1 off permeate connector and 2 off drain connectors per panel. To be flush mounted within proprietary paneling or trunking supplied by others. Capable of modification for central concentrate connections.	88
4	**Mimic Remote Panel:** To advise system status to technicians' area. Information on panel includes: "RO Run" indication "RO Standby" indication "Heat Sanitisation" indication "Dialysis" indication (meaning that system is available for dialysis) "Common alarm" indication.	1

excess permeate should re-circulate thro' the RO unit rather than into the break tank.

4no. earth connections req'd on each Media panel.

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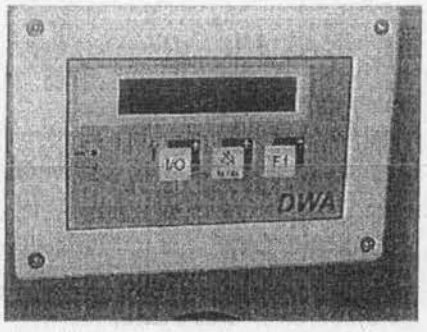
5	**Nurse Station Panel:** To advise the system status at the nurses area. Information on panel includes: "RO Run" indication "RO Standby" indication "Heat Sanitisation" indication "Dialysis" indication (meaning that system is available for dialysis) "Common alarm" indication.  Remote Panel	1
6	**Treated water distribution ring main:** Distribution ring main to be installed in Thick Walled Sanipex material. This will give a continuous bead and crevice free ring main to 88 points of use. 88 points of use in total	
7	**In Line Heater:** 2 off in line heaters will be required in order to maintain the heat sanitisation time over a ring main of this length.	2
	Process Plant to supply 2nd floor Outpatients, Ready Use & Laboratory 46 off points of use on 2nd floor. From this, 40 off points of use to be in simultaneous use. **These to be balanced over 2 ring mains as detailed within client requirement.**	

locations & type of panel (main/mimic, indicator) to be agreed.

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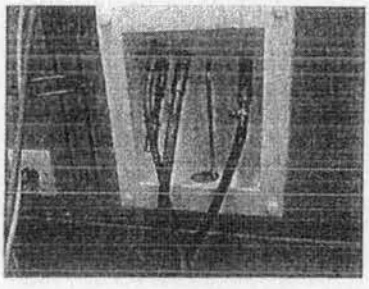
VEOLIA WATER

ELGA PROCESS WATER

1	**ELGA Modula 5 Twin Pass "TP" Reverse Osmosis Plant:** 2 off Twin Pass reverse Osmosis system of all stainless steel construction, complete with on board stainless steel break tank and low noise submersible pump, membranes & housings, control system with data storage and status output, control valves and pipework. Each system is pre-piped, pre-wired, and pressure tested before despatch. Technical Performance: - Design Flow 1,850 litres/hr @ 10°C per plant Each twin pass plant is capable of maintaining full flow and quality with a single bank of membranes during an emergency situation. Please refer to attached data sheet - as previous note, how is 100% redundancy achieved in event of common component failure	2
2	**Heat Sanitisation & Ultrafiltration (NephroSafe):** Nephro Safe Skid mounted heat sanitisation and on board Ultrafiltration system. Containing 500 litres of treated water held at 60 degrees C. Electrical heating to 90 degrees C for heat sanitisation. Plant shall be of all stainless steel construction, with insulated tank and plc control. Additional facility to heat sanitise the dialysis machines. Heat sanitisable 0.05 micron ultrafilter mounted on the Nephro safe skid will ensure compliance with treated water standards at all times Please refer to attached data sheet	2
3	**Media Panels for points of use:** 46 off media panels to ELGA Process Water standard with 1 off permeate connector, 1 off concentrate connector and 2 off drain connectors per panel. To be flush mounted within proprietary paneling or trunking supplied by others.  ELGA Media Panel	46

How many points req'd on media panel.

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VEOLIA WATER

4	**Mimic Remote Panel:** To advise system status to technicians' area. Information on panel includes: "RO Run" indication "RO Standby" indication "Heat Sanitisation" indication "Dialysis" indication (meaning that system is available for dialysis) "Common alarm" indication.	1
5	**Nurse Station Panel:** To advise the system status at the nurses area. Information on panel includes: "RO Run" indication "RO Standby" indication "Heat Sanitisation" indication "Dialysis" indication (meaning that system is available for dialysis) "Common alarm" indication.	1
6	**Treated water distribution ring main:** Distribution ring mains to be installed in Thick Walled Sanipex material. 2 off distribution ring mains to 46 off points of use in total	2
	Installation, Commissioning & Training	
1	**Mechanical installation:** We have included for installation of ABS interconnecting pipework and fittings on the make up plant. Installation will commence at the raw water boost pump set and terminate at the outlet of the Nephro safe to connect with the ring main pipework and media panels. We have made the following assumptions: Adequate drainage, electrical supply and ventilation should be provided to the plant room by others. Clear Access to and from the plant area. Equipment to be installed against a solid wall, without the need for special support bracketry such as Unistrut. An adequate valved raw water supply to be provided to within 2 metres of the System, by others. An adequate floor level drain is required within 3m of the plant position.	1
2	**Electrical Installation:** Electrical connection of the equipment to a local isolated power supply within 2 metres of our equipment.	1
3	**Commissioning:** Following installation, the local ELGA engineer will commission the system during normal working hours (Mon-Fri 9-5-30).	
4	**Recommendations:** We recommend that the plant room area floor is tanked to a height of 300mm with a threshold gully. A threshold bund can be used but should not reduce the usable floor area. We recommend that surface finishes are water resistant and repellent. We recommend that forced air ventilation is provided to the plant room to minimise condensation or high levels of humidity.	1
5	**Operator Training:** We have allowed for 2 days complete day of basic user training for key operators to be included. Additional training can be carried out locally or at our manufacturing facility in Germany.	1

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6	**Delivery:** Packing and delivery to site, including offloading and positioning.	1
7	**Documentation** Documentation to be provided electronically within the "Zutec" system Operating and maintenance manual. Block Layout. Flow diagram	2

Additional Information / Clarifications

Clarifications / Additional Information Relating to:
Specification for the supply and installation of central water treatment plant(s) to supply Renal facilities at the Southern General Hospital, Volume 2/1 Appendix M&E 6 Renal Water Version 2 Update from Renal Physics User Group Meeting on 21st January 2010

As stated in previous correspondence, ELGA Process water are providing systems that address the requirements of this specification at NSGH. Please find additional information and clarifications relating to this below.

Section 1.0 (Page 3): We note the requirement for water metering and energy metering in this section. For clarity, we have not included for any incoming water and incoming energy metering in our scope of supply. In our experience, (if required) this is normally incorporated in the utility supply to our systems.

Bmce to confirm sub-meters will be installed

Section 2.1 (Page 4): Our systems are designed to operate in the manner described. However, some time will be required for pre-planned maintenance on the systems. In addition, periodic backwash of carbon filters and regeneration of softener / scavengers will be required. This can be programmed to occur at period of low water demand and can be sequenced so that pre-treated water can be continuously fed to the RO units.

Section 2.10 (Page 4): We note the requirement to maintain water temperatures at "not less than 20 deg". The purpose of this requirement is to ensure that sufficient purified water is produced by the Renal RO systems – irrespective of the incoming feed water temperature. We have designed our system to maintain an incoming feed water temperature of 10 deg C and have sized the Renal RO systems to provide sufficient purified water to meet the demand criteria for NSGH described in this document and in the other documents provided to ELGA pre-contract. We have adopted this approach because:

- Raising the incoming feed water from 4 deg C to 20 deg C in winter, will require significantly greater amounts of energy compared to raising incoming feed water from 4 deg C to 10 deg C. As a result, the ELGA systems will use considerably less energy and will therefore have lower running costs to NHSGG&C – compared to systems maintaining a water temperature of 20 deg C.
- Bacteria will develop and multiply at a faster rate in 20 deg C water – compared to 10 deg C water. As bacteria control is a key requirement of the renal purified water systems, we have "designed out" an element of bacterial challenge by opting for a 10 deg C feed.

Paragraph 4 (Page 5): To address this point, we have included for 3 off alarms on feed water tanks in the renal purified water systems: High level, intermediate level and low level.

Paragraph 5 (Page 5): We note the requirement for a "water supply stop valve" on the media supply panel. We take this to mean the self-sealing valve arrangement in the Walther couplings provided at each panel. In a few other renal purified water systems in the UK (not supplied by ELGA), we understand that an additional valve has been installed before the Walther couplings. In our view, this provides a location for bacterial development and is therefore detrimental to the production of consistent, high quality purified water.

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Paragraph 6 (Page 5): We note the requirements for gas, nurse call, power, TV /radio on the media panel. The media panels being supplied by ELGA do not have these items included. In all recently installed systems (last 8 years), these services have been provided in the bed head arrangement adjacent to the renal purified water media panel.

Section 3.1.1 (Page 6): For clarity, our technologists' panel and nurses' panel have a "general" alarm light. This will activate for any of the alarm conditions on the renal purified water plant. The purpose of this is to ensure that **ALL** alarms on the renal purified water plant are investigated by appropriate personnel going to the plant affected and taking action on the alarm. In our experience, if **specific** alarm conditions can be identified remotely, there can be a tendency to ignore what may be subjectively deemed "non critical alarms". This, in turn, can lead to more serious problems developing on the plant (and an increased risk of plant downtime) – if unattended.
We meet the requirements of this section as high level, low level and intermediate level alarms will active the general alarm light on both the nurses' and technologists' panels.

Section 3.1.3 (Page 6): We note the requirement for a softener system in this section. In our design, we have included for combined softener / organic scavenger units. This is to address the particular feed water requirements in the Glasgow area (lower levels of hardness and higher levels of dissolved organic material – compared to other parts of the UK). The combined softener / scavengers we are providing will therefore give greater protection to the RO units – compared to softening alone.

Section 3.1.6 (Page 6): We note the requirement for 6 off outlets in the Renal Technology Laboratory. We have included for 8 off outlets – per the Renal Water Requirements document (PM! 057 dated 10/3/11). For clarity, we are supplying these outlets with renal purified water – per design drawings. → split over two rings for resilience

Section 3.2.5 (Page 7): The ELGA system meets the requirements of this section in the following manner. The ELGA system design provides automated heat disinfection of the 0.05µm ultrafilter and distribution ring. Our system also provides "integrated heat" disinfection of the haemodialysis machines. In the renal purified water systems we provide in the UK, we include a 0.05µm heat sanitisable ultrafilter – rather than provide heat sanitisable RO membranes. Other renal purified water system suppliers who provide heat sanitisable RO systems tend not to use a heat sanitisable ultrafilter. Our design rationale is as follows:
- Heat sanitisable RO membranes are currently 2 x the cost of conventional RO membranes. This significantly increases the ongoing operating costs associated with systems containing these membranes.
- Repeated heat sanitisation tends to reduce the operating life of RO membranes, thus further increasing operating costs.
As stated in previous correspondence, we confirm that our system as designed will consistently meet the water quality requirements of the applicable national and international standards at NSGH.
We also note that Addendum B of this specification has a more detailed description of the required heat sanitisation of the purified water system (compared to section 3.2.5). No mention is made of heat sanitisation of RO membranes in Addendum B. We fully comply with the requirements of Addendum B.

Section 3.2.6 (Page 7): See notes on Section 3.2.5 above.

Section 3.2.7 (Page 7): We note the requirement for leak detection. In response we have included 1 off leak detector for each purified water system. For this leak detector to operate effectively, each system should be located in a bunded area (see also "Recommendations" in "System Details" above). If the leak detector detects water in the bund, it will shut down RO permeate production as well as providing an alarm signal that will trigger the common alarm for each system.

Section 3.2.8 (Page 7): We note the requirement of this section. A number of signals are available for remote monitoring of the RO systems as standard – and are included in our scope of supply. These include: Low raw water tank alarm, intermediate raw water tank alarm (level adjustable), high raw water level alarm, raw water pump power

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on and trip alarm, power to softener/scavenger indication, softener/scavenger in backwash indication, power to carbon filters, carbon filter in backwash, RO unit power on and trip alarm, heat sanitisation on and trip alarm, concentrate tank high and low level alarm, cecon unit power on and trip alarm.

Section 3.2.10 (Page 7): We exceed the requirements of this section as we provide a heat disinfectable / sanitisable 0.05µm ultrafilter.

Section 3.3 (Page 8): We note the requirements for 4 off Earth Potential Equalisation points on the media panel. The media panels being supplied by ELGA do not have these items included. In all recently installed systems (last 8 years), any equalisation points have been provided in the bed head arrangement adjacent to the renal purified water media panel (see also comment for Paragraph 6 (Page 5) above). - BMCE to confirm inclusion.

Section 3.3.2 (Page 8): We note the requirements in this section. There is, however, no definition here as to what constitutes a "lengthy" distribution ring. For clarity, we have included for 2 off sample points for each distribution ring.

Section 3.3.4 (Page 8): We note the requirements of this section. We have included for each media panel to be uniquely identified with a self adhesive label (black lettering on clear flexible plastic self-adhesive strips). The identification nomenclature will be in line with customer requirements.

Section 3.3.5 (Page 8): See comments for Paragraph 5 (Page 5) above.

Section 3.3.6 (Page 8): See comments for Section 3.3 (Page 8) above.

Section 3.4.1 (Page 8): See comments for Section 3.2.5 (Page 7) above.

Section 3.4.6 (Page 8): We note the requirements for chemical disinfection. For clarity, our chemical disinfection cycle is fully automated – but requires manual initiation at the machine so as to prevent any possibility of chemical sanitization occurring whilst the system is operational.

Section 4.3 and 4.4 (Page 9): We note the requirements of this section. Our scope includes for horizontal runs of pipe between each media panel in each ward area. Pipe runs would be at high level between ward areas. Pipe would drop to media panel level in each ward, then horizontally connect to each media panel in that ward before returning to high level - prior to moving on to the next ward area.
We have not designed our system pipework to drop from high level then return to high level at each media point. This adds numerous bends to the system, significantly lengthens the overall pipe runs and is contra to this section - and Section 3.3 (Page 8).

Section 4.5 (Page 9): To address this section, we have included for the completion of 1 off water quality test on each of the 2 off renal RO systems (taken at the hygienic sample valve on the outlet from the RO system) to demonstrate compliance with the applicable water quality standards in the project specification documents provided to date. These samples will be taken immediately after the successful completion of commissioning. In addition, we will also demonstrate that each RO system is providing RO water flow and pressure(at the outlet from each RO system) in accordance with the project specification documents provided to date. Finally, we will demonstrate that the correct flow of RO water is provided at each point of use (NB. Each point of use tested separately and in isolation).

Section 4.7 (Page 9): We note the requirements of this section. This looks to be a different document system from the Zutec system we are required to work to. We are assuming that Zutec is the operating system for this project.

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Section 4.8 (Page 9): In the absence of information on the "format and system architecture for the Building Services systems", we have based our scope of supply on ELGA standard format O&M manuals which would be provided at the end of commissioning.

"All Areas" Section (Page 13): We note the requirement for the interruption of heat sanitisation via a keyswitch. Our system allows for manual interruption of heat sanitisation via a non-keyswitch over-ride button. Our rationale is that it is important to be able to interrupt a heat sanitisation cycle easily so as to allow the speedy resumption of dialysis. The use of keyswitches requires the location of the key and key holder to interrupt the heat sanitisation – thus causing potential delays in the resumption of dialysis.

Clarifications / Additional Information Relating to:
New South Glasgow Hospitals Specification Water Treatment Equipment Ref ZBP-XX-XX-SP-500-104 Construction T3, Rev B, February 2012

As stated in previous correspondence, ELGA Process water are providing systems that address the requirements of this specification at NSGH. Please find additional information and clarifications relating to this below.

Plant Room 32 (Page 8): We note the requirement for a water meter in this section. For clarity, we have not included for any incoming water metering in our scope of supply. In our experience, (if required) this is normally incorporated in the utility supply to our systems. - BMCE to confirm provision

Plant Room 21 (Page 9): We note the requirement for a water meter in this section. For clarity, we have not included for any incoming water metering in our scope of supply. In our experience, (if required) this is normally incorporated in the utility supply to our systems. BMCE to confirm provision.

370 Reverse Osmosis Units (Page 11, 12 and 13): We note that the description of RO units in this section is based on a manufacturer's specification – and that this manufacturer is not ELGA. As a result, some of the details on the ELGA RO units may vary subtly from this specification. See description of RO units in System Details above.
We can confirm that the ELGA RO units meet the design intent of this specification – and all other specifications provided relating to the renal purified water systems. A few of these differences are noted below:
RO Pressure vessels are not GRP on our system (Page 11). ELGA pressure vessels are stainless steel.
There is no "hotwell" on our RO systems (Page 12).
There is no bypass around our RO systems (Page 12). We would not install a bypass as described as this would compromise the bacterial integrity of the system.
The inlet ball valve specified (Page 12) is an electrically operated motorised valve on the ELGA system.
The information requirements for the mimic panels are different from that noted (Page 13). See System Details above for what is indicated on our panels. We believe that the information on our panels provides the nurses and technicians a more complete picture of the operational status of the purified water systems.

Completion (Page 15): All points in this section have been defined and agreed between ELGA and Mercury Engineering as part of our Terms and Conditions Review process. See document: New South Glasgow Hospitals Project. Terms and Conditions Agreement for ELGA Process Water Sub-Contract Order (Revision 1: 13/09/12)

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910 **Documentation (Page 15):** All points in this section have been defined and agreed between ELGA and Mercury Engineering as part of our Terms and Conditions Review process. See document: New South Glasgow Hospitals Project. Terms and Conditions Agreement for ELGA Process Water Sub-Contract Order (Revision 1: 13/09/12)

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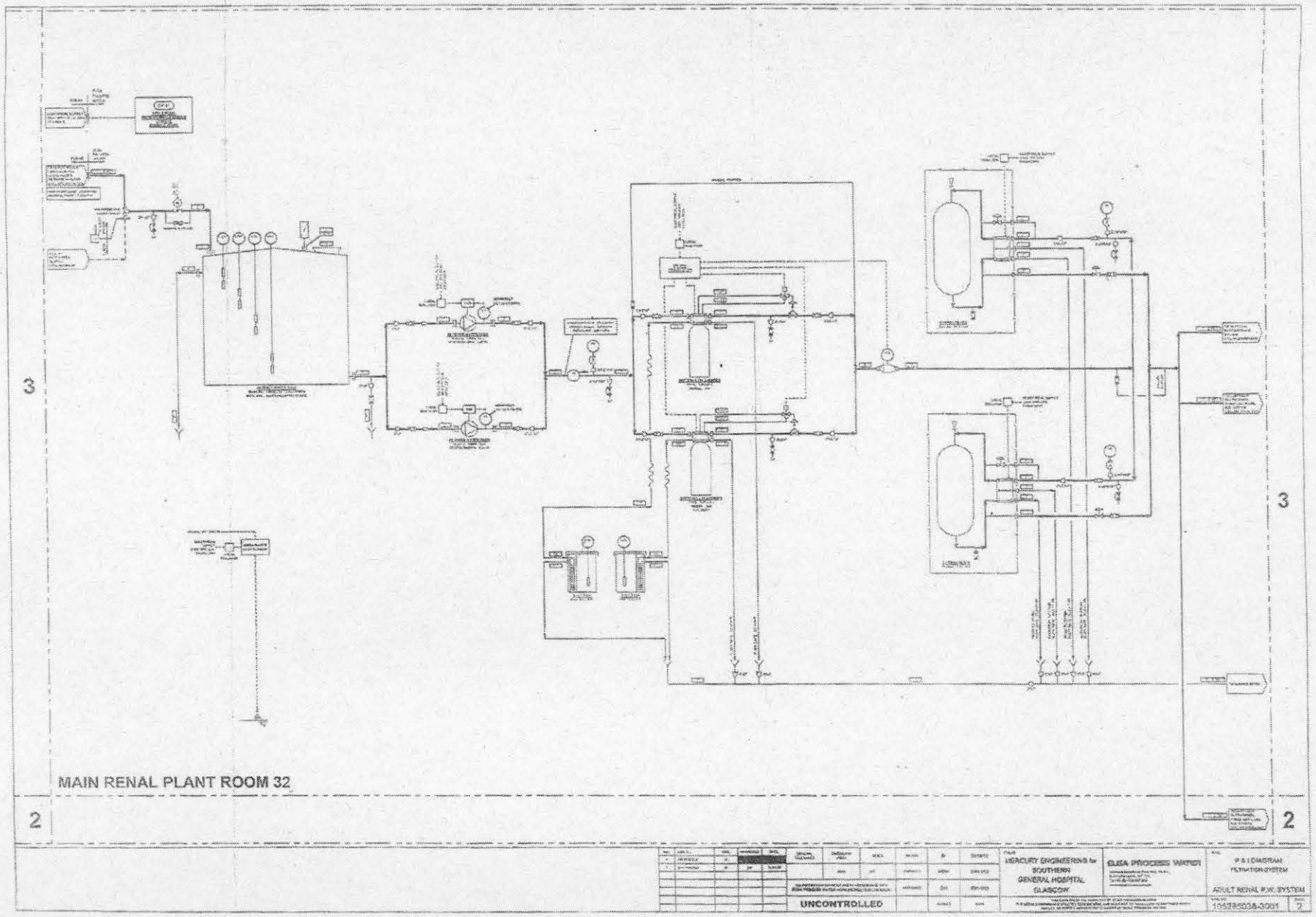
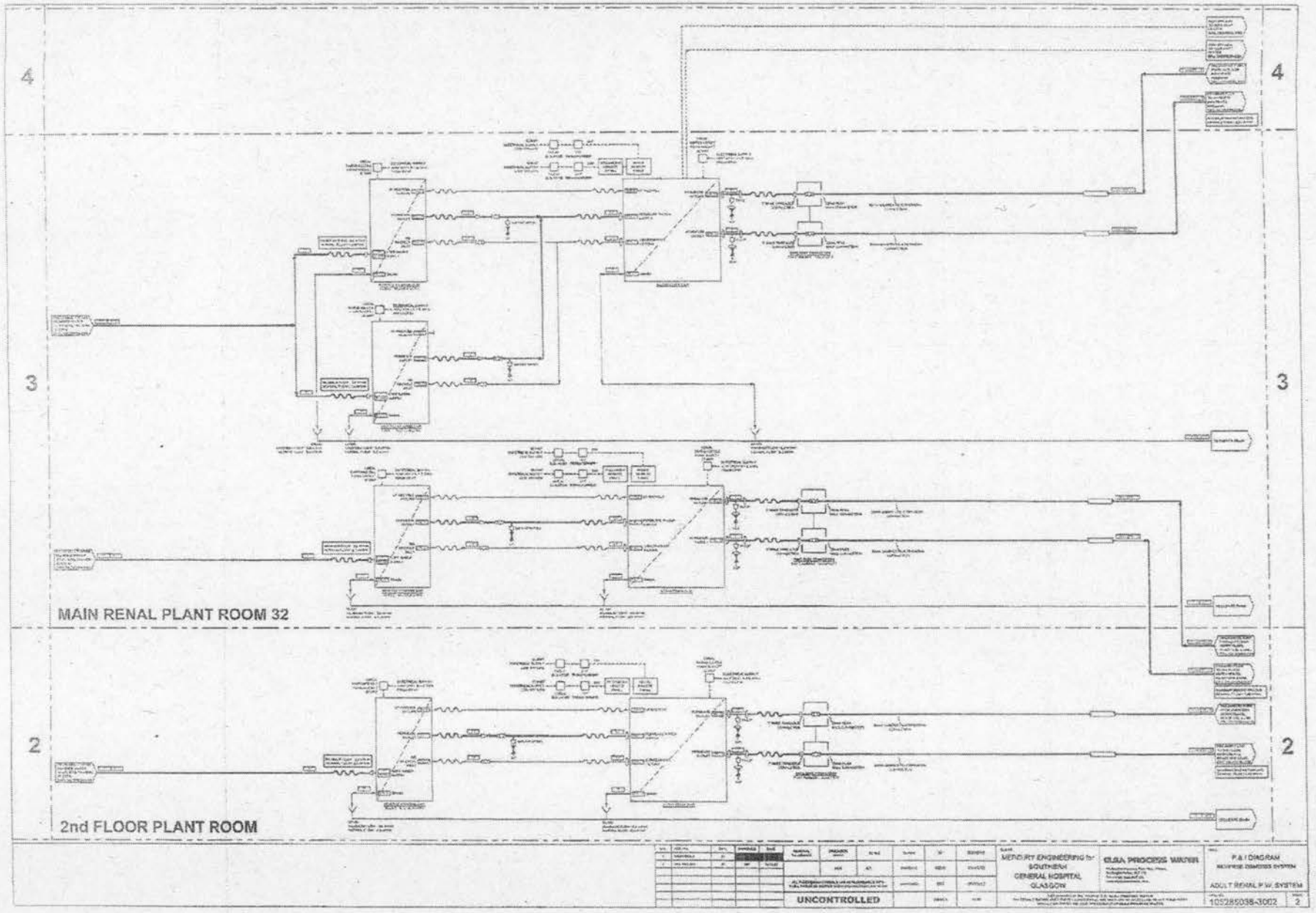

3
3
MAIN RENAL PLANT ROOM 32
2
2
UNCONTROLLED
LEGACURY ENGINEERING for
SOUTHERN
GENERAL HOSPITAL
GLASGOW
GLEA PROCESS WATER
P & I DIAGRAM
FILTRATION SYSTEM
ADULT RENAL P.W. SYSTEM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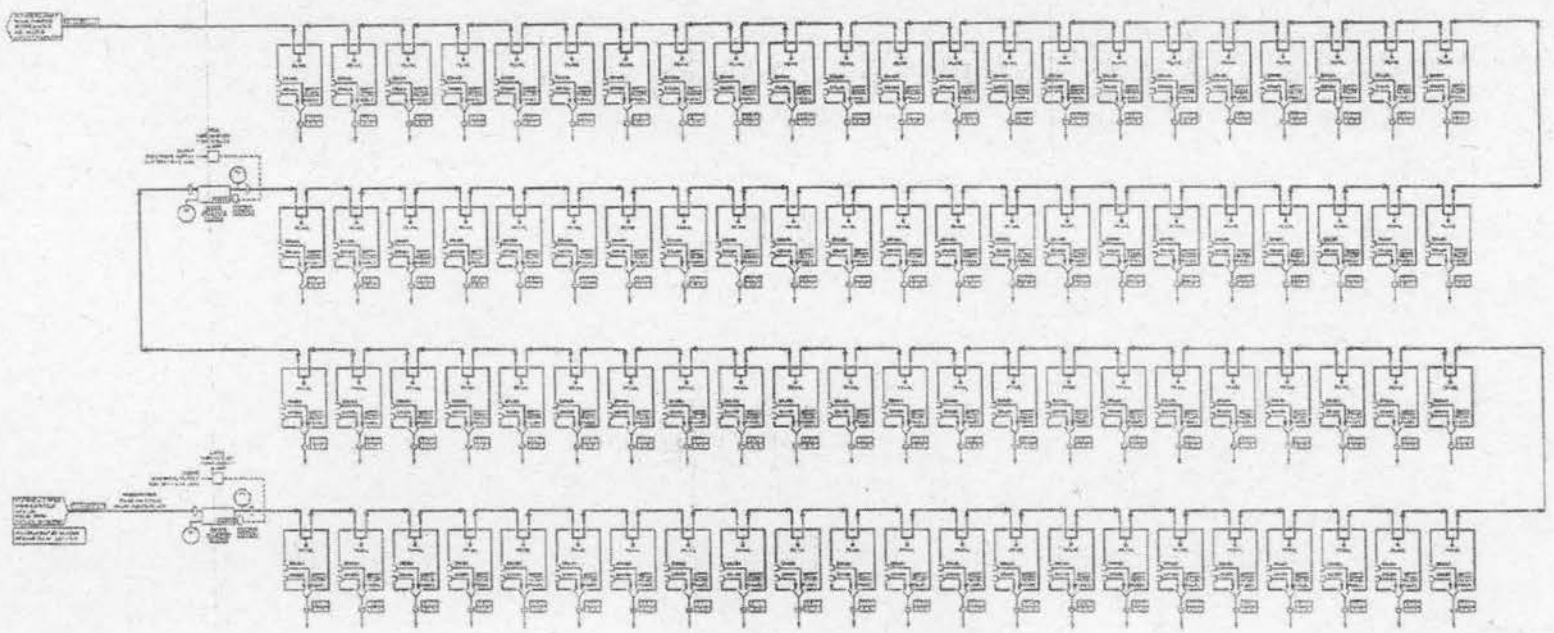
ADULT RENAL P.W. SYSTEM



4th FLOOR INPATIENTS RINGMAIN

TOTAL MAXIMUM SIMULTANEOUS DEMAND

23 - OFF MEDIA PANELS DURING DAY SERVICE

0 - OFF MEDIA PANELS DURING NIGHT SERVICE

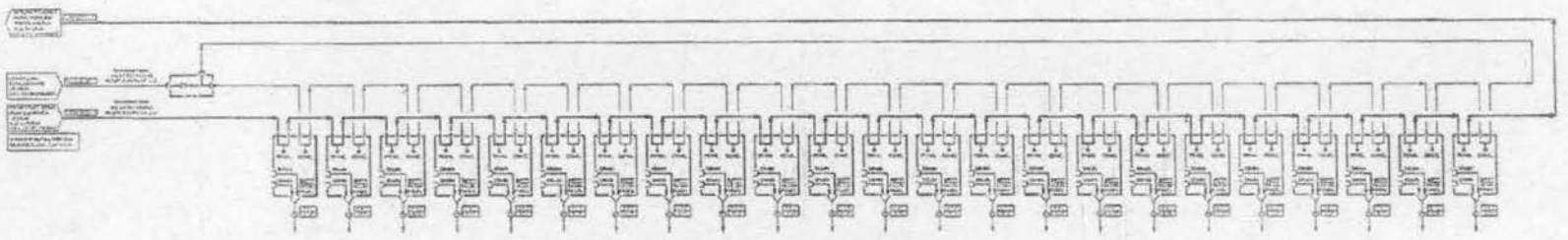
UNCONTROLLED

MERCURY ENGINEERING for SOUTHERN GENERAL HOSPITAL GLASGOW

GLEA PROCESS WATER

P & I DIAGRAM 4th FLOOR INPATIENTS RINGMAIN ADULT MEDIAL P.W. SYSTEM

105285008-3003



2nd FLOOR OUTPATIENTS, READY USE AND LABORATORY RINGMAIN

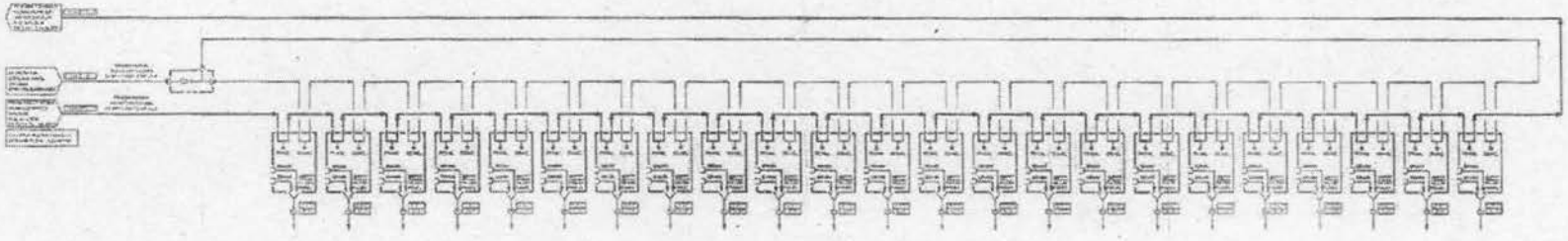
TOTAL MAXIMUM SIMULTANEOUS DEMAND

20 - OFF MEDIA PANELS DURING DAY SERVICE

8 - OFF MEDIA PANELS DURING NIGHT SERVICE

2

2



2nd FLOOR OUTPATIENTS, READY USE AND LABORATORY RINGMAIN

TOTAL MAXIMUM SIMULTANEOUS DEMAND

20 - OFF MEDIA PANELS DURING DAY SERVICE

7 - OFF MEDIA PANELS DURING NIGHT SERVICE

UNCONTROLLED

MERCURY ENGINEERING for SOUTH-ERN GENERAL HOSPITAL GLASGOW

GGA PROCESS WATER

P & I DIAGRAM

2nd FLOOR OUTPATIENT, READY USE AND LAB. RINGMAIN

ADULT RENAL P.W. SYSTEM

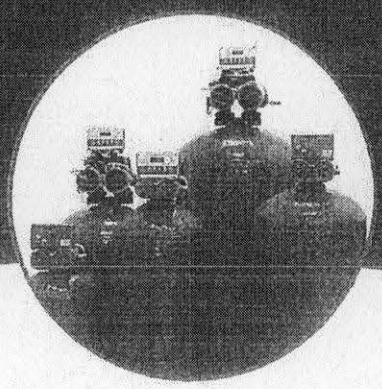
105286035-3004

ELGA
PROCESS WATER

IonSoft I

Water Softeners

Produce up to 17.5 m^3/hr of softened water



The IonSoft I range of water softeners produce from 0.4 to 17.5 m^3/hr of softened water for a variety of process and general manufacturing applications. The flexible design of the IonSoft softeners means that they can be configured to meet individual site requirements, thus providing a cost efficient, reliable and easy to use solution to the problems associated with hard water.

- Choice of systems; Simplex, Twin or Duplex units, tailored to customer requirements
- Choice of time clock or water meter operation
- Simple to program and operate; softener regeneration is automatically controlled and initiated
- The advanced control systems ensure that optimum performance is achieved from the softeners, thus minimising waste water
- Uniform bead size resin, gives peak regeneration efficiency and low salt usage
- The control head operates on low voltage (12/24V) to ensure safe instillation, operation and maintenance
- Proven design and materials of construction ensures operational reliability
- Optional automatic valve prevents hard water to service during regeneration
- Nationwide network of after sales service and support ensures that your water systems are maintained in optimal operational condition efficiency thus reducing operating costs.

VEOLIA
WATER
Solutions & Technologies

IonSoft I

System Performance

IonSoft I MODEL			80	135	200	200+	250	350	500
Maximum Treated Water Flow	- Simplex	m^3/hr	3.5	5.0	5.5	10.0	12.5	17.5	17.5
	- Duplex Parallel	m^3/hr	7.0	10.0	11.0	20.0	25.0	35.0	35.0
Minimum Treated Water Flow		m^3/hr	0.4	0.6	1.0	0.8	1.2	2.0	2.0
Regeneration Time (maximum)		mins	77	81	97	79	69	73	97
Maximum Flow to Drain		m^3/hr	0.96	1.44	1.92	3.00	3.80	5.80	7.50
Effluent Volume		m^3	0.58	1.00	1.49	1.40	2.00	2.50	3.60
Pressure Loss at Maximum Flow		bar	0.5	0.9	1.4	1.1	1.3	1.7	1.6
Salt Usage Per Regeneration		kg	9.6	13.5	20.0	20.0	25.0	35.0	50.0

Volume of Softened Water Per Regeneration

IonSoft I MODEL			80	135	200	200+	250	350	500
Raw Water - Soft	100mg/l	m^3	40	60	100	100	125	175	250
Raw Water - Average	200mg/l	m^3	40	34	50	50	63	88	125
Raw Water - Hard	400mg/l	m^3	10	17	25	25	31	44	63

System Dimensions, Weights & Connections

IonSoft I MODEL			80	135	200	200+	250	350	500
System Height		mm	1575	1875	1820	2132	1980	2225	2385
System Width	- Simplex	mm	1070	1150	1500	1500	1600	1750	2000
	- Duplex	mm	1810	1890	2000	2000	2200	2400	2800
System Depth		mm	640	640	875	875	875	1100	1100
Recommended Headroom		mm	900	900	900	900	900	900	900
Approx. Shipping Weight	- Simplex	kg	100	150	250	300	450	550	690
	- Duplex	kg	180	275	450	540	820	1000	1240
Approx. Service weight	- Simplex	kg	210	320	600	600	900	1100	1500
	- Duplex	kg	360	550	1080	1080	1640	2000	2480
Inlet		inches	1	1	1	1½	2	2	2
Outlet		inches	1	1	1	1½	2	2	2
Drain		inches	¾	¾	¾	1½	1½	1½	1½
Salt Tank Overflow		inches	½	½	½	½	½	½	½

Treated Water Quality

Ion I Soft	Hardness
	≤5mg/l as $CaCO_3$

Material Specifications

Pressure Vessels	Composite, HDPE & GRP
Resin	Uniform bead size
Control Valve	Glass reinforced ABS
Salt Tank	Polythylene

Feed Water Supply Quality

Water free from iron, suspended solids and <1pm, free Chlorine.
Supply Pressure: min. 2 bar max. 6 bar
Temperature: min. 5°C max. 30°C

Electrical Supply

All models 240V single phase, 50Hz.

For higher flow rate applications consult ELGA Process Water.

ELGA PROCESS WATER

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Filtration Systems
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Produces up to 35 m³/hr of filtered water

TECHNICAL DATA

Plant Type	Filtered water flow range m³/hr*	Cleaning flow at 2.0 bar m³/hr	Cleaning period mins	Maximum working pressure bar	Minimum working pressure bar	Inlet/Outlet/Drain Connections BSP		
PSF Sand Filters								
PSF 120	0.37 - 2.2	2.7	24	8.6	1.7	1"	1"	1"
PSF 160	0.65 - 3.9	4.5	24	8.5	1.7	1"	1"	1"
PSF 240	1.46 - 8.8	11.2	24	8.5	4.0	1½"	1½"	1½"
PSF 300	3.25 - 20	20.2	24	7.0	2.6	2"	2"	2"
PSF 400	5.75 - 36	36.2	24	7.0	2.0	2"	2"	2"
PCF Carbon Filters								
PCF 120	1.10 - 2.19	1.6	24	8.5	1.7	1"	1"	1"
PCF 160	1.95 - 3.9	2.7	24	8.5	1.7	1"	1"	1"
PCF 210	3.35 - 6.69	5.4	24	8.5	1.7	1½"	1½"	1"
PCF 240	4.38 - 8.76	4.5	24	8.5	1.7	1½"	1½"	1"
PCF300	10 – 20	12.3	36	7.0	1.7	2"	2"	2"
PCF 400	17.5 – 35	20.15	36	7.0	2.5	2"	2"	2"
PGF Iron Removal Filters								
PGF 160	0.78 - 1.56	3.36	60	8.5	1.7	1"	1"	1"
PGF 210	1.34 - 2.68	5.60	60	8.5	1.7	1"	1"	1"
PGF 240	1.75 - 3.50	7.84	60	8.5	2.5	1½"	1½"	1"
PMD Iron Removal Filters								
PMD 300	3.5 - 7.0	15.7	24	7.0	2.0	2"	2"	2"
PMD 400	6.0 - 12.0	29.0	24	7.0	2.5	2"	2"	2"

* Flow rates stated are dependent on the influent feed water quality.

* Maximum working temperature at maximum pressure is 43°C

OVERALL DIMENSIONS

Model		120	160	210	240	300	400
Height	mm	1402	1857	1797	2034	2420	2827
Depth	mm	409	478	621	691	927	1226
Headroom (recommended)	mm	600	600	600	600	600	600
Approx. Service Weight	Kg	176	425	720	1150	2255	4370

Note: add extra 600 mm to PGF 160-240 installations to allow for potassium permanganate regeneration tank.

Client to Provide:

- Power supply 240V, 50Hz
- Drainage for backwash flow
- Raw, filtered water and drain pipework to and from unit
- Potassium permanganate for PGF filters
- Manual isolating valves

For other flowrate applications consult Vivendi Water Systems

VIVENDI water

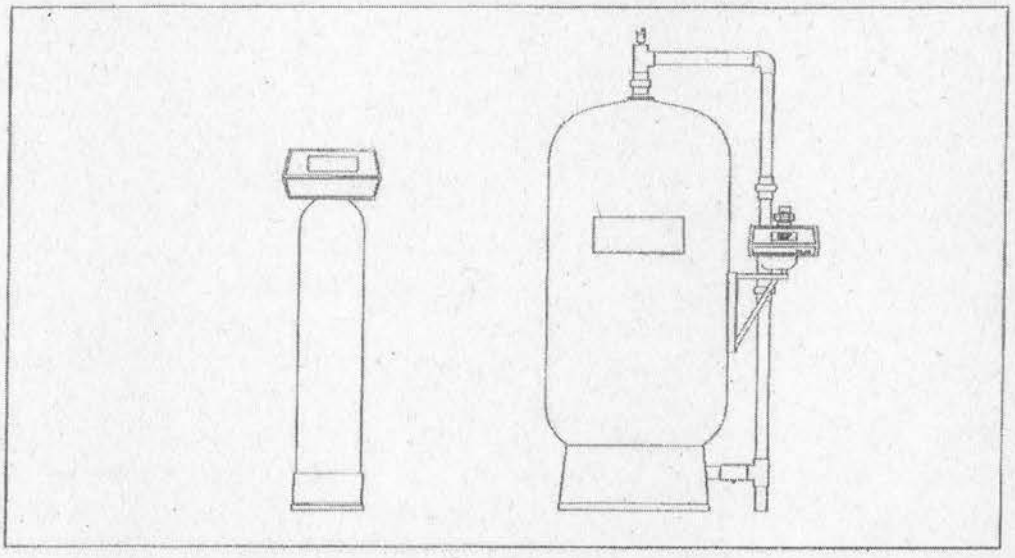
PSS130 Rev I: 01/01. In keeping with the progressive nature of the company, we reserve the right to amend details without notice.

Eliminator®

Filtration Systems

Eliminator Filters

Produces up to 35 m³/hr of filtered water



The Vivendi Water Systems range of Eliminator filtration systems is the result of many years experience in the development of water treatment plant. The filters remove suspended matter, turbidity, iron, colour and odour from feedwater which if not removed could adversely affect the performance of downstream equipment and processes, leading to costly downtime and production losses. Automatic operation allows the filters to be used in a variety of industrial applications. The systems incorporate a robust, corrosion resistant design, with an automatic multiport control valve system and a glass fibre reinforced pressure vessel.

Sand Filters - For applications where suspended matter and turbidity are present.

Carbon Filters - For applications where chlorine, taint, odour or soluble organics are present.

Iron Removal Filters - For applications where dissolved and undissolved iron and manganese are present.

- Packaged plant
- Fully automatic
- Cleaning initiated by time clock
- Simple robust construction
- Designed for ease of service and maintenance
- High velocity backwash
- Low installation time and costs
- Low operator involvement
- Allows cleaning to occur during periods of no or low demand
- High reliability
- Low service and maintenance costs
- High filtrate quality and extended service runs

VIVENDI WATER SYSTEMS

VIVENDI water

ELGA PROCESS WATER

Modula™

Reverse Osmosis Systems Producing 350 – 3500 litres/hr of High Purity Water for Dialysis

The DWA Modula™ range of reverse osmosis units are designed specifically for the modern Haemodialysis unit.

The Modula™ concept incorporates proven and reliable products into a flexible design package.

ELGA Process Water is the sole UK distributor for DWA's range of dialysis water treatment systems.

Since 1984, DWA has specialised in innovative solutions for the supply of high purity water to dialysis centres worldwide.

Our expertise in water treatment provides solutions from pre-treatment stages, through reverse osmosis, ultrafiltration and hot cleaning systems, directly to the supply connection.

Features & Benefits

- Submersible pumps with low operating noise
- Water saving technology resulting in lower operating costs
- Compact modular design giving an optimised footprint
- Emergency mode in case of control board failure ensures continued RO output
- Continuous monitoring of critical operating parameters
- Easy to use interface panel
- Quick access to all components; ease of service, reduce maintenance costs
- Automated control of the required permeate output via intelligent modulation of the pumps (ECO-Mode)
- Selectable Autoflush mode for dialysis free times

Options

- Parallel or twin-pass operation
- Ultra filtration modules
- Hot cleaning of the ring main and dialysis machines

Models

Modula

A cost effective and adaptable system designed to comply with modern day standards.

Modula S

Minimised water consumption for sustainable operation.

Modula S-XL

The new reverse osmosis unit for dialysis with built in redundancy.

Modula S-TP

Twin pass reverse osmosis unit designed to produce ultrapure water for dialysis.

Related Services

Our AQUAservice maintenance agreements are designed to allow you to choose from our wide range of capabilities the level of support you require to meet your application, operational and budgetary needs.

VEOLIA WATER
Solutions & Technologies

Modula™

Modula		1	2	3	4	5
Permeate Output @10°C	l/hr	350	700	1050	1400	1750
Permeate Pressure	bar	2-5				
Power Supply		400V, 3 Phase, 50 Hz / 4kW				
Recovery Rate	%	75				
Dimensions	mm	1050 (W) x 1550 (H) x 550 (D)				
Working Weight	kg	170				
Noise Level	dBA	65				

Modula S		S1	S2	S3	S4	S5
Permeate Output @10°C	l/hr	350	700	1050	1400	1750
Permeate Pressure	bar	2-5				
Power Supply		400V, 3 Phase, 50 Hz / 3.5kW				
Recovery Rate	%	Up to 85				
Dimensions	mm	1190 (W) x 1500 (H) x 690 (D)				
Working Weight	kg	280				
Noise Level	dBA	65				

Modula SXL		SXL4	SXL5	SXL6	SXL7	SXL8	SXL9	SXL10
Permeate Output @10°C	l/hr	1400	1750	2100	2450	2800	3150	3500
Permeate Pressure	bar	2-5						
Power Supply		400V, 3 Phase, 50 Hz / 6.5kW						
Recovery Rate	%	Up to 85						
Dimensions	mm	1270 (W) x 1620 (H) x 690 (D)						
Working Weight	kg	500						
Noise Level	dBA	65						

Modula STP		STP1	STP2	STP3	STP4	STP5
Permeate Output @10°C	l/hr	350	700	1050	1400	1750
Permeate Pressure	bar	2-5				
Power Supply		400V, 3 Phase, 50 Hz / 6.5kW				
Recovery Rate	%	Up to 85				
Dimensions	mm	1350 (W) x 1720 (H) x 690 (D)				
Working Weight	kg	500				
Noise Level	dBA	65				

Feed Water		Quality Requirements
Water Quality		Potable
Fouling Index		<3
Conductivity	µs/cm	<1400
Fe	ppm	<0.05
Cl	ppm	<0.10
SiO_2	ppm	<0.3
pH		6.5-8.5
Temperature (max)	°C	25
Hardness	ppm	<2

Manufactured according to MDD (Medical Device Directive)

Unit Design	Specification
Frame	Stainless Steel V2A (304)
Tubing	Stainless Steel V4A (316L)
Membrane Housing	Stainless Steel V4A (316L)
Protection Category	I
Overvoltage Category	II
IP Rating	X4

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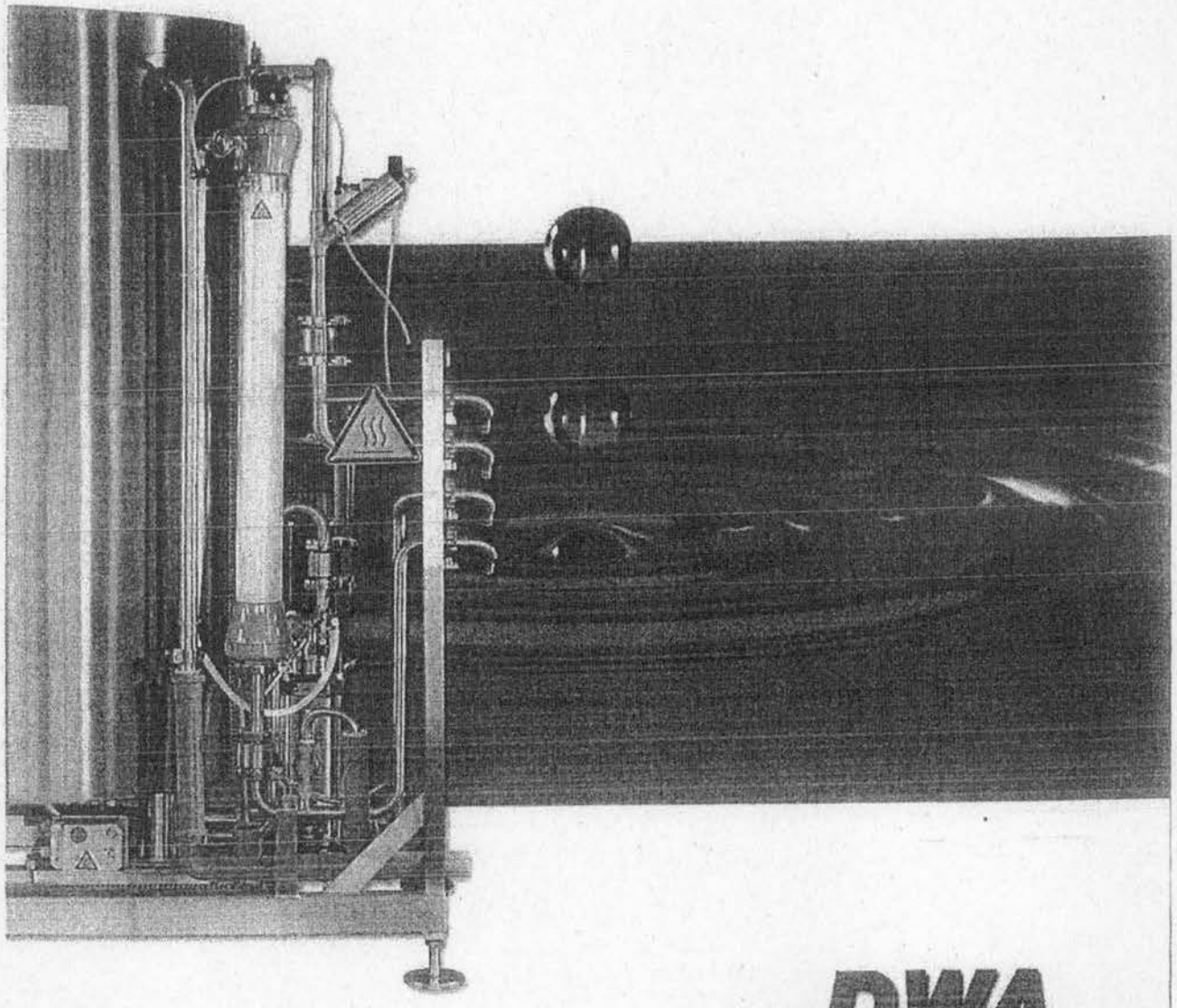
VEOLIA WATER
Solutions & Technologies



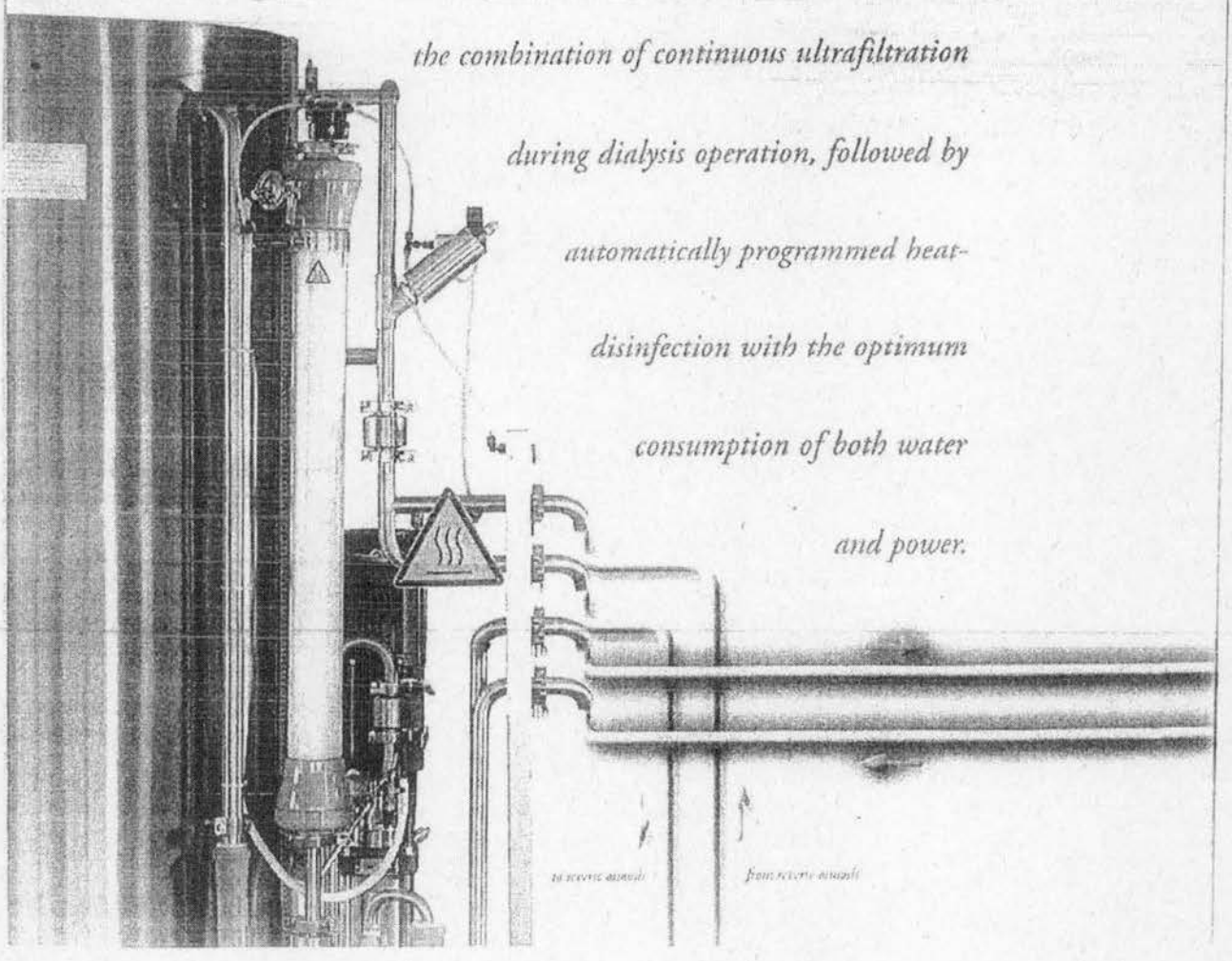
DWA

nephro SAFE

HEAT-DISINFECTION AND ULTRAFILTRATION

THROUGH INTO THE DIALYSIS MACHINE

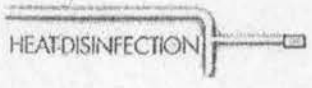
The production of ultrapure permeate and its supply through into the dialysis machine with the same consistent high quality is another innovation which demonstrates DWA's expertise in the development of permeate systems for dialysis. The nephro SAFE system ensures bacterial free permeate through the combination of continuous ultrafiltration during dialysis operation, followed by automatically programmed heat-disinfection with the optimum consumption of both water and power.



nephro SAFE
CONTINUOUS ULTRAFILTRATION

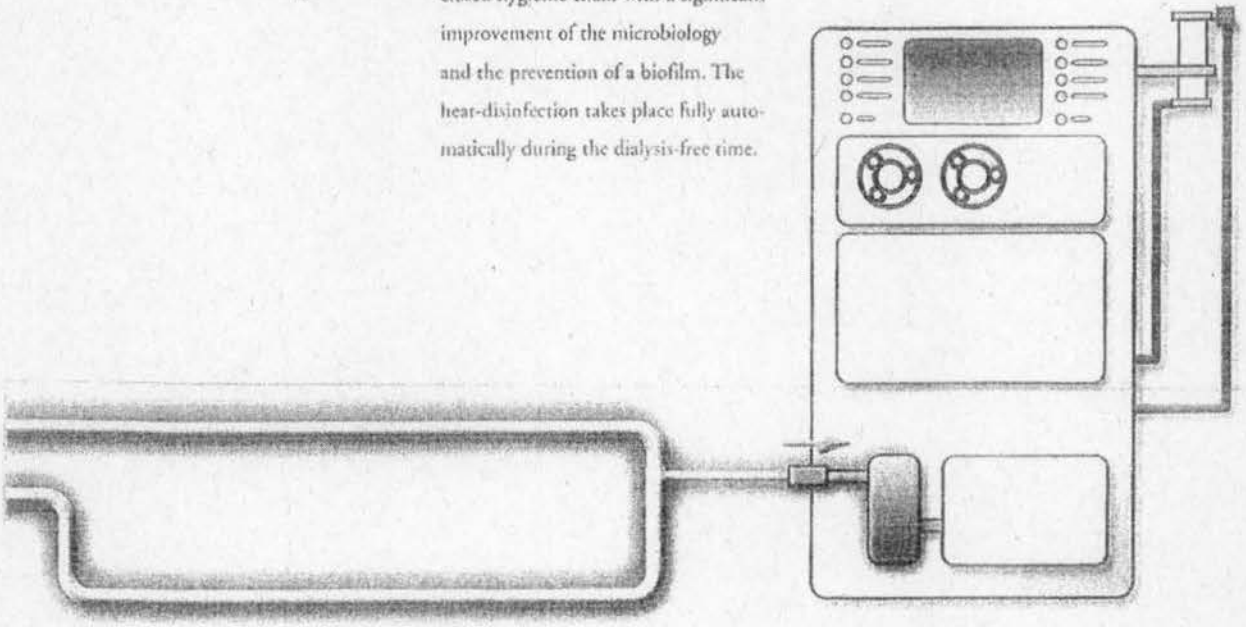
The continuous ultrafiltration of the content of the distribution ring during dialysis serves to eliminate any microorganisms, biofilm fragments and endotoxins which may be present in the permeate. They can enter the permeate distribution ring during the coupling and uncoupling of the dialysis machine from the permeate supply or from micro-biologically burdened areas of the dialysis machine. Because of the low molecular weight of some endotoxins, reverse osmosis processes are not able to retain them completely. Although the pores of reverse osmosis membranes are up to one hundred times smaller, the separation capacity of ultrafiltration membranes is about two orders of magnitude higher for endotoxins (permeability only 0.001 %). The production of ultrapure permeate is therefore possible through a combination of reverse osmosis and ultrafiltration.

nephro SAFE
HEAT-DISINFECTION WITHOUT DEAD ZONES

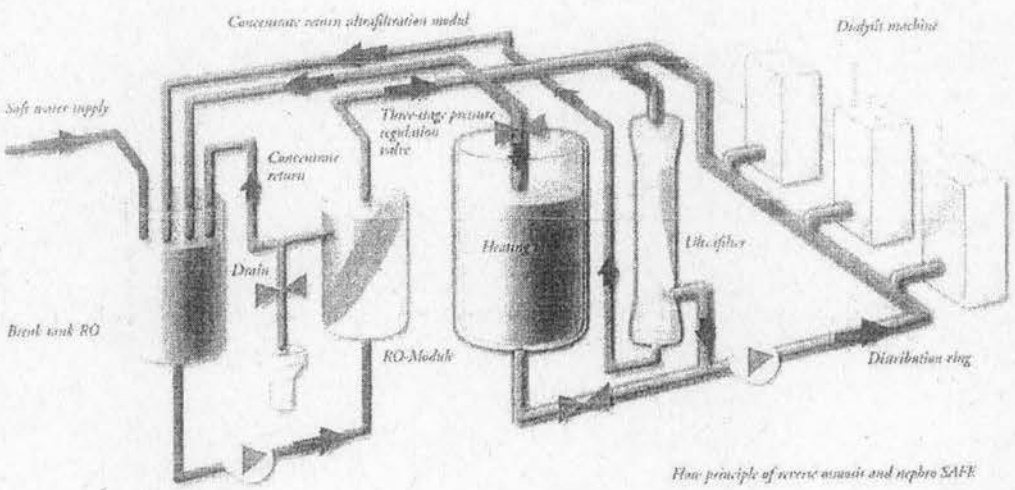


Heat-disinfection using the nephro SAFE disinfects the entire permeate distribution ring, the dialysis machine connection hose and the inlet part of the dialysis machine. The result is a closed hygienic chain with a significant improvement of the microbiology and the prevention of a biofilm. The heat-disinfection takes place fully automatically during the dialysis-free time.

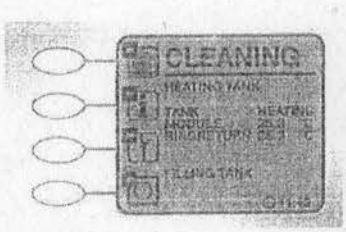
The use of the hot permeate through the dialysis machine ensures savings of both power and water.



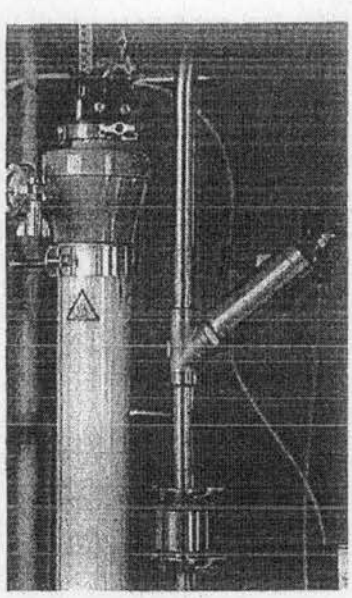
THE SYMBIOSIS OF ULTRAFILTRATION AND HEAT-DISINFECTION FOR GUARANTEED ULTRAPURE PERMEATE THROUGH INTO THE DIALYSIS MACHINE



Flow principle of reverse osmosis and nephro SAFE



Microprocessor controlled



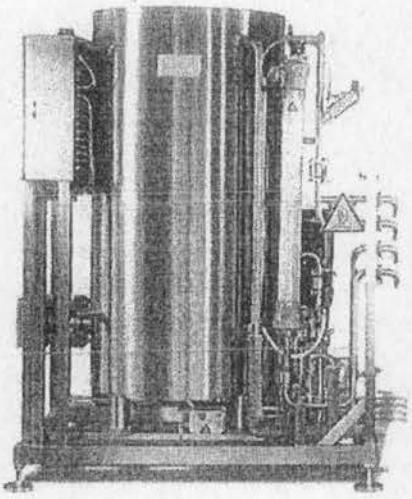
Ultrafilter (patented) and three-stage pressure regulation valve

nephro SAFE
SPECIAL TECHNICAL FEATURES

- Patented process for ultrafiltration of the permeate
- High durability life of the ultrafilter through crossflow operation
- Water savings through concentrate return to the reverse osmosis module
- Three-stage pressure regulation valve for fully automatic filling of the tank in case of excess permeate
- 14 kW connection line for standard building fuse
- Microprocessor controlled
- Interfaces for printer, data terminal and modem

nephro SAFE
FUNCTIONAL MATERIALS
AND OPERATION

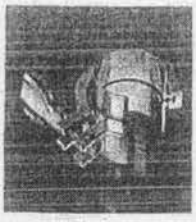
- The functional, hygienic design and the use of high quality stainless steel ensures the high reliability and long life of the nephro SAFE.
- High efficiency thermal insulation and the double-walled structure of the tank ensures low power consumption.
- The frequency-controlled pressure pump ensures optimum pressure and flow conditions in the distribution ring.



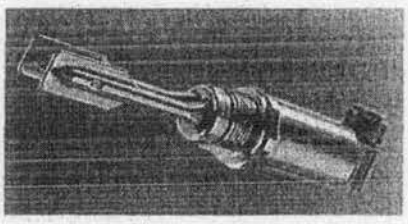
nephro SAFE with integrated ultrafiltration and heating module

nephro SAFE
OPTIMUM HYGIENE

- The nephro SAFE is manufactured completely from stainless steel which is surface-treated to maintain optimal hygiene to all fluid ways. A completely dead zone-free design is ensured through hygienic clamp connectors.
- Dead zone-free level measurement in the tank is performed through state-of-the-art liquifants sensors.
- The temperature in the tank is maintained constantly at > 85 °C. In this way, microbiological contamination of the tank content is eliminated.
- Integrated dead zone-free sample-taking points permit convenient and safe microbiological analysis of the permeate.



Clamp connector made of nitinol steel



Hygienic level measurement using liquifants sensors

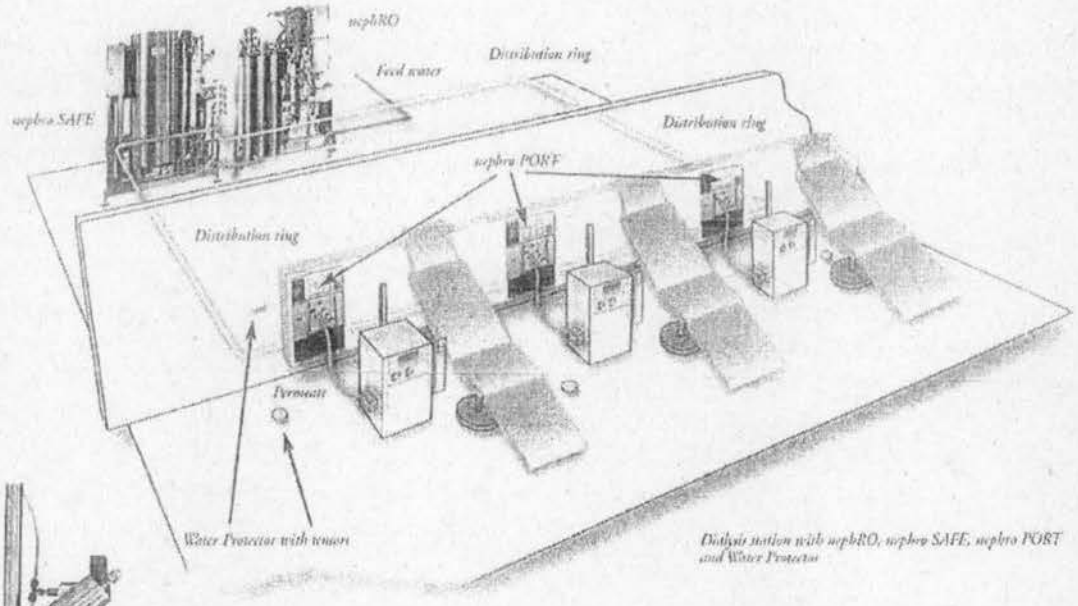
nephro SAFE
MICROBIOLOGICAL STUDY

"No microorganisms or only a minimum number at the most were detected. Because of the regular thermal disinfection of the distribution ring system through the nephro SAFE system, permeate with very good microbiological quality was made available at all sampling points tested."

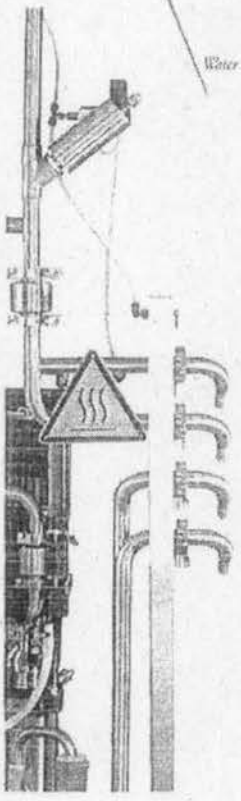
Dr. Porsch, Head of the Hygienic Department, Dr. Limbach Association of Laboratories

15 February 2001

TECHNICAL DATA



Dialysis station with nephRO, nephro SAFE, nephro PORT and Water Protector



Model	*Item*	*Specification*
nephro SAFE		
Components	*Dimensions (W x H x D)*	*790 x 1950 x 1450*
	Weight (empty/full)	*approx. 350/850 kg*
Heating element	*Power*	*12 kW*
Tank (= hot tank)	*Contents*	*480 litre*
Pump	*Power consumption*	*2 kW*
Temperature during heat-disinfection		*> 80 °C*
Electrical connections	*Mains plug*	*CEE plug, 5-pin, 32 A*
	Mains voltage	*400 V, 3 phase, 50 Hz*
	Protection	*25 A safety fuse, K characteristics*
Electrical safety	*Type of protection against electrical shock*	*Protection Class I*
	Overvoltage Category II	
	Protection against the penetration of liquids	*Splash Water Protection (IPX 4)*

Manufactured in MPG (Medizinproduktegesetz) *Technical changes reserved*

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ELGA PROCESS WATER

New South Glasgow Hospitals (NSGH) Project: Technical Submission

For: Children's Renal Purified Water System

To: Mercury Engineering

Date: 15th November 2012

Client reference documents:	"SGH Renal Central Water Plant Specification Version 3.0" (12th February 2010) ZBP Document: ZBP-xx-xx-SP-500-104, Water Treatment Equipment Rev B, February 2012 Revised table of user demand points issued by ZBP, 13th April 2011 Correspondence from ZBP to ELGA on 13 April 2011
Client Drawings:	ZBP XX XX XX 509 002 Rev 01 ZBP ZG 01 PL 500 017 Rev B ZBP ZB 03 PL 500 032 Rev A ZBP ZA 03 PL 500 031 Rev A
ELGA Drawings:	105285038-5001 Issue 2 105285038-5002 Issue 2 105285038-5003 Issue 2

General

The following Technical Submission describes the Children's renal purified water system being supplied by ELGA Process Water for the NSGH project.

Incoming hot and cold water to be blended to 10 deg C to overcome the 4 degree C winter temperature

Treated water standard taken as being "UK Renal Association 4th Edition,2007 Clinical Practice Guidelines for Haemodialysis" and incorporating changes included within the 2009 update. Also ISO Working Document: "Guidance on the Preparation and Quality Management of Fluids for Haemodialysis and Related Theraples". We confirm that the renal purified water system provided by ELGA will consistently meet both standards.

Areas Supplied

This RO system supplies:

- **Adult Critical Care Area:** 5 points of use. No indication of how many to be in simultaneous use. ELGA experience in this area would suggest 3 to 4. Total simultaneous demand, assuming 1.5 litres per minute at point of use will be 450 litres per hour. Ringmain length estimated at 280 metres.
- **National Children's Hospital (NCH):** 15 off dialysis stations in total. No indication of number in simultaneous use, therefore all 15 off are assumed to be in simultaneous use. These are to be spread over 2 ring mains with an even distribution of points of use. Total simultaneous demand, assuming 1.5

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Web site: www.elgaprocesswater.com

litres per minute at point of use will be 1,350 litres per hour. Ring main lengths estimated from drawings above as 2 off 200 metres each, 400 metres in total.

System Details

Item No.	Description	No. Off
1	Raw water thermostatic blending valve to allow a consistent 10 degree C	1
2	Raw water break tank. Capacity of 1m3	1
3	Raw water boost pump set in duty & standby configuration with auto changeover panel. To operate 12 hours on and off each. Standby pump to become duty pump on a pump trip signal. Complete with pressure sustaining set. Model: Grundfos CRNE 5-10 Motor rating 1.5kW Please refer to Grundfos catalogue, pages 8 and 13	1
4	**Duplex Water Softener / Scavenger:** Ionsoft 200 duplex water meter operated water softener / organic scavenger complete with glass reinforced plastic vessel, regeneration control valve, ion exchange material, soft water test kit, bypass shut off valve, solenoid valve, combined salt storage and measuring tank. Technical Performance: - Flow rate of 6m3 per hour per stream to accommodate the service flow and carbon filter backwash. Treated water hardness < 5 mg/l as $CaCO_3$ Inclusion of by-pass pipework for emergency situations. Model: ELGA Ionsoft 200 – See attached data sheet	1
5	**Activated Carbon Filters:** PCF 240. Activated carbon filter in duty / duty arrangement. Complete with glass reinforced plastic vessel, and activated carbon filtration media.By passes to be fitted around each carbon filter for emergency situation. Regeneration by timeclock with manual over ride. Model: ELGA PCF 240 – See attached data sheet	3
6	**Central Control Panel:** Central control panel to ELGA Process Water standard. The panel will distribute power to all supplied items with 'supply on' indication and provide auto-changeover for the pumps.	1
	Process Plant to Supply Children's Hospital and Critical Care Area	

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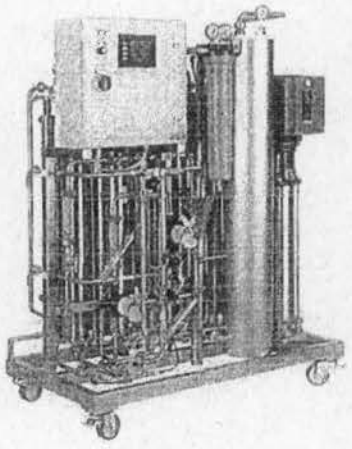
1	**ELGA Modula 5 Twin Pass "TP" Reverse Osmosis Plant:** 2 off Twin Pass reverse Osmosis system of all stainless steel construction, complete with on board stainless steel break tank and low noise submersible pump. membranes & housings, control system with data storage and status output, control valves and pipework. Each system is pre-piped, pre-wired, and pressure tested before despatch. Technical Performance: - Design Flow 1,800 litres/hr @ 10°C per plant One plant to serve the Adult ICU ring main (5 points of use) and one Children's ring main with 7 off points of use One plant to serve the 2nd Children's ring main with 8 off points of use. Each twin pass plant is capable of maintaining full flow and quality on a single bank of membranes, in the event of an emergency situation. See attached data sheet  Modula Twin Pass RO How is 100% rectification achieved.	2

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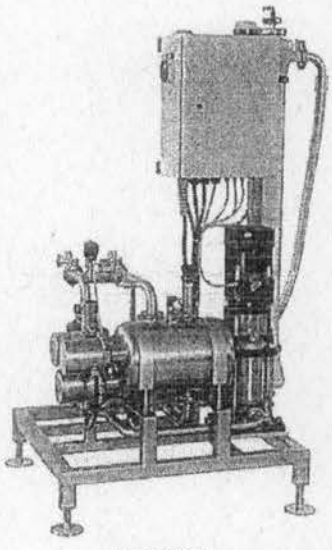
VEOLIA WATER

2	**Heat Sanitisation Unit – ELGA HDS: 2 off** ELGA HDS skid mounted heat sanitisation and on board Ultrafiltration system. With on board tank of 15 litres capacity. Instantaneous electrical heating to 90 degrees C for heat sanitisation. Plant shall be of all stainless steel construction, with insulated tank and plc control. Additional facility to heat sanitise the dialysis machines and interconnecting hoses for additional security. Heat sanitisable 0.05 micron ultrafilter mounted on the HDS skid will ensure compliance with treated water standards at all times. See attached data sheet  ELGA HDS	2

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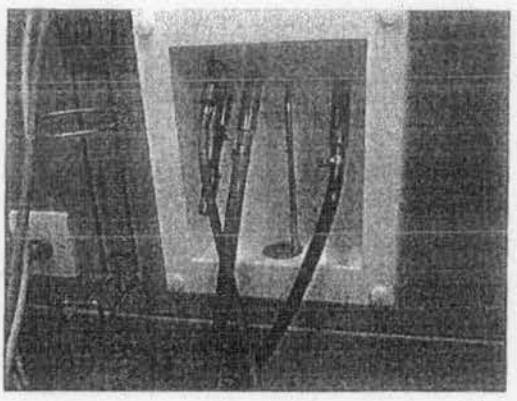
3	**Media Panels for points of use:** 20 off media panels to ELGA Process Water standard with 1 off permeate connector and 2 off drain connectors per panel. To be flush mounted within proprietary paneling or trunking supplied by others. Capable of modification for central concentrate connections.  ELGA Media Panel	20
4	**Mimic Remote Panel:** To advise system status to technicians' area. Information on panel includes: "RO Run" indication "RO Standby" indication "Heat Sanitisation" indication "Dialysis" indication (meaning that system is available for dialysis) "Common alarm" indication.	1
5	**Nurse Station Panel:** To advise the system status at the nurses area. Information on panel includes: "RO Run" indication "RO Standby" indication "Heat Sanitisation" indication "Dialysis" indication (meaning that system is available for dialysis) "Common alarm" indication.	1
6	**Treated water distribution ring mains:** 3 off distribution ring mains to be installed in Thick Walled Sanipex. This will give 3 continuous bead and crevice free ring mains as follows: *Critical Care Area: 1 off ring main* *Childrens Hospital: 2 off ring mains* 20 points of use in total.	3

outlets split between rings to achieve resilience

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	Installation, Commissioning & Training	
1	**Mechanical installation:** We have included for installation of ABS interconnecting pipework and fittings on the make up plant. Installation will commence at the raw water boost pump set and terminate at the outlet of the Nephro safe to connect with the ring main pipework and media panels. We have made the following assumptions: Adequate drainage, electrical supply and ventilation should be provided to the plant room by others. Clear Access to and from the plant area. Equipment to be installed against a solid wall, without the need for special support bracketry such as Unistrut. An adequate valved raw water supply to be provided to within 2 metres of the System, by others. An adequate floor level drain is required within 3m of the plant position.	1
2	**Electrical installation:** Electrical connection of the equipment to a local isolated power supply within 2 metres of our equipment.	1
3	**Commissioning:** Following installation, the local ELGA engineer will commission the system during normal working hours (Mon-Fri 9-5-30).	
4	**Recommendations** We recommend that the plant room area floor is tanked to a height of 300mm with a threshold gully. A threshold bund can be used but should not reduce the usable floor area. We recommend that surface finishes are water resistant and repellent. We recommend that forced air ventilation is provided to the plant room to minimise condensation or high levels of humidity.	1
5	**Operator Training:** We have allowed for 2 days complete day of basic user training for key operators to be included. Additional training can be carried out locally or at our manufacturing facility in Germany.	1
6	**Delivery:** Packing and delivery to site, including offloading and positioning.	1
7	**Documentation** Documentation to be provided electronically within the "Zutec" system Operating and maintenance manual. Block Layout. Flow diagram	2

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ELGA PROCESS WATER

Additional Information / Clarifications

Clarifications / Additional Information Relating to:
Specification for the supply and installation of central water treatment plant(s) to supply Renal facilities at the Southern General Hospital, Volume 2/1 Appendix M&E 6 Renal Water Version 2 Update from Renal Physics User Group Meeting on 21st January 2010

As stated in previous correspondence, ELGA Process water are providing systems that address the requirements of this specification at NSGH. Please find additional information and clarifications relating to this below.

Section 1.0 (Page 3): We note the requirement for water metering and energy metering in this section. For clarity, we have not included for any incoming water and incoming energy metering in our scope of supply. In our experience, (if required) this is normally incorporated in the utility supply to our systems.

Section 2.1 (Page 4): Our systems are designed to operate in the manner described. However, some time will be required for pre-planned maintenance on the systems. In addition, periodic backwash of carbon filters and regeneration of softener / scavengers will be required. This can be programmed to occur at period of low water demand and can be sequenced so that pre-treated water can be continuously fed to the RO units.

Section 2.10 (Page 4): We note the requirement to maintain water temperatures at "not less than 20 deg". The purpose of this requirement is to ensure that sufficient purified water is produced by the Renal RO systems – irrespective of the incoming feed water temperature. We have designed our system to maintain an incoming feed water temperature of 10 deg C and have sized the Renal RO systems to provide sufficient purified water to meet the demand criteria for NSGH described in this document and in the other documents provided to ELGA pre-contract. We have adopted this approach because:

- Raising the incoming feed water from 4 deg C to 20 deg C in winter, will require significantly greater amounts of energy compared to raising incoming feed water from 4 deg C to 10 deg C. As a result, the ELGA systems will use considerably less energy and will therefore have lower running costs to NHSGG&C – compared to systems maintaining a water temperature of 20 deg C.
- Bacteria will develop and multiply at a faster rate in 20 deg C water – compared to 10 deg C water. As bacteria control is a key requirement of the renal purified water systems, we have "designed out" an element of bacterial challenge by opting for a 10 deg C feed.

Paragraph 4 (Page 5): To address this point, we have included for 3 off alarms on feed water tanks in the renal purified water systems: High level, intermediate level and low level.

Paragraph 5 (Page 5): We note the requirement for a "water supply stop valve" on the media supply panel. We take this to mean the self-sealing valve arrangement in the Walther couplings provided at each panel. In a few other renal purified water systems in the UK (not supplied by ELGA), we understand that an additional valve has been installed before the Walther couplings. In our view, this provides a location for bacterial development and is therefore detrimental to the production of consistent, high quality purified water.

Paragraph 6 (Page 5): We note the requirements for gas, nurse call, power, TV /radio on the media panel. The media panels being supplied by ELGA do not have these items included. In all recently installed systems (last 8 years), these services have been provided in the bed head arrangement adjacent to the renal purified water media panel.

Section 3.1.1 (Page 6): For clarity, our technologists' panel and nurses' panel have a "general" alarm light. This will activate for any of the alarm conditions on the renal purified water plant. The purpose of this is to ensure that

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ALL alarms on the renal purified water plant are investigated by appropriate personnel going to the plant affected and taking action on the alarm. In our experience, if **specific** alarm conditions can be identified remotely, there can be a tendency to ignore what may be subjectively deemed "non critical alarms". This, in turn, can lead to more serious problems developing on the plant (and an increased risk of plant downtime) – if unattended. We meet the requirements of this section as high level, low level and intermediate level alarms will active the general alarm light on both the nurses' and technologists' panels.

Section 3.1.3 (Page 6): We note the requirement for a softener system in this section. In our design, we have included for combined softener / organic scavenger units. This is to address the particular feed water requirements in the Glasgow area (lower levels of hardness and higher levels of dissolved organic material – compared to other parts of the UK). The combined softener / scavengers we are providing will therefore give greater protection to the RO units – compared to softening alone.

Section 3.1.6 (Page 6): We note the requirement for 6 off outlets in the Renal Technology Laboratory. We have included for 8 off outlets – per the Renal Water Requirements document (PM! 057 dated 10/3/11). For clarity, we are supplying these outlets with renal purified water – per design drawings. → split between rings.

Section 3.2.5 (Page 7): The ELGA system meets the requirements of this section in the following manner. The ELGA system design provides automated heat disinfection of the 0.05µm ultrafilter and distribution ring. Our system also provides "integrated heat" disinfection of the haemodialysis machines. In the renal purified water systems we provide in the UK, we include a 0.05µm heat sanitisable ultrafilter – rather than provide heat sanitisable RO membranes. Other renal purified water system suppliers who provide heat sanitisable RO systems tend not to use a heat sanitisable ultrafilter. Our design rationale is as follows:
- Heat sanitisable RO membranes are currently 2 x the cost of conventional RO membranes. This significantly increases the ongoing operating costs associated with systems containing these membranes.
- Repeated heat sanitisation tends to reduce the operating life of RO membranes, thus further increasing operating costs.

As stated in previous correspondence, we confirm that our system as designed will consistently meet the water quality requirements of the applicable national and international standards at NSGH.
We also note that Addendum B of this specification has a more detailed description of the required heat sanitisation of the purified water system (compared to section 3.2.5). No mention is made of heat sanitisation of RO membranes in Addendum B. We fully comply with the requirements of Addendum B.

Section 3.2.6 (Page 7): See notes on Section 3.2.5 above.

Section 3.2.7 (Page 7): We note the requirement for leak detection. In response we have included 1 off leak detector for each purified water system. For this leak detector to operate effectively, each system should be located in a bunded area (see also "Recommendations" in "System Details" above). If the leak detector detects water in the bund, it will shut down permeate production as well as providing an alarm signal that will trigger the common alarm for each system.

Section 3.2.8 (Page 7): We note the requirement of this section. A number of signals are available for remote monitoring of the RO systems as standard – and are included in our scope of supply. These include: Low raw water tank alarm, intermediate raw water tank alarm (level adjustable), high raw water level alarm, raw water pump power on and trip alarm, power to softener/scavenger indication, softener/scavenger in backwash indication, power to carbon filters, carbon filter in backwash, RO unit power on and trip alarm, heat sanitisation on and trip alarm, concentrate tank high and low level alarm, cecon unit power on and trip alarm.

Section 3.2.10 (Page 7): We exceed the requirements of this section as we provide a heat disinfectable / sanitisable 0.05µm ultrafilter.

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Section 3.3 (Page 8): We note the requirements for 4 off Earth Potential Equalisation points on the media panel. The media panels being supplied by ELGA do not have these items included. In all recently installed systems (last 8 years), any equalisation points have been provided in the bed head arrangement adjacent to the renal purified water media panel (see also comment for Paragraph 6 (Page 5) above). - BMCE to confirm provision.

Section 3.3.2 (Page 8): We note the requirements in this section. There is, however, no definition here as to what constitutes a "lengthy" distribution ring. For clarity, we have included for 2 off sample points for each distribution ring.

Section 3.3.4 (Page 8): We note the requirements of this section. We have included for each media panel to be uniquely identified with a self adhesive label (black lettering on clear flexible plastic self-adhesive strips). The identification nomenclature will be in line with customer requirements.

Section 3.3.5 (Page 8): See comments for Paragraph 5 (Page 5) above.

Section 3.3.6 (Page 8): See comments for Section 3.3 (Page 8) above.

Section 3.4.1 (Page 8): See comments for Section 3.2.5 (Page 7) above.

Section 3.4.6 (Page 8): We note the requirements for chemical disinfection. For clarity, our chemical disinfection cycle is fully automated – but requires manual initiation at the machine so as to prevent any possibility of chemical sanitization occurring whilst the system is operational.

Section 4.3 and 4.4 (Page 9): We note the requirements of this section. Our scope includes for horizontal runs of pipe between each media panel in each ward area. Pipe runs would be at high level between ward areas. Pipe would drop to media panel level in each ward, then horizontally connect to each media panel in that ward before returning to high level - prior to moving on to the next ward area.
We have not designed our system pipework to drop from high level then return to high level at each media point. This adds numerous bends to the system, significantly lengthens the overall pipe runs and is contra to this section -and Section 3.3 (Page 8).

Section 4.5 (Page 9): To address this section, we have included for the completion of 1 off water quality test on each of the 2 off renal RO systems (taken at the hygienic sample valve on the outlet from the RO system) to demonstrate compliance with the applicable water quality standards in the project specification documents provided to date. These samples will be taken immediately after the successful completion of commissioning. In addition, we will also demonstrate that each RO system is providing RO water flow and pressure(at the outlet from each RO system) in accordance with the project specification documents provided to date. Finally, we will demonstrate that the correct flow of RO water is provided at each point of use (NB. Each point of use tested separately and in isolation).

Section 4.7 (Page 9): We note the requirements of this section. This looks to be a different document system from the Zutec system we are required to work to. We are assuming that Zutec is the operating system for this project.

Section 4.8 (Page 9): In the absence of information on the "format and system architecture for the Building Services systems", we have based our scope of supply on ELGA standard format O&M manuals which would be provided at the end of commissioning.

"All Areas" Section (Page 13): We note the requirement for the interruption of heat sanitisation via a keyswitch. Our system allows for manual interruption of heat sanitisation via a non-keyswitch over-ride button. Our rationale is that it is important to be able to interrupt a heat sanitisation cycle easily so as to allow the speedy resumption of

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dialysis. The use of keyswitches requires the location of the key and key holder to interrupt the heat sanitisation – thus causing potential delays in the resumption of dialysis.

Clarifications / Additional Information Relating to: New South Glasgow Hospitals Specification Water Treatment Equipment Ref ZBP-XX-XX-SP-500-104 Construction T3, Rev B, February 2012

As stated in previous correspondence, ELGA Process water are providing systems that address the requirements of this specification at NSGH. Please find additional information and clarifications relating to this below.

Plant Room 32 (Page 8): We note the requirement for a water meter in this section. For clarity, we have not included for any incoming water metering in our scope of supply. In our experience, (if required) this is normally incorporated in the utility supply to our systems. BMcE to confirm provision.

Plant Room 21 (Page 9): We note the requirement for a water meter in this section. For clarity, we have not included for any incoming water metering in our scope of supply. In our experience, (if required) this is normally incorporated in the utility supply to our systems. BMcE to confirm provision

370 Reverse Osmosis Units (Page 11, 12 and 13): We note that the description of RO units in this section is based on a manufacturer's specification – and that this manufacturer is not ELGA. As a result, some of the details on the ELGA RO units may vary subtly from this specification. See description of RO units in System Details above.
We can confirm that the ELGA RO units meet the design intent of this specification – and all other specifications provided relating to the renal purified water systems. A few of these differences are noted below:
RO Pressure vessels are not GRP on our system (Page 11). ELGA pressure vessels are stainless steel.
There is no "hotwell" on our RO systems (Page 12).
There is no bypass around our RO systems (Page 12). We would not install a bypass as described as this would compromise the bacterial integrity of the system.
The inlet ball valve specified (Page 12) is an electrically operated motorised valve on the ELGA system.
The information requirements for the mimic panels are different from that noted (Page 13). See System Details above for what is indicated on our panels. We believe that the information on our panels provides the nurses and technicians a more complete picture of the operational status of the purified water systems.

Completion (Page 15): All points in this section have been defined and agreed between ELGA and Mercury Engineering as part of our Terms and Conditions Review process. See document: New South Glasgow Hospitals Project. Terms and Conditions Agreement for ELGA Process Water Sub-Contract Order (Revision 1: 13/09/12)

910 Documentation (Page 15): All points in this section have been defined and agreed between ELGA and Mercury Engineering as part of our Terms and Conditions Review process. See document: New South Glasgow Hospitals Project. Terms and Conditions Agreement for ELGA Process Water Sub-Contract Order (Revision 1: 13/09/12)

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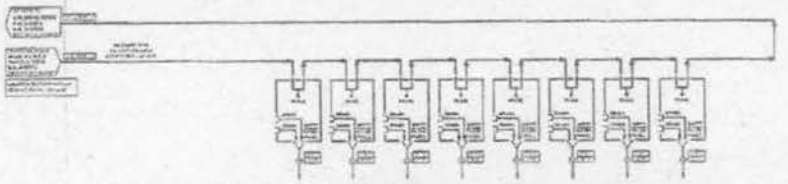
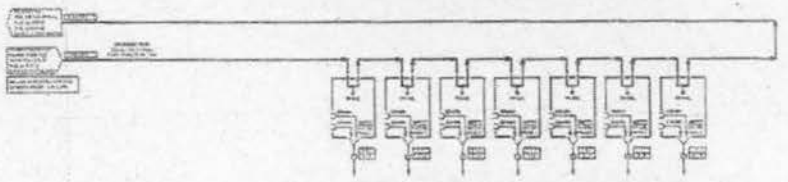
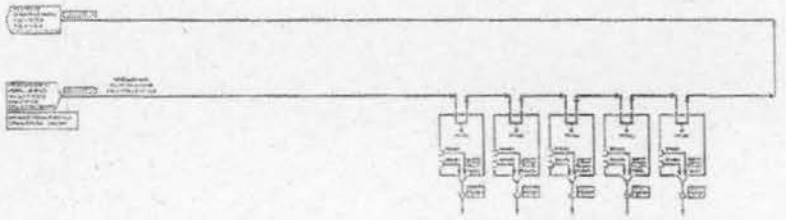


2nd FLOOR CHILDRENS RENAL RINGMAIN
TOTAL MAXIMUM SIMULTANEOUS DEMAND
8 - OFF MEDIA PANELS DURING DAY SERVICE
0 - OFF MEDIA PANELS DURING NIGHT SERVICE

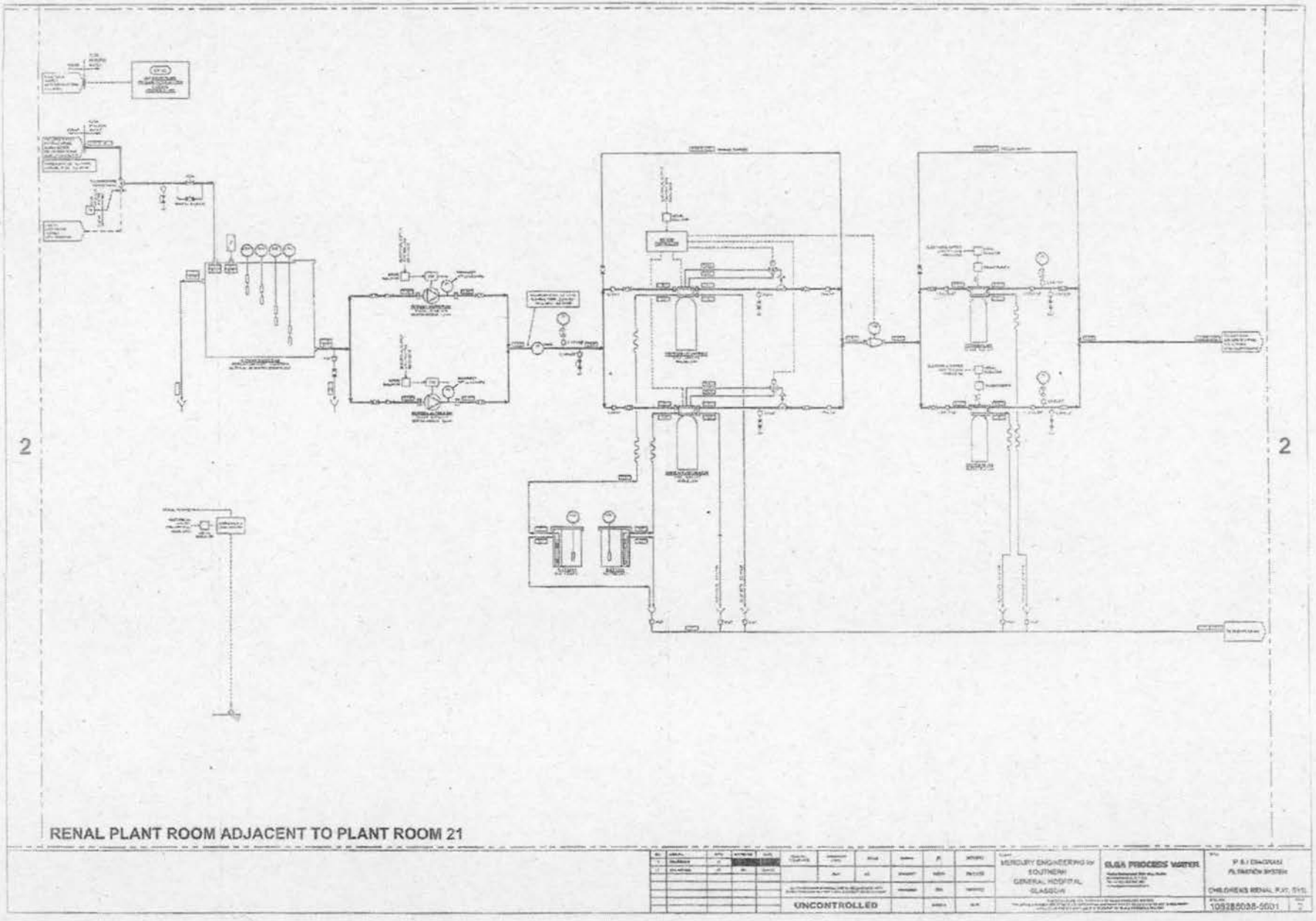


2nd FLOOR CHILDRENS RENAL RINGMAIN
TOTAL MAXIMUM SIMULTANEOUS DEMAND
7 - OFF MEDIA PANELS DURING DAY SERVICE
0 - OFF MEDIA PANELS DURING NIGHT SERVICE



1st FLOOR ADULT ICU RINGMAIN
TOTAL MAXIMUM SIMULTANEOUS DEMAND
4 - OFF MEDIA PANELS DURING DAY SERVICE
0 - OFF MEDIA PANELS DURING NIGHT SERVICE

UNCONTROLLED


2
2
RENAL PLANT ROOM ADJACENT TO PLANT ROOM 21
UNCONTROLLED
MERCURY ENGINEERING for SOUTHERN GENERAL HOSPITAL GLASGOW
ELGA PROCESS WATER
CHILDRENS RENAL P.W. SYS.
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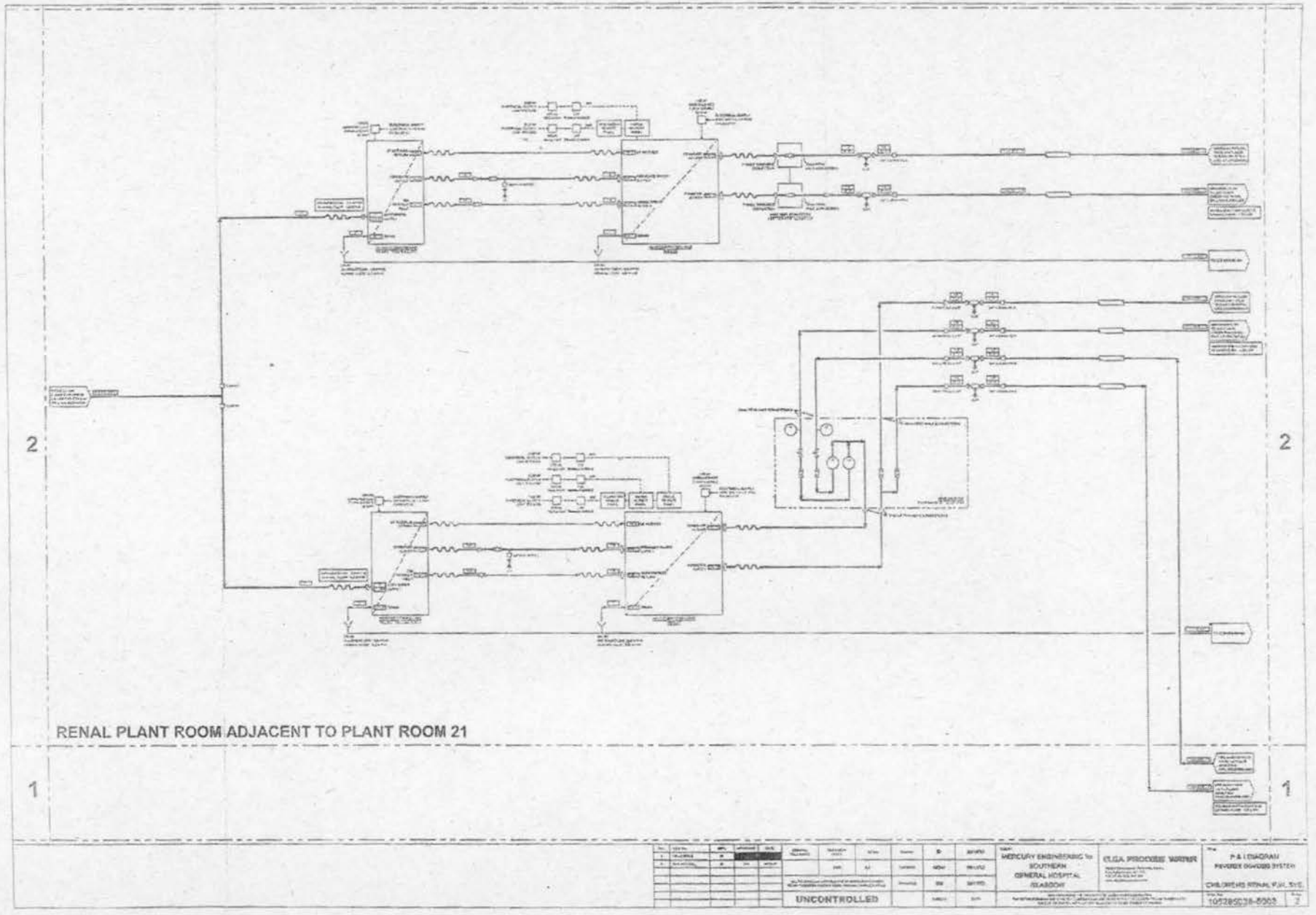
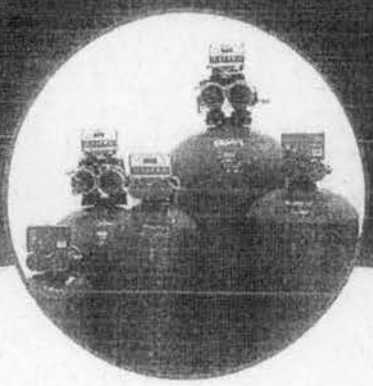

2
2
RENAL PLANT ROOM ADJACENT TO PLANT ROOM 21
1
1
UNCONTROLLED

ELGA
PROCESS WATER

IonSoft I

Water Softeners

Produce up to 17.5 m^3/hr of softened water



The IonSoft I range of water softeners produce from 0.4 to 17.5 m^3/hr of softened water for a variety of process and general manufacturing applications. The flexible design of the IonSoft softeners means that they can be configured to meet individual site requirements, thus providing a cost efficient, reliable and easy to use solution to the problems associated with hard water.

- Choice of systems; Simplex, Twin or Duplex units, tailored to customer requirements
- Choice of time clock or water meter operation
- Simple to program and operate; softener regeneration is automatically controlled and initiated
- The advanced control systems ensure that optimum performance is achieved from the softeners, thus minimising waste water
- Uniform bead size resin, gives peak regeneration efficiency and low salt usage
- The control head operates on low voltage (12/24V) to ensure safe instillation, operation and maintenance
- Proven design and materials of construction ensures operational reliability
- Optional automatic valve prevents hard water to service during regeneration
- Nationwide network of after sales service and support ensures that your water systems are maintained in optimal operational condition efficiency thus reducing operating costs.

VEOLIA
WATER
Solutions & Technologies

IonSoft I

System Performance

IonSoft I MODEL			80	135	200	200+	250	350	500
Maximum Treated Water Flow	- Simplex	m^3/hr	3.5	5.0	5.5	10.0	12.5	17.5	17.5
	- Duplex Parallel	m^3/hr	7.0	10.0	11.0	20.0	25.0	35.0	35.0
Minimum Treated Water Flow		m^3/hr	0.4	0.6	1.0	0.8	1.2	2.0	2.0
Regeneration Time (maximum)		mins	77	81	97	79	69	73	97
Maximum Flow to Drain		m^3/hr	0.96	1.44	1.92	3.00	3.80	5.30	7.50
Effluent Volume		m^3	0.58	1.00	1.49	1.40	2.00	2.50	3.60
Pressure Loss at Maximum Flow		bar	0.5	0.9	1.4	1.1	1.3	1.7	1.6
Salt Usage Per Regeneration		kg	9.6	13.5	20.0	20.0	25.0	35.0	50.0

Volume of Softened Water Per Regeneration

IonSoft I MODEL			80	135	200	200+	250	350	500
Raw Water - Soft	100mg/l	m^3	40	68	100	100	125	175	250
Raw Water - Average	200mg/l	m^3	40	34	50	50	63	88	125
Raw Water - Hard	400mg/l	m^3	10	17	25	25	31	44	63

System Dimensions, Weights & Connections

IonSoft I MODEL			80	135	200	200+	250	350	500
System Height		mm	1575	1875	1820	2132	1980	2225	2385
System Width	- Simplex	mm	1070	1150	1500	1500	1600	1750	2000
	- Duplex	mm	1810	1890	2000	2000	2200	2400	2800
System Depth		mm	640	640	875	875	875	1100	1100
Recommended Headroom		mm	900	900	900	900	900	900	900
Approx. Shipping Weight	- Simplex	kg	100	150	250	300	450	550	690
	- Duplex	kg	180	275	450	540	820	1000	1240
Approx. Service weight	- Simplex	kg	210	320	600	600	900	1100	1500
	- Duplex	kg	360	550	1080	1080	1640	2000	2480
Inlet		inches	1	1	1	1 1/2	2	2	2
Outlet		inches	1	1	1	1 1/2	2	2	2
Drain		inches	1 1/4	3/4	3/4	1 1/2	1 1/2	1 1/2	1 1/2
Salt Tank Overflow		inches	1/2	1/2	1/4	1/2	1/2	1/2	1/2

Treated Water Quality

Ion I Soft	Hardness
	<5mg/l as $CaCO_3$

Material Specifications

Pressure Vessels	Composite, HDPE & GRP
Resin	Uniform bead size
Control Valve	Glass reinforced ABS
Salt Tank	Polythylene

Feed Water Supply Quality
Water free from iron, suspended solids and <1pm, free Chlorine.
Supply Pressure: min. 2 bar max. 6 bar
Temperature: min. 5°C max. 30°C

Electrical Supply
All models 240V single phase, 50Hz.

For higher flow rate applications consult ELGA Process Water.

ELGA PROCESS WATER

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VEOLIA WATER

Eliminator™
Filtration Systems
Eliminator Filters
Produces up to 35 m³/hr of filtered water

TECHNICAL DATA

Plant Type	Filtered water flow range m³/hr*	Cleaning flow at 2.0 bar m³/hr	Cleaning period mins	Maximum working pressure bar	Minimum working pressure bar	Inlet/Outlet/Drain Connections BSP		
PSF Sand Filters								
PSF 120	0.37 - 2.2	2.7	24	8.5	1.7	1"	1"	1"
PSF 160	0.65 - 3.9	4.5	24	8.5	1.7	1"	1"	1"
PSF 240	1.46 - 8.8	11.2	24	8.5	4.0	1½"	1½"	1½"
PSF 300	3.25 - 20	20.2	24	7.0	2.6	2"	2"	2"
PSF 400	5.75 - 36	36.2	24	7.0	2.0	2"	2"	2"
PCF Carbon Filters								
PCF 120	1.10 - 2.19	1.8	24	8.5	1.7	1"	1"	1"
PCF 160	1.95 - 3.9	2.7	24	8.5	1.7	1"	1"	1"
PCF 210	3.35 - 6.69	3.4	24	8.5	1.7	1½"	1½"	1"
PCF 240	4.38 - 8.76	4.5	24	8.5	1.7	1½"	1½"	1"
PCF300	10 – 20	12.3	36	7.0	1.7	2"	2"	2"
PCF 400	17.5 – 35	20.16	36	7.0	2.5	2"	2"	2"
PGF Iron Removal Filters								
PGF 160	0.78 - 1.56	3.36	60	8.5	1.7	1"	1"	1"
PGF 210	1.34 - 2.68	5.60	60	8.5	1.7	1"	1"	1"
PGF 240	1.75 - 3.50	7.84	60	8.5	2.5	1½"	1½"	1"
PMD Iron Removal Filters								
PMD 300	3.5 - 7.0	15.7	24	7.0	2.0	2"	2"	2"
PMD 400	6.0 - 12.0	29.0	24	7.0	2.5	2"	2"	2"

* Flow rates stated are dependent on the influent feed water quality.

* Maximum working temperature at maximum pressure is 43°C

OVERALL DIMENSIONS

Model		120	160	210	240	300	400
Height	mm	1402	1857	1797	2034	2420	2827
Depth	mm	409	478	621	691	927	1226
Headroom (recommended)	mm	600	600	600	600	600	600
Approx. Service Weight	Kg	176	425	720	1150	2255	4370

Note: add extra 600 mm to PGF 160-240 installations to allow for potassium permanganate regeneration tank.

Client to Provide:

- Power supply 240V, 50Hz
- Drainage for backwash flow
- Raw, filtered water and drain pipework to and from unit
- Potassium permanganate for PGF filters
- Manual isolating valves

For other flowrate applications consult Vivendi Water Systems

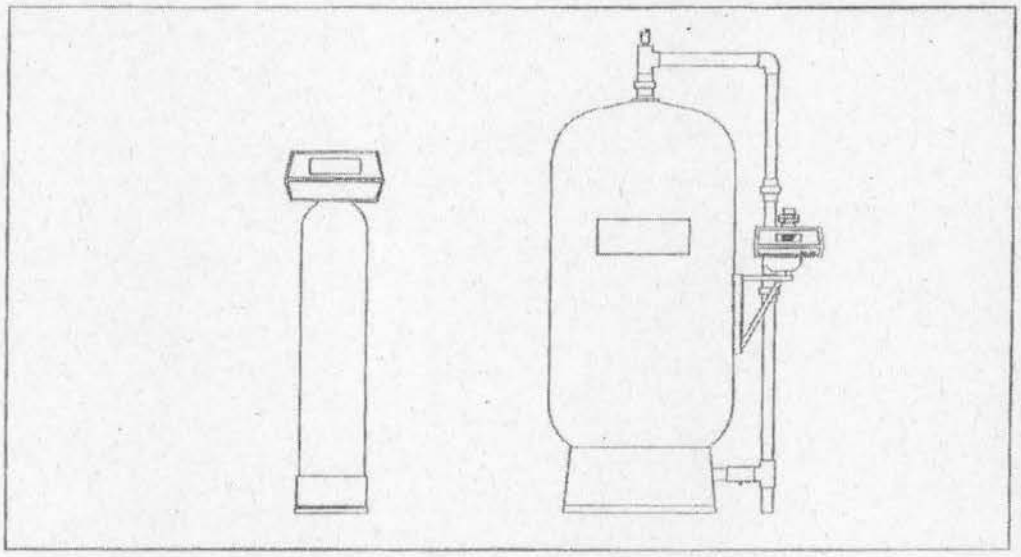
VIVENDI water

Eliminator®

Filtration Systems

Eliminator Filters

Produces up to 35 m³/hr of filtered water



The Vivendi Water Systems range of Eliminator filtration systems is the result of many years experience in the development of water treatment plant. The filters remove suspended matter, turbidity, iron, colour and odour from feedwater which if not removed could adversely affect the performance of downstream equipment and processes, leading to costly downtime and production losses. Automatic operation allows the filters to be used in a variety of industrial applications. The systems incorporate a robust, corrosion resistant design, with an automatic multiport control valve system and a glass fibre reinforced pressure vessel.

Sand Filters - For applications where suspended matter and turbidity are present.

Carbon Filters - For applications where chlorine, taint, odour or soluble organics are present.

Iron Removal Filters - For applications where dissolved and undissolved iron and manganese are present.

- Packaged plant
- Fully automatic
- Cleaning initiated by time clock
- Simple robust construction
- Designed for ease of service and maintenance
- High velocity backwash
- Low installation time and costs
- Low operator involvement
- Allows cleaning to occur during periods of no or low demand
- High reliability
- Low service and maintenance costs
- High filtrate quality and extended service runs

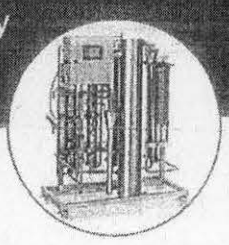
VIVENDI WATER SYSTEMS

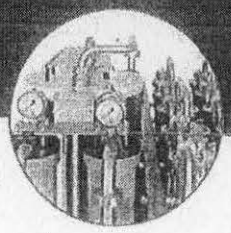
VIVENDI water

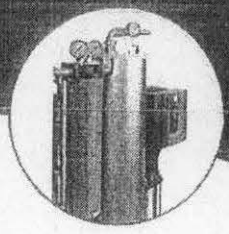
ELGA PROCESS WATER

Modula™

Reverse Osmosis Systems Producing 350 – 3500 litres/hr of High Purity Water for Dialysis







The DWA Modula™ range of reverse osmosis units are designed specifically for the modern Haemodialysis unit.

The Modula™ concept incorporates proven and reliable products into a flexible design package.

ELGA Process Water is the sole UK distributor for DWA's range of dialysis water treatment systems.

Since 1984, DWA has specialised in innovative solutions for the supply of high purity water to dialysis centres worldwide.

Our expertise in water treatment provides solutions from pre-treatment stages, through reverse osmosis, ultrafiltration and hot cleaning systems, directly to the supply connection.

Features & Benefits

- Submersible pumps with low operating noise
- Water saving technology resulting in lower operating costs
- Compact modular design giving an optimised footprint
- Emergency mode in case of control board failure ensures continued RO output
- Continuous monitoring of critical operating parameters
- Easy to use interface panel
- Quick access to all components; ease of service, reduce maintenance costs
- Automated control of the required permeate output via intelligent modulation of the pumps (ECO-Mode)
- Selectable Autoflush mode for dialysis free times

Options

- Parallel or twin-pass operation
- Ultra filtration modules
- Hot cleaning of the ring main and dialysis machines

Models

Modula

A cost effective and adaptable system designed to comply with modern day standards.

Modula S

Minimised water consumption for sustainable operation.

Modula S-XL

The new reverse osmosis unit for dialysis with built in redundancy.

Modula S-TP

Twin pass reverse osmosis unit designed to produce ultrapure water for dialysis.

Related Services

Our AQUAservice maintenance agreements are designed to allow you to choose from our wide range of capabilities the level of support you require to meet your application, operational and budgetary needs.

VEOLIA WATER
Solutions & Technologies

Modula™

Modula		1	2	3	4	5
Permeate Output @10°C	l/hr	350	700	1050	1400	1750
Permeate Pressure	bar	2-5				
Power Supply		400V, 3 Phase, 50 Hz / 4kW				
Recovery Rate	%	75				
Dimensions	mm	1050 (W) x 1550 (H) x 550 (D)				
Working Weight	kg	170				
Noise Level	dBA	65				

Modula S		S1	S2	S3	S4	S5
Permeate Output @10°C	l/hr	350	700	1050	1400	1750
Permeate Pressure	bar	2-5				
Power Supply		400V, 3 Phase, 50 Hz / 3.5kW				
Recovery Rate	%	Up to 85				
Dimensions	mm	1190 (W) x 1500 (H) x 690 (D)				
Working Weight	kg	280				
Noise Level	dBA	65				

Modula SXL		SXL4	SXL5	SXL6	SXL7	SXL8	SXL9	SXL10
Permeate Output @10°C	l/hr	1400	1750	2100	2450	2800	3150	3500
Permeate Pressure	bar	2-5						
Power Supply		400V, 3 Phase, 50 Hz / 6.5kW						
Recovery Rate	%	Up to 85						
Dimensions	mm	1270 (W) x 1620 (H) x 690 (D)						
Working Weight	kg	500						
Noise Level	dBA	65						

Modula STP		STP1	STP2	STP3	STP4	STP5
Permeate Output @10°C	l/hr	350	700	1050	1400	1750
Permeate Pressure	bar	2-5				
Power Supply		400V, 3 Phase, 50 Hz / 6.5kW				
Recovery Rate	%	Up to 85				
Dimensions	mm	1350 (W) x 1720 (H) x 690 (D)				
Working Weight	kg	500				
Noise Level	dBA	65				

Feed Water		Quality Requirements
Water Quality		Potable
Fouling Index		<3
Conductivity	µs/cm	<1400
Fe	ppm	<0.05
Cl	ppm	<0.10
SiO_2	ppm	<0.3
pH		6.5-8.5
Temperature (max)	°C	25
Hardness	ppm	<2

Unit Design	Specification
Frame	Stainless Steel V2A (304)
Tubing	Stainless Steel V4A (316L)
Membrane Housing	Stainless Steel V4A (316L)
Protection Category	I
Overvoltage Category	II
IP Rating	X4

Manufactured according to MDD (Medical Device Directive)

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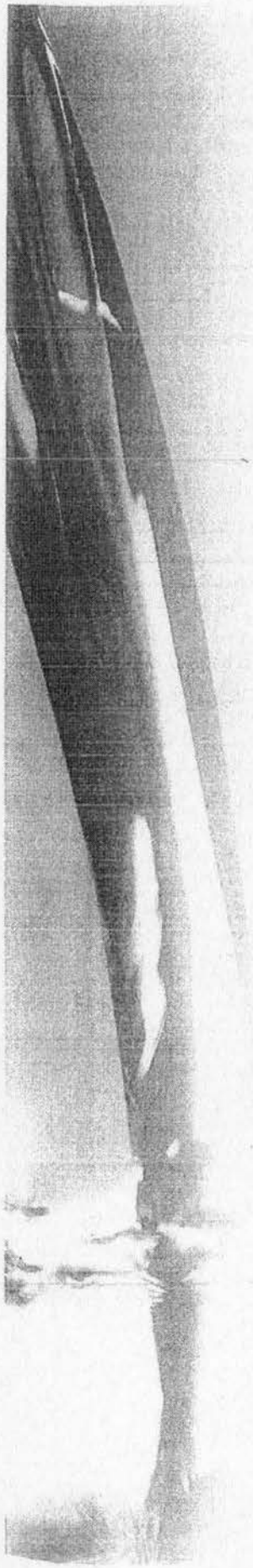
VEOLIA WATER
Solutions & Technologies

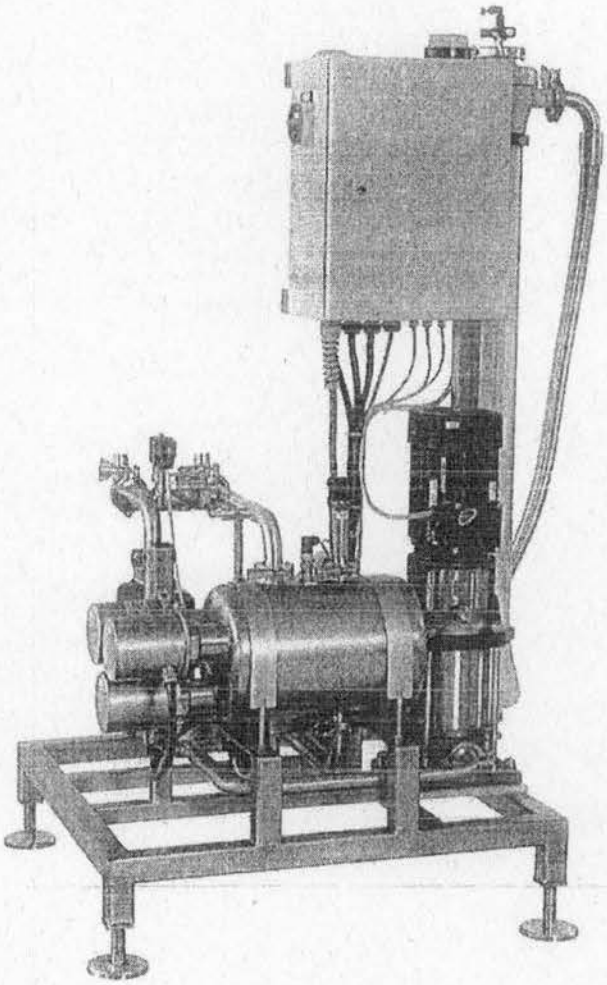


DWA

The Dialysis Water Specialists

HDS

Economical Online-Heating



www.dwa-online.com

HDS – Economical Online-Heating

FUNCTION

HDS unit is a heat disinfection system with the ability to provide an integrated heat solution for the ring main, dialysis machines and connection hose without a storage tank.

The in-line boost heater has a more efficient heating process compared to traditional methods.

HDS is compatible with all DWA reverse osmosis systems (modula series / nephRO TP). Linked with **HDS** the reverse osmosis system has the master function.

When linked in series with the DWA reverse osmosis system, a consistent and reliable process is guaranteed ensuring the highest microbial results with low operational costs.

It is possible to heat-disinfect the dialysis machines and the ring-main at the same time. For this 150 litres permeate per hour can be taken. Depending on type of dialysis machine, 4 to 7 machines per cycle can be heat-disinfected. The next cycle can be started after the previous directly. This enables a thermic disinfection of all dialysis machines in short time.

Your advantages at a glance:

- Low operational costs
- Compatible with all DWA reverse osmosis systems
- Optional ultrafiltration module
- Integrated heat-disinfection of the dialysis machines
- Highest microbiological safety

TECHNICAL DATA

Dimensions & Weight	Dimensions (W x H x D):	730 x 1400 x 730 mm
	Weight:	120 kg 115 kg[1]
Performance Data	Heating power:	18 kW
	Max. water extraction during heat-disinfection:	150 l/h
	Max. flow:	3600 l/h
	Max. inlet / outlet pressure:	2-6 bar
Electrical Connection	Mains plug:	CEE 32 A
	Mains voltage:	400 V / 3~ (N) / 50-60 Hz
	Energy consumption per phase:	max. 32 A
	Electrical power consumption:	max. 21 kW
	Fuses:	32 A / Fi ΔI 30 mA
Water Connection	RO feed:	Tubing DN20 or Tri-Clamp DN50
	RO feed[1]:	Tubing DN20 or Tri-Clamp DN25
	Excess RO permeate return:	
	Ring-main feed:	
	Ring-main return:	

[1]Without ultrafiltration module

We reserve the right to make technical changes

DWA GmbH & Co. KG

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76698 Ubstadt-Weiher
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DWA
The Dialysis Water Specialists

GTD 6/2012/E

www.dwa-online.com

ELGA PROCESS WATER

New South Glasgow Hospitals (NSGH) Project: Technical Submission

For: Endoscopy Purified Water System

To: Mercury Engineering

Date: 15th November 2012

Client reference document:	New South Glasgow Hospitals – Specification - Water Treatment Equipment. Ref ZBP-XX-XX-SP-500-104, Rev B February 2012
Client Drawings:	"NA XX 02 PL 251 100 rev 01" "NA XX 03 PL 251 100 rev 01"
ELGA Drawings:	105285038-2001 Issue 2 105285038-2002 Issue 2

General

The following Technical Submission describes the purified water system for endoscopy applications for the NSGH project being provided by ELGA Process Water.

The design of the system is consistent with ELGA purified water treatment systems already installed and successfully operating within existing NHS endoscopy facilities in Scotland. The design is also accepted by NHS for endoscopy reprocessing.

ELGA Reverse Osmosis, "Pure Water System" described below is to supply 16 off Getinge Fibroclean FC2 endoscope reprocessors requiring treated water for all rinse steps.

Total requirement for 16 off reprocessors will be 1,350 litres per hour

Delivery flow to be not less than 4.5 litres per minute per reprocessor.

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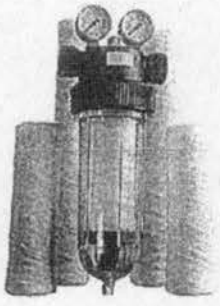
Web site: www.elgaprocesswater.com

VEOLIA WATER

System Details

Item	Part No	Description	Qty
1.		ELGA ECF 25 cartridge filter housing complete with pressure gauges and 1 off filter element. Filter rated to 10 microns for the removal of large particulate  ELGA ECF 25 Cartridge Filter	1
2.		ELGA duplex water softener with water meter control. Model Selectron 50  Selectron softener	1
3.		ELGA Osiris 1200/1000 duplex high flow pure water treatment system: Make up flow: up to 1,350 litres per hour total with duplex capacity. Full PLC control Temperature control with automatic rejection over a pre set limit. Ring main delivery flow: 80 litres per minute Externally mounted carbon prefilter and housing Externally mounted hygienic sample points on ring main out and return.	1

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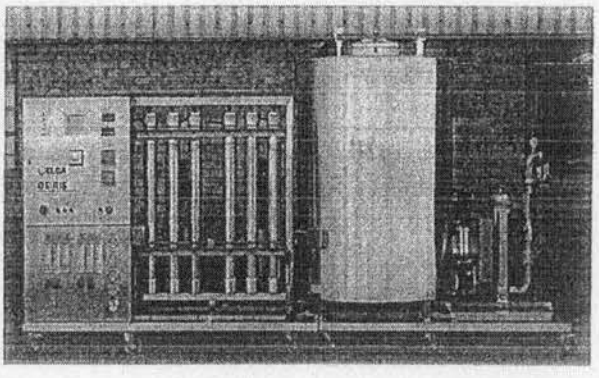
		UV Santisation Items housed on the Osiris skid: • Class AA air gap break tank • Raw water booster pumps (Duplex) • 1,350 litre per hour reverse osmosis membranes (Duplex) • 1,000 litre treated water storage tank in 316 stainless steel with bacterial vent filter , level controls • Ring main delivery pump to deliver at 80 litres per minute • UV Sanitiser • Ultrafiltration filter to 0.05 micron • Remote monitoring available as additional option • Power controls and distribution system • Interconnecting pipework, valves, gauges and monitors. All are factory installed & QA tested prior to delivery.  Osiris 1200 duplex with 1,000 litre tank	
4.		Salt. First charge of salt to permit commissioning and testing of water softener	1
5.		Installation for Osiris system. Assuming all services within 2 metres of plant location, and suitably terminated. All works carried out during normal working hours. Ie. Mon – Fri 08:00 to 17:00. Including offloading and positioning.	1
6.		Commissioning for Osiris to HTM 2030 by ELGA engineer. No specific HTM 2030 commissioning requirements apply to water system commissioning.	1
7.		Installation of pure water distribution ring main. Ring main will come from plant room, following the service duct and main corridor and connect to each reprocessor.	1

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		16 off points of use included with connection by ELGA Pipework will be insulated. One termination valve supplied to feed each washer disinfector. All care will be taken to minimise deadlegs installation in order to enable efficient disinfection of the entire system and minimise bacterial growth.	
8.		Water quality analysis and certification	1
9.		Delivery to UK site	1

Additional Information / Clarifications:

General

- Ring main pipework to be in heat sanitisable PEXA ,commencing at the plant room, following the service void and main corridor at high level to the point of use.
- ELGA scope of supply will commence at raw water inlet. This to be 1" pipework, correctly terminated and within 2 metres of the plant location. Termination by "Others"
- All services, including power and water to be within 2 metres of proposed Osiris location and correctly terminated.
- All connections to 16 off washer disinfectors to be by ELGA (1 off connection per AER)
- Offloading and positioning is included assuming the availability of suitable lifts to upper floors. We exclude for any lifting equipment.
- Ring main to be pressure tested by ELGA
- The above water treatment system complies fully with the specification as laid out within the referenced documents. However, although not specified in the referenced documents, recent trends within endoscope reprocessing departments have shown a preference for a fully heat sanitisable system. In order to modify the above system for heat sanitisation, the system can be built with a modified tank, in preparation for the later insertion of a heating element. This modification can be completed at additional cost – if required.

Clarifications / Additional Information Relating to:
New South Glasgow Hospitals Specification Water Treatment Equipment Ref ZBP-XX-XX-SP-500-104 Construction T3, Rev B, February 2012

As stated in previous correspondence, ELGA Process water are providing a system that addresses the requirements of this specification at NSGH. Please additional information and clarifications relating to this.

Plant Room 31 (Page 8): We note the requirement for a water meter in this section. For clarity, we have not included for any incoming water metering in our scope of supply. In our experience, (if required) this is normally incorporated in the utility supply to our systems.

The 2 off water purification units requirement in this section is addressed by the duplex arrangement of the Osiris 1200/1000 being provided by ELGA.

Distribution system is in heat sanitisable Sanipex – rather than ABS specified. In our experience, ABS is not crevice free and therefore unlikely to provide a point of use guarantee consistently compliant with SHTM 2030 and EN15883. Sanipex has a proven track record in this environment.

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Part of Veolia Water Systems Ltd. Registered in England and Wales No. 327847. Registered Office: Spring Bank House, High Street, Lane End, High Wycombe, Buckinghamshire, HP14 3JH, UK

Completion (Page 15): All points in this section have been defined and agreed between ELGA and Mercury Engineering as part of our Terms and Conditions Review process. See document: New South Glasgow Hospitals Project. Terms and Conditions Agreement for ELGA Process Water Sub-Contract Order (Revision 1: 13/09/12)

910 Documentation (Page 15): All points in this section have been defined and agreed between ELGA and Mercury Engineering as part of our Terms and Conditions Review process. See document: New South Glasgow Hospitals Project. Terms and Conditions Agreement for ELGA Process Water Sub-Contract Order (Revision 1: 13/09/12)

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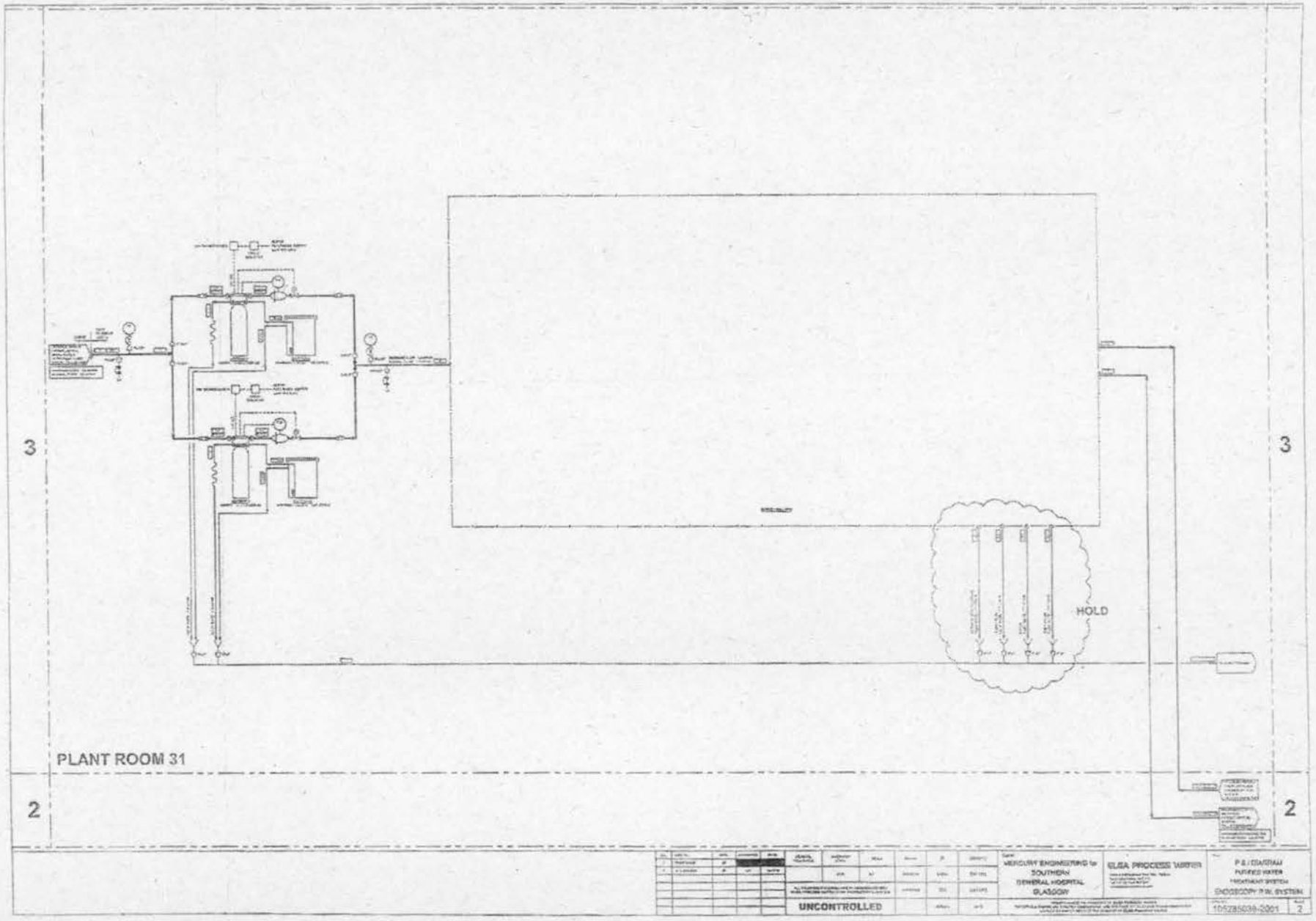
3
3
HOLD
PLANT ROOM 31
2
2
UNCONTROLLED
MERCURY ENGINEERING for SOUTHERN GENERAL HOSPITAL GLASGOW
ELGA PROCESS WATER
P & I DIAGRAM
PURIFIED WATER
TREATMENT SYSTEM
ENDOSCOPY R.W. SYSTEM
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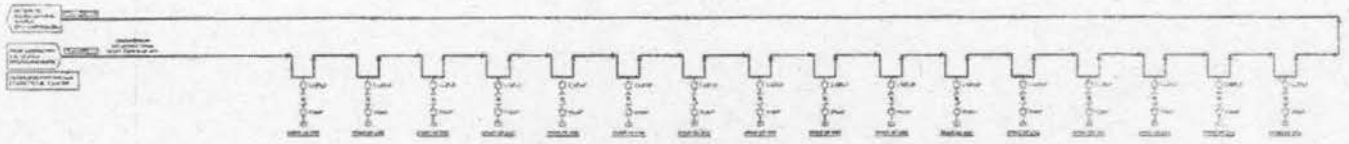


2nd ENDOSCOPY PURIFIED WATER SYSTEM RINGMAIN

TOTAL MAXIMUM SIMULTANEOUS DEMAND

16 - OFF REPROCESSORS DURING DAY SERVICE

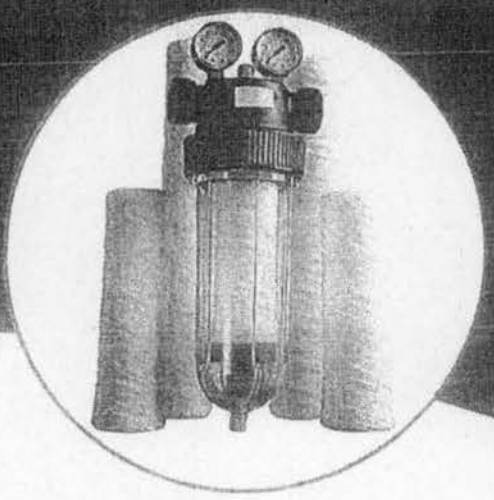
0 - OFF REPROCESSORS DURING NIGHT SERVICE

UNCONTROLLED

Eliminator®

Cartridge Filters

Produce up to 22 m^3/hr of filtered water



Eliminator® Cartridge Filters produce up to 22 m^3/hr of filtered water for a wide variety of process water and general manufacturing applications. They are designed to reduce particulate matter from water, either as part of a water purification system or as a stand-alone filtration unit. The filter element is a string wound polypropylene filter nominally rated at 10 micron to provide an efficient, cost-effective solution for protection of downstream process equipment.

- High Capacity cartridges, located on a one-piece support tube end cap assembly, provide improved operational life and strength
- A tension spring positioned beneath the cartridge end cap and support tube ensures that the filter element is kept in constant contact with the filter head as the element contracts during operation
- Once the filter element has contracted beyond its useful life, the output flow is automatically reduced. This prevents further operation and potential dirt carryover
- Automatic indication confirms when a filter element change is required
- Filter elements are simple to replace without disconnecting the pipework, thus reducing down time
- Eliminator® cartridge filters are available as complete systems or as a retrofit kit for existing installations with paper elements
- High dirt capacity elements ensure cost effective operation with extended service life, when compared with systems using paper elements.

VEOLIA WATER
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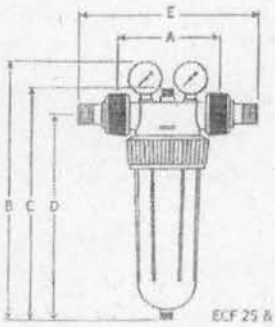
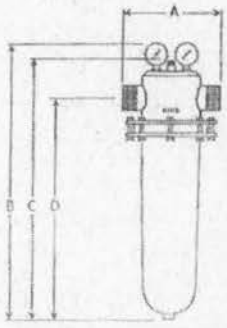
Eliminator®



ECF 25 & 32



ECF 50 & 62

System Performance, Dimensions, & Connections

Eliminator® MODEL		ECF 25	ECF 32	ECF 50	ECF 62
Maximun Flow	m³/hr	5	7	16	22
A	mm	155	155	240	240
B	mm	402	581	670	670
C	mm	377	556	650	650
D	mm	330	505	540	540
E	mm	229	299	-	-
Filter Bowl Diameter	mm	125	125	175	175
Inlet/Outlet	inches	1	1¼	2	2½

Material Specifications

Filter Head, Bowl Housing and Pipe Couplings	Glass filled polypropylene
Filter Element Material	String wound polypropylene
Filter Element	10 Micron nominal
Support Tube and Cap	uPVC

Feed Water Supply Quality
Pressure: max. 10 bar Temperature: max. 50°C

Eliminator® Filter Systems Comprise
Filter head, bowl, pressure gauges, support tube and end cap assembly, spring with upper/lower locator and filter cartridge. Flanged split ring with set screws and wing nuts are provided with ECF 50 and 62 systems.

Retrofit Kits Comprise
Retrofit kits are designed to utilise the existing bowl and head assemblies. The internals are removed, discarded and replaced with a new support tube and end cap assembly, spring with upper/lower locator and a filter cartridge. Flanged split ring with set screws and wing nuts are provided with ECF 50 and 62 systems.

Eliminator® Cartridge Filter Systems are protected by Patent No. 96308350.6

For higher flow rate applications consult ELGA Process Water.

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ELGA
PROCESS WATER

Selectron

Water Softeners

Produce up to 4 m^3/hr of softened water

The Selectron range of water softeners produce from 0.08 to 4 m^3/hr of softened water for boiler feed, glass washing and general manufacturing applications. The flexible design and programming features of the Selectron systems means that they can be easily configured to meet individual site requirements, thus providing a cost efficient, reliable and easy-to-use solution to the problems associated with hard water.

- The Selectron utilises a fully programmable and flexible microprocessor control system with an easy-to-read LCD display to provide constant system status
- Selectron units can be upgraded by using the same control, common to the entire range. Similarly, Timeclock systems can be easily upgraded to Watermeter operation
- Simple to program and use; softener regeneration is automatically controlled and initiated
- The advanced control systems ensure that optimum performance is achieved from the softeners, thus maximising water savings and minimising salt usage
- Choice of Timeclock or Watermeter operation
- The control head operates on 24 Volts to ensure safe installation, operation and maintenance
- All units in the range are supplied 'off the shelf' for quick, easy and low cost installation and start up
- Proven design and materials of construction ensures operational reliability
- Solenoid valve prevents hard water to service during regeneration (optional)

VEOLIA
WATER
Solutions & Technologies

Selectron

System Performance

SELECTRON MODEL		15	30	50	80
Maximum Treated Water Flow	m^3/hr	1.0	2.4	3.2	4.0
Optimum Treated Water Flow	m^3/hr	0.7	1.6	2.1	2.7
Minimum Treated Water Flow	m^3/hr	0.08	0.12	0.15	0.25
Regeneration Time	mins	24	38	56	83
Maximum Flow to Drain	m^3/hr	0.37	0.60	0.75	1.25
Efficient Volume	m^3	0.17	0.23	0.32	0.45
Pressure Loss at Maximum Flow	bar	0.25	1.67	2.80	3.40
Salt Usage per Regeneration	kg	1.95	3.90	6.50	10.40

Volume of Softened Water per Regeneration

SELECTRON MODEL		15	30	50	80
Raw Water - Soft 100mg/l	m^3	8.20	16.50	32.50	52.00
Raw Water - Average 200mg/l	m^3	4.10	8.25	16.25	26.00
Raw Water - Hard 400mg/l	m^3	2.00	4.12	8.12	13.00

Note: volumes stated above are based on systems running at optimum flow rates.

System Dimensions, Weights & Connections

SELECTRON MODEL		15	30	50	80
Height	mm	1110	1120	1605	1577
Depth	mm	575	575	575	575
Width	mm	760	760	760	760
Recommended Headroom	mm	500	500	500	500
Approx. Shipping Weight	kg	60	70	90	145
Approx. Service Weight	kg	200	240	275	400
Inlet	inches	3/4	3/4	3/4	3/4
Outlet	inches	3/4	3/4	3/4	3/4
Drain	mm	13	13	13	13
Salt Tank Overflow	mm	13	13	13	13

Treated Water Quality

	Hardness
Selectron at Optimum Flow	<10 mg/l as $CaCO_3$

Material Specifications

Pressure Vessels	Composite Plastics
Control Valve	Noryl Plastic
Salt Tank	Polypropylene

Feed Water Supply Quality
Potable water free from organic contamination and suspended solids.
Supply Pressure: min. 1.7 bar max. 8.5 bar
Temperature: min. 5°C max. 35°C

Electrical Supply
All models 240V single phase, 50Hz.

For higher flow rate applications consult ELGA Process Water.

LIT: 36656/Rev C: 08/05 In keeping with the progressive nature of the company, we reserve the right to amend details without notice

ELGA PROCESS WATER

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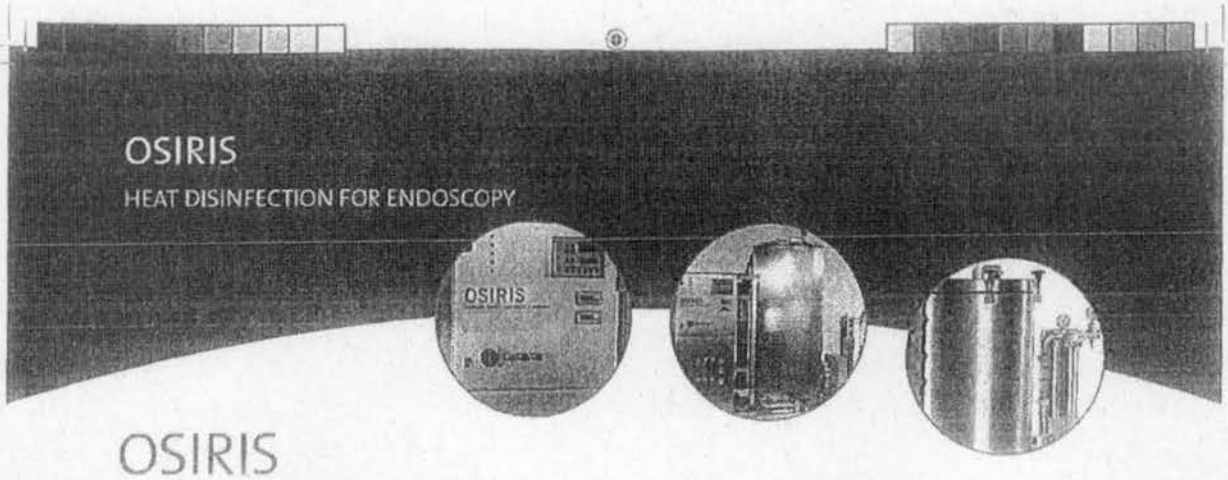
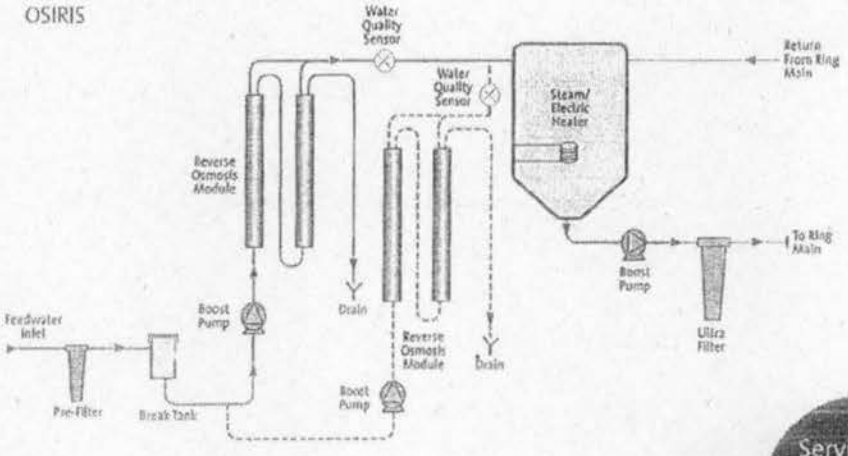


OSIRIS

A fully integrated packaged central water treatment system, specifically designed to meet the requirements of multiple AER's (Automated Endoscope Reprocessors). The OSIRIS can supply compliant purified water to endoscopy at up to 1500 litres/hr. A semi automated hot water disinfection program provides the ultimate assurance that the system will continuously supply compliant purified water.

- HTM 01-06 compliance guaranteed – semi automatic heat disinfection
- High efficiency reverse osmosis and ultra filtration for complete endotoxin and bacteria removal
- Duplex design of key components for ultimate security
- Robust stainless steel construction
- Complete service and validation support services to ensure optimum system performance and reliability (4, 8, 24 hour emergency support)

OSIRIS



Service 24/7, 365 days a year 4, 8, 24 hour support

Treated Water Specifications

MODEL	OSIRIS
Make-up rate	300 l/hr - 1500 l/hr
Delivery flow rate range	80 - 200 l/min
Storage tank	500 - 1500 l/hr
Conductivity	<30µS/cm
Bacteria	<10CFU/100ml
Endotoxin	<0.25 EU/ml

ELGA Process Water
Marlow International
Parkway, Marlow
Buckinghamshire
SL7 1YL, UK
tel. +44 (0) 1628 897600
fax. +44 (0) 1628 897001
email sales.uk@veoliawater.com
www.elgaprocesswater.com

NHS Supply Chain

ELGA PROCESS WATER

New South Glasgow Hospitals (NSGH) Project: Technical Submission

For: PICU Renal Purified Water Systems

To: Mercury Engineering

Date: 15th November 2012

Client reference document:	"New South Glasgow Hospitals – Specification – Water Treatment Equipment ZBP-XX-XX-SP-500-004" (February 2012. Page 9 of 16) Correspondence from ZBP to ELGA on 13 April 2011 Revised table of user demand points issued by ZBP, 13th April 2011
Client Drawings:	None Provided
ELGA Drawings:	None

General

The following Technical Submission describes the purified water system for single patient RO units being provided by ELGA Process Water for renal dialysis within the PICU for the NSGH project.

Our scope covers 3 off single patient RO units complete with pre-filtration. Each unit is capable of delivering 70 litreshr-1. 3 off single patient RO units are being provided.

The purified water standard to be achieved by the single patient RO units is UK Renal Association 4th Edition,2007 Clinical Practice Guidelines for Haemodialysis" and incorporating changes included within the 2009 update.

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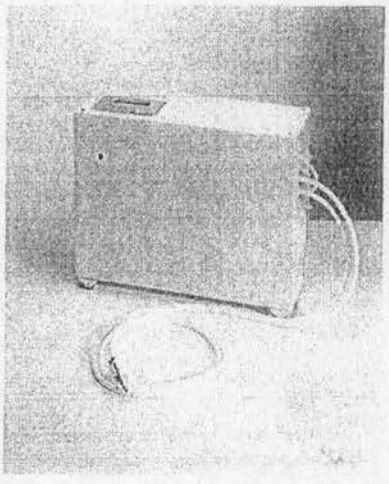
Web site: www.elgaprocesswater.com

ELGA PROCESS WATER

System Details

Item No.	Description	No. Off
1.	**ELGA Hama RO 3000.** Individual reverse osmosis plant for single patient use. Output capacity of 70 litres per hour. Complete with "Walther" type stainless steel coupling to dialysis machine Please refer to attached photograph and data sheet  ELGA Hama RO 3000	3
2	**Media Panels** ELGA media panels consistent with fitment throughout the adult and childrens hospital facilities. To be flush mounted within proprietary paneling or trunking supplied by others.	3
3	**Drain Connector Sets** Media panel mounted drain connector	3
6	**Delivery** Packing and delivery to site, including offloading and positioning.	1

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VEOLIA WATER

ELGA PROCESS WATER

7	**Documentation** To ELGA Process Water Standard Operating and maintenance manual. Block Layout. Flow diagram	2 copies

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Web site: www.elgaprocesswater.com
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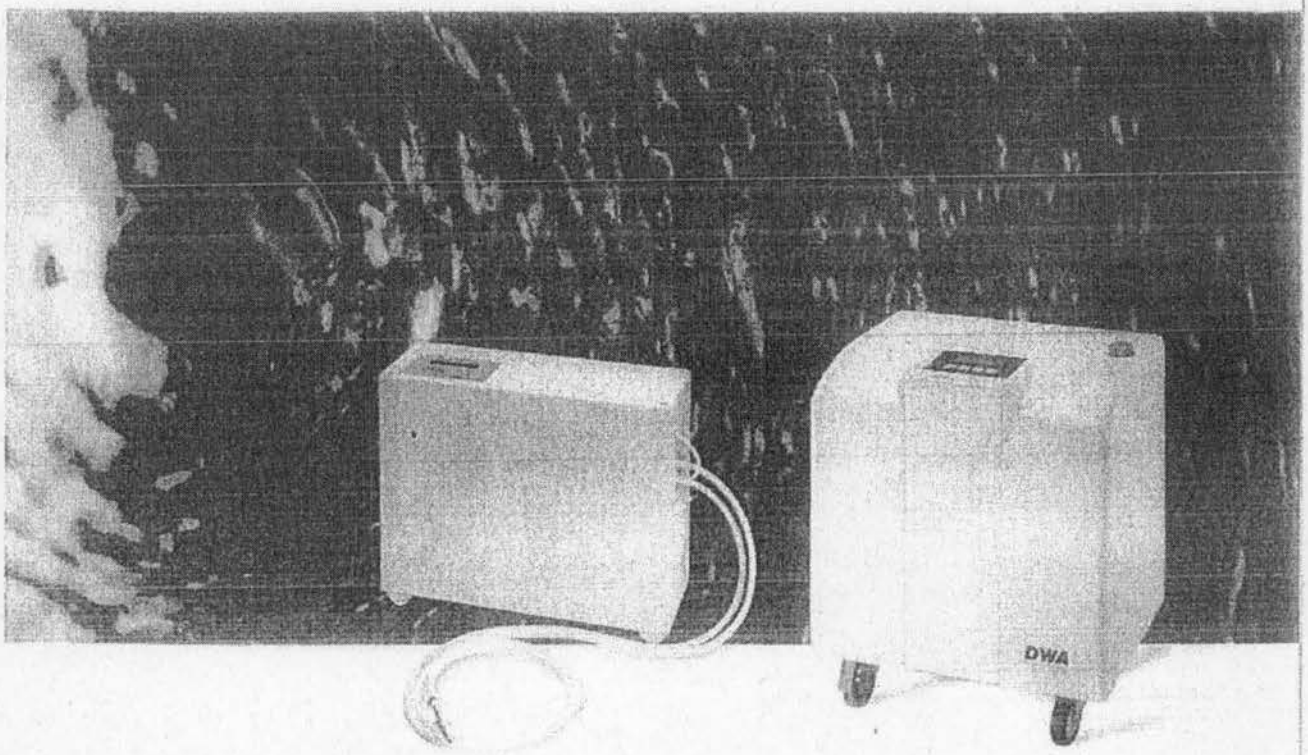
VEOLIA WATER

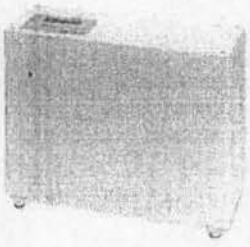


DWA

HemoRO HOT
HemoRO 3000

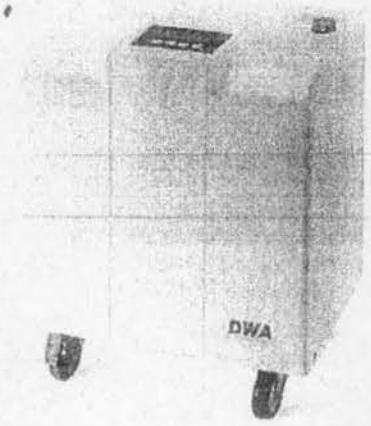
SMALL REVERSE OSMOSIS UNITS

The HemoRO HOT and HemoRO 3000 small reverse osmosis units continue the high standards from DWA for permeate quality and supply reliability in the fields of home and hospital dialysis. Easy to transport, simple to connect and quickly ready for use – for all areas both outside and inside of the dialysis centre.



Quickly into service, outstanding permeate quality and microbiological safety – perfect for use with acute and intensive care dialysis.

Simple and secure operation, extremely quiet running and low care and maintenance requirements make this system the first choice for home dialysis.



HemoRO HOT – MICROBIOLOGICALLY SAFE AND EASY TO OPERATE

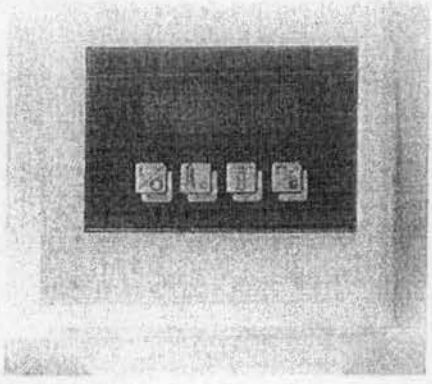
HemoRO HOT
MICROBIOLOGICAL SAFETY

The fully automatic, integrated hot cleaning program with optional Tyndallisation, programmable standby flushing and connection to the dialysis unit through a loop line ensures optimum microbiological permeate quality.

Tyndallisation is understood as repeated heating (2 to 3 times) at temperatures from 70 – 100°C. The basic idea is that any spore surviving the first heating will germinate in between and can be killed as vegetative forms through the effects of repeated heating.

HemoRO HOT
OPERATION

Simple and secure operation is through a clear 4-button user interface with a large illuminated display. The integrated hot cleaning permits the highest level of microbiological reliability with safe operation. Flushing with citric acid, allows hard water operation up to 25 °dH even with recular hot cleaning. Maintenance and control intervals are displayed by the unit to promt optimum user input.



User interface of the HemoRO HOT

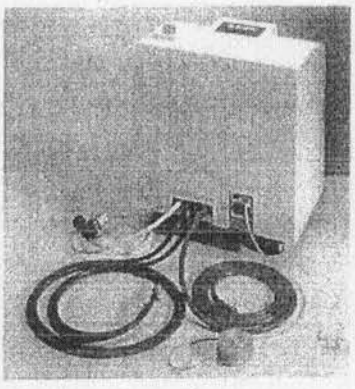
HemoRO HOT
TECHNICAL FEATURES

- Complete hydraulic system including module, suitable for hot cleaning
- Loop line to dialysis unit
- Fully automatic Tyndallisation (sequenced hot cleaning)
- Fully automatic standby flushing
- Hard water operation capability with routine citric acid flushing
- Low noise emission (53 dB in dialysis operation)
- 4-button user interface
- Illuminated display
- Microprocessor controlled
- Easy to transport with robust large castors
- Standardised sample-taking
- Approved in compliance with MDD

HemoRO HOT – ACCESSORIES
TECHNICAL DATA

HemoRO HOT
ACCESSORIES

- Water protector, for connection to the HemoRO HOT
- Leak monitor on the raw water supply
- Sample-taking set, for taking microbiological samples at the coupling to the dialysis unit
- Citric acid injection set



HemoRO HOT with conversion possibilities

HemoRO HOT
TECHNICAL DATA

General	*Dimensions (W x H x D)*	*500 x 400 x 340 mm*
	Weight	*35 kg*
	Softener	*Operation up 25 °dH is possible without softener*
Performance data	*Permeate capacity > 4 °C*	*50 l/h*
	Power consumption	*1.5 kW*
	Inlet pressure min.	*3 bar dynamic at 150 l/h*
	Inlet pressure max.	*5 bar*
	Mains voltage	*230 V / 50 Hz*
	Type of protection against electric shock	*Protection Class 1*
	Degree of protection against electric shock	*Type B*
Noise emission	*Hot cleaning*	*50.8 dB*
	Dialysis	*53 dB*

Time required for hot cleaning

Type of hot cleaning	*Duration with hard water operation*	*Duration with water hardness 0 °dH*
Standard with cooldown	*approx. 75 minutes*	*approx. 55 minutes*
Without cooldown	*approx. 60 minutes*	*approx. 40 minutes*
Tyndallisation	*approx. 30 hours*	*approx. 29.5 hours*

We reserve the right to make technical changes

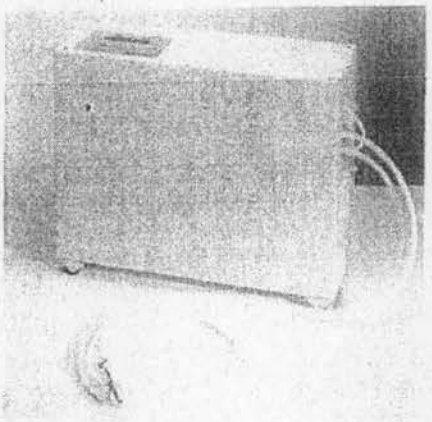
HemoRO 3000 – THE PROVEN SMALL OSMOSIS UNIT

HemoRO 3000

The HemoRO 3000 from DWA, proven in many dialysis centres throughout the world, is now even better and safer. The loop line to the dialysis unit is one new feature, along with numerous technical improvements, for example, the flow tank which is now easy to open for cleaning purposes. Many suggestions from our customers have been integrated in these improvements.

HemoRO 3000
TECHNICAL FEATURES

- Loop line to the dialysis unit
- Automatic chemical cleaning
- Microprocessor controlled
- Fully automatic standby flushing
- Hard water operation up to 25 °dH
- Clear 2-button user interface
- Standardised sample-taking



HemoRO 3000 – wall-ring line

HemoRO 3000
ACCESSORIES

- Prefilter
- Leak monitor on the raw water supply
- Sample-taking set, for microbiological sample-taking

HemoRO 3000
TECHNICAL DATA

General	*Dimensions (W x H x D)*	*480 x 360 x 170 mm*
	Weight	*30 kg*
	Softener	*not necessary up to 25 °dH / 15 °dH*
Performance data	*Permeate capacity at 10 °C*	*50 l/h / 70 l/h*
	Power consumption	*300 W*
	Inlet pressure min.	*1.5 bar dynamic at 150 l/h / 300 l/h*
	Inlet pressure max.	*5 bar*
Mechanical connections	*Inlet*	*3/4" internal thread*
	Outlet pure water	*Male coupling 6 mm*
	Outlet concentrate	*DG socket*
Electrical connections	*Main voltage*	*230 V / 50 Hz / 115 V / 60 Hz*
	Type of protetion against electric shock	*Protection Class I*
	Degree of protetion against electric shock	*Type B*
	Degree of protection against penetration of fluid	*IPX4 splash water proof*

We reserve the right to make technical changes

[redacted]

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ELGA PROCESS WATER

New South Glasgow Hospitals (NSGH) Project: Technical Submission

For: Renal Concentrate System

To: Mercury Engineering

Date: 15th November 2012

Client reference documents:	"SGH Renal Central Water Plant Specification Version 3.0" (12th February 2010) Revised table of user demand points issued by ZBP, 13th April 2011
Client Drawings:	ZBP XX XX SC509 001 Rev 3
ELGA Drawings:	105285038-4001 Issue 2

General

The following Technical Submission describes the renal central concentrate system being supplied by ELGA Process Water for the NSGH project.

The system provides 1 off concentrate formulation to 46 off points of use.

Storage capacity of not less than 4,500 litres

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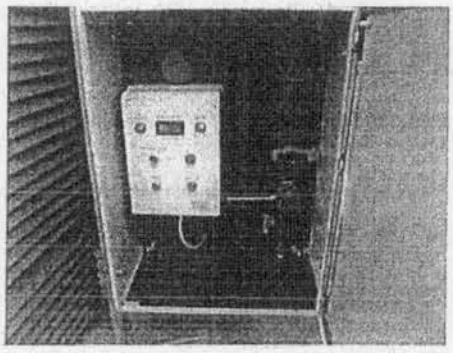
VEOLIA WATER

ELGA PROCESS WATER

System Details

Item No.	Description	No. Off
1.	**Transfer Fill Point:** A transfer fill point and controls to be located at ground level for tanker access. Exact positioning to be agreed. Fill point to accommodate the connection to 1 off "A" Concentrate formulations. Fill point consists of powder coated, mild steel enclosure with front door and key lock. Enclosure has plain exterior finish with no indication as to the function of the contents. Inside enclosure is level control display, start / stop function, connection point for concentrate tanker hose, transfer pump and associated pipes and valves. Enclosure has frost protection heater.  **Typical single concentrate fill point**	1
2.	**Control panel:** With tank level indicator lights, lamp test and emergency stop for each pump.	1
3	**Concentrate storage tanks**: 2 off, each of 3,000 litre capacity. Complete with level controls Conical based and fabricated from white polypropylene. Tanks to be connected to give up to 6,000 litres of concentrate storage.	2

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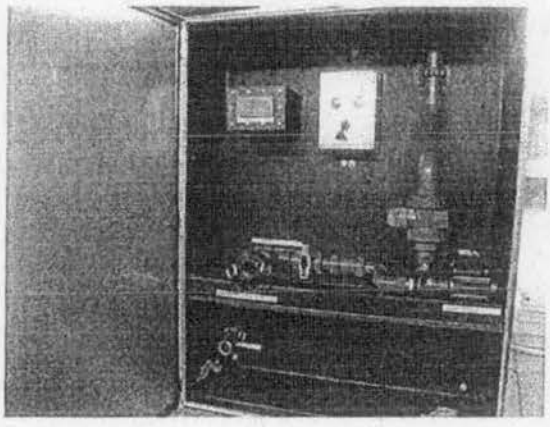
VEOLIA WATER

4	**Transfer pump:** Delivery pump to be located on the ground floor. This pump is to transfer the 1 off "A" concentrate from the tanker into the bulk storage tanks. Model: Totten "Mag Drive" type with corrosion resistance  **Typical view of transfer pump**	1
5	**Transfer pump**: Delivery pump to be located on the ground floor. This pump is to transfer the 1 off "A" concentrate from the bulk storage tanks to a day tank located within the 2nd floor area. Model: Totten "Mag Drive" type as above	1
6.	**Transfer Pipework**: Transfer pipework and connections in polyethylene to transfer 1 off "A" concentrate from ground floor bulk tank to 2nd floor holding tank	

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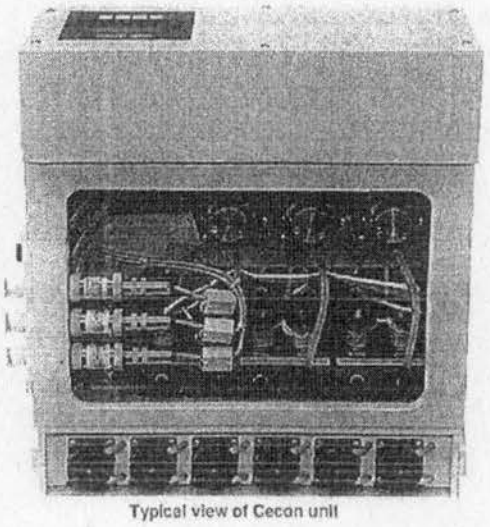
7	**Concentrate Distribution:** 1 off ELGA "Cecon" concentrate supply system. The "Cecon" will provide a pressurised supply of 1 off concentrate to each dialysis machine. The "Cecon" has a variable pressure control to allow for the requirements of the latest dialysis machines, fitted with on board tanks. The 2nd function of the "Cecon" is to de-gas the concentrate before delivery. This can be particularly problematic in a warm environment or summer temperatures. For more information, please see attached data sheet.  **Typical view of Cecon unit**	1
8	**Day Tanks:** 1 off day tank of 300 litre capacity. This tank will be sited within the 2nd floor area and will allow even distribution of concentrate to all points on 1 level. Day tank will be equipped with level controls and be continuously re-filled from the bulk storage tank located remotely.	1
9	**Coupling set:** 46 off sets of stainless steel self sealing couplings. Both male and female halves are supplied. Type: Plastic type (PEEK)	46
10	**Distribution ring main:** We have allowed for 2 off distribution pipework rings to supply 46 off points of use with 1 off concentrate each as per specification.	1
11	**Mechanical Installation:** We have included for installation of flexible plastic interconnecting pipework and stainless steel fittings within the media panels.	1
12	**Electrical Installation:** Electrical connection of the equipment to a local isolated power supply within 1m of our equipment.	1
13	**Commissioning:** Following installation, the engineer will commission the system during normal working hours (Mon-Fri 9-5-30).	1
14	**Operator Training:** 1 off complete day of basic user training for key operators to be included.	1

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VEOLIA WATER

15	**Delivery:** Packing and delivery to site, including offloading and positioning.	1
16	**Documentation:** To ELGA Process Water Standard Operating and maintenance manual. Block Layout. Flow diagram	2 copies

Additional Information / Clarifications

General

- A local day tank is provided within the ward area for local distribution of concentrate.
- Concentrate fill point terminations will be in 1.25" female BSP thread

Clarifications / Additional Information Relating to:
Specification for the supply and installation of central water treatment plant(s) to supply Renal facilities at the Southern General Hospital, Volume 2/1 Appendix M&E 6 Renal Water Version 2 Update from Renal Physics User Group Meeting on 21st January 2010

As stated in previous correspondence, ELGA Process water are providing systems that address the requirements of this specification at NSGH. Please additional information and clarifications relating to this.

Addendum A (Page 12): We note the requirement for point of use couplings to be in PVDF plastic. ELGA standard couplings are manufactured in PEEK plastic – a technical equivalent to PVDF for this application.

Clarifications / Additional Information Relating to:
New South Glasgow Hospitals Specification Water Treatment Equipment Ref ZBP-XX-XX-SP-500-104 Construction T3, Rev B, February 2012

As stated in previous correspondence, ELGA Process water is providing a system that address the requirements of this specification at NSGH. Please additional information and clarifications relating to this.

Completion (Page 15): All points in this section have been defined and agreed between ELGA and Mercury Engineering as part of our Terms and Conditions Review process. See document: New South Glasgow Hospitals Project. Terms and Conditions Agreement for ELGA Process Water Sub-Contract Order (Revision 1: 13/09/12)

910 Documentation (Page 15): All points in this section have been defined and agreed between ELGA and Mercury Engineering as part of our Terms and Conditions Review process. See document: New South Glasgow Hospitals Project. Terms and Conditions Agreement for ELGA Process Water Sub-Contract Order (Revision 1: 13/09/12)

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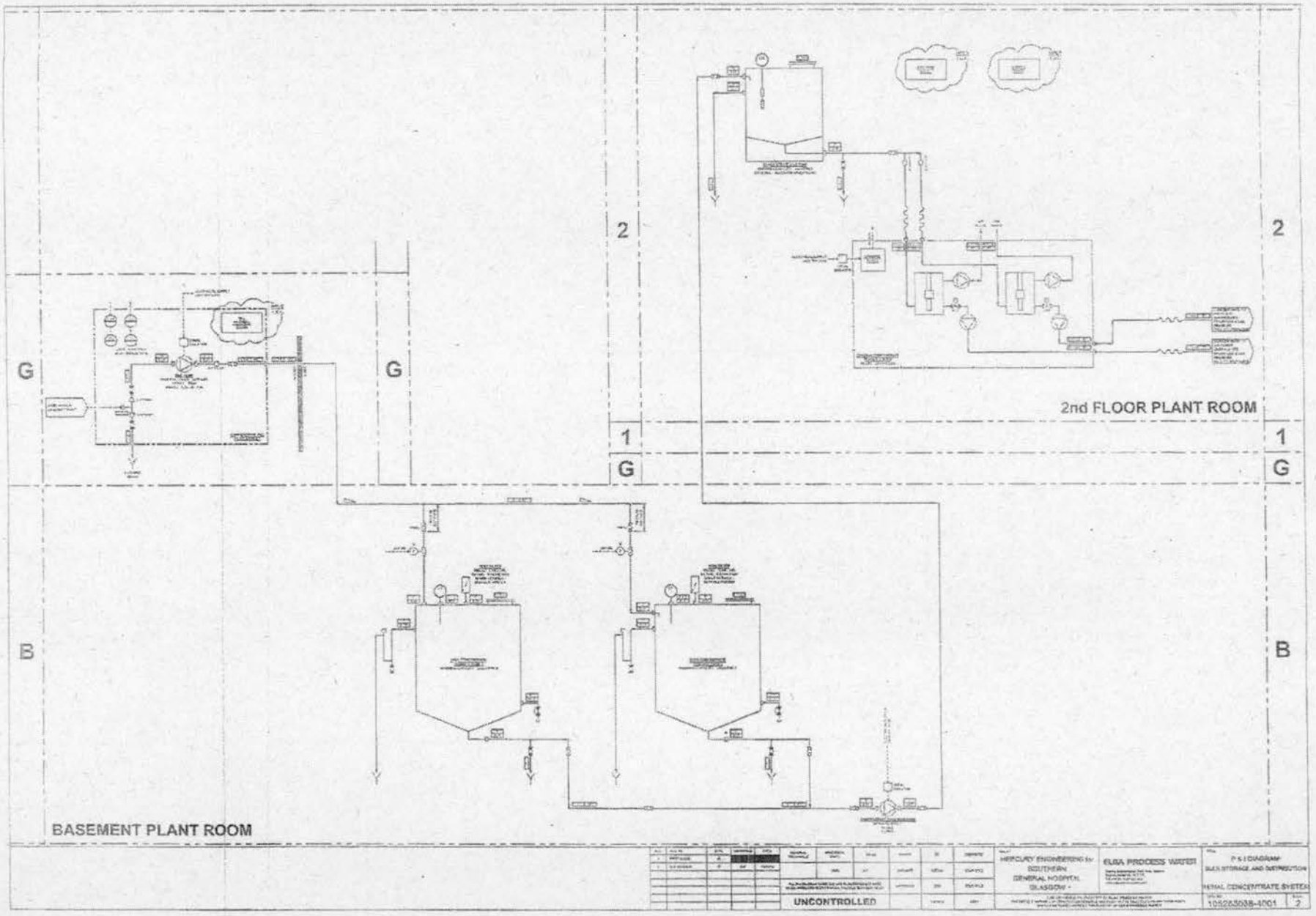
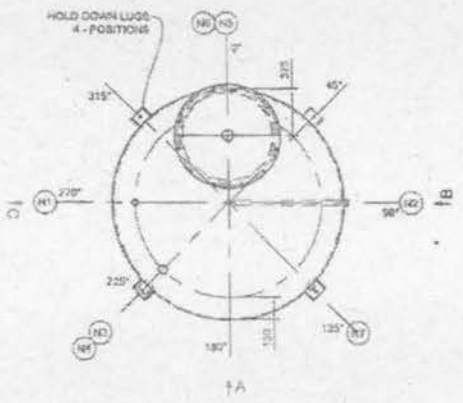
VEOLIA WATER

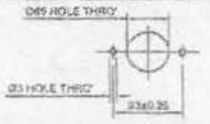

2nd FLOOR PLANT ROOM
BASEMENT PLANT ROOM
UNCONTROLLED



PLAN VIEW

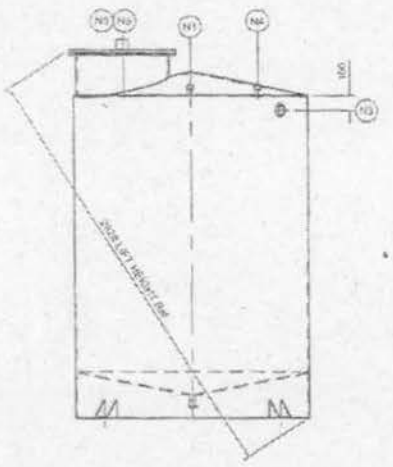
TANK CONNECTION DETAILS			
ITEM	SIZE	TYPE	DESCRIPTION
N1	1"	1	INLET
N2	1"	1	OUTLET
N3	2"	1	OVERFLOW
N4	1.1/2"	1	LEVEL TRANSMITTER
N5	1"	1	VENT
N6	600 Sq	RSA	MANWAY - FLANGED & BOLTED
N7	1/2"	1	DRAIN / SAMPLE

CONNECTION TYPE DETAILS	
CONN. TYPE	DESCRIPTION
1	SOCKET CONNECTIONS (BSP.F) EXTERNALLY THREADED ENTIRE LENGTH.
2	EXTERNAL FLANGED CONNECTIONS.
3	BSP.F EXTERNAL SOCKET CONNECTION c/w INTERNAL PLAIN ELBOW.
4	DRILLED HOLE OF CONN SIZE DIAMETER.
5	SEE DETAIL BELOW.
6	EXTERNAL FLANGED CONNECTION c/w INTERNAL PLAIN ELBOW.
7	EXTERNAL FLANGE PAD CONNECTION 200 O/D x 6 mm THK CENTRAL HOLE 94 DIA.
	FLANGED CONNECTIONS ON TANK ARE TO BE BS4504 PN16

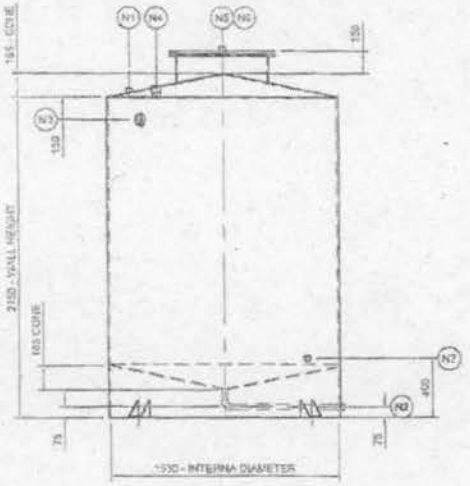


DETAIL OF CONNECTION TYPE 5
(FOR NASUGA FLOAT SWITCH TYPE TBL12)

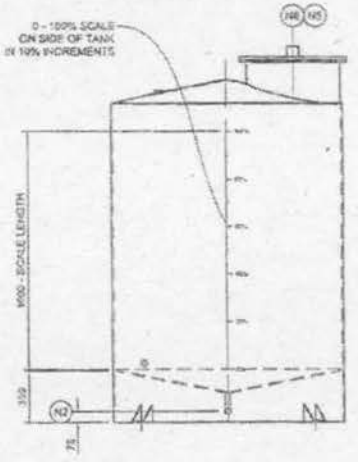
OPERATING CONDITIONS	
Contents	DIALYSIS CONCENTRATE
Working Capacity	3,000 LITRES
Specific gravity	1.0
Max. working temperature	AMBIENT
Min. working temperature	5°C
Max. working pressure	ATMOSPHERIC
Materials of construction	NATURAL POLYPROPLENE
Location	PLANTROOM
TOLERANCES	
Angular	±0.5°
Dimensional	±2mm



VIEW ON ARROW 'C'



VIEW ON ARROW 'A'



VIEW ON ARROW 'B'

N.B. - NOZZLE ORIENTATIONS T.B.C.

NOTES

1. FOR TRUE ORIENTATION OF CONNECTIONS SEE PLAN VIEW.
2. TANK TO BE TESTED FOR WATER TIGHTNESS.

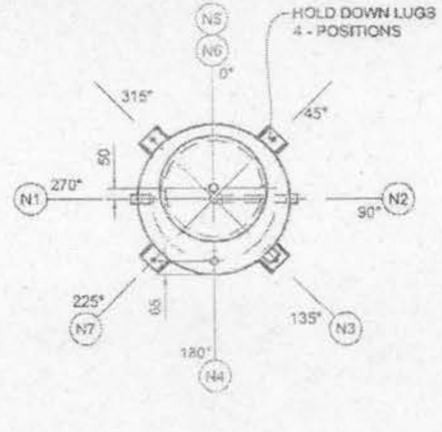
NOT FOR MANUFACTURER

MERCURY ENGINEERING for SOUTHERN GENERAL HOSPITAL GLASGOW

GLGA PROCESS WATER

CONCENTRATE TANK DETAIL 3,000 LITRES WORKING (BASEMENT PLANT ROOM)

10678-0038-4010 1



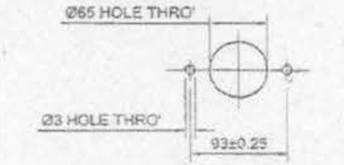
PLAN VIEW

TANK CONNECTION DETAILS			
ITEM	SIZE	TYPE	DESCRIPTION
N1	1"	3	INLET
N2	1"	1	OUTLET
N3	1.1/2"	1	OVERFLOW
N4	N/A	5	LEVEL SWITCH
N5	400 Dia	-	INSPECTION HATCH - PUSH FIT LID
N6	1"	1	VENT

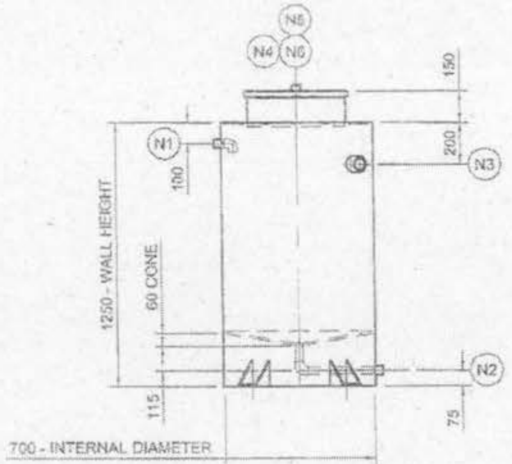
N.B. - NOZZLE ORIENTATIONS T.B.C.

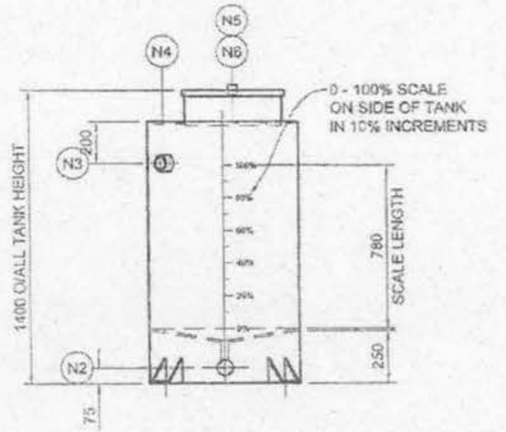
CONNECTION TYPE DETAILS	
CONN. TYPE	DESCRIPTION
1	SOCKET CONNECTIONS (BSP.F) INTERNALLY THREADED ENTIRE LENGTH.
2	EXTERNAL FLANGED CONNECTIONS.
3	BSP.F EXTERNAL SOCKET CONNECTION c/w INTERNAL PLAIN ELBOW.
4	DRILLED HOLE OF CONN' SIZE DIAMETER.
5	SEE DETAIL BELOW.
6	EXTERNAL FLANGED CONNECTION c/w INTERNAL PLAIN ELBOW.
7	EXTERNAL FLANGE PAD CONNECTION. 200 O/D x 8 mm THK CENTRAL HOLE 94 DIA.

FLANGED CONNECTIONS ON TANK ARE TO BE BS4504 PN16



DETAIL OF CONNECTION TYPE 5
(FOR KASUGA FLOAT SWITCH TYPE TBL12)





OPERATING CONDITIONS	
Contents	DIALYSIS CONCENTRATE
Working Capacity	300 LITRES
Specific gravity	1.0
Max. working temperature	AMBIENT
Min. working temperature	5°C
Max. working pressure	ATMOSPHERIC
Materials of construction	NATURAL POLYPROPYLENE
Location	PLANTROOM
TOLERANCES	
Angular	±0.5°
Dimensional	±2mm

NOT FOR MANUFACTURE

NOTES

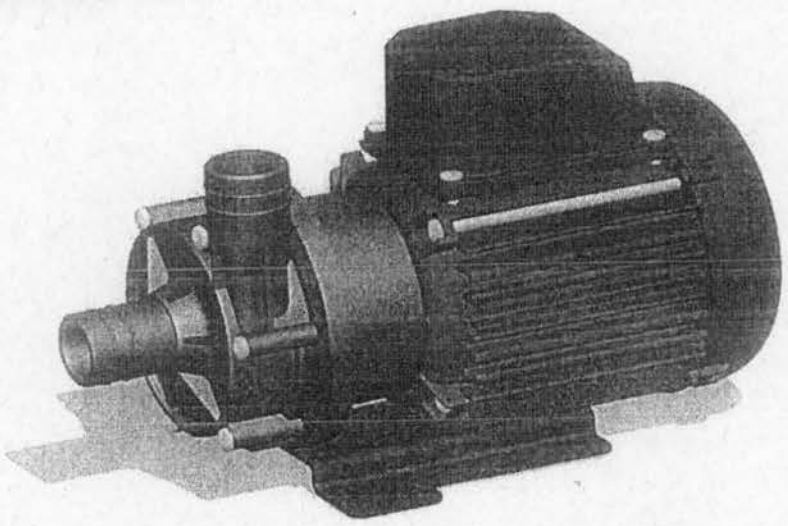
1. FOR TRUE ORIENTATION OF CONNECTIONS SEE PLAN VIEW.
2. TANK TO BE TESTED FOR WATER TIGHTNESS.

[redacted]

Scale	A2 1:15
Units	mm
Client	MERCURY ENGINEERING for SOUTHERN GENERAL HOSPITAL GLASGOW
Company	ELGA PROCESS WATER
Title	CONCENTRATE DAY TANK DETAIL 300 LITRES WORKING (2nd FLOOR PLANT ROOM)
Dwg No.	105285038-4022
Issue	1

Totton PUMPS

GP80/6
Magnetically Coupled Centrifugal Pump



Principal Applications

Specifically developed for applications requiring cost effective, continuous low flow for the transfer and recirculation of water and glycol solutions.

Wetted Materials

Brass spindle
Nitrile 'O' ring standard, other materials available
StFe ceramic magnet
PP pump housing – PPS optional
PPS spindle housing
Alumina ceramic thrust washer

Features

Magnetic couplings provide an energy efficient thermal shield, minimising heat transfer to the pumped fluids
Variable pump body orientation
Adaptable mounting foot positions
Compatible with standard fittings
IPX5 motor enclosure
Deep groove ball bearings

GP80/6	Port Details	GP80/6	Port Details
230V 1Ph 50Hz	26 mm hose barb	110V 1Ph 50Hz	26 mm hose barb
230V 1Ph 50Hz	3/4"bsp Male	110V 1Ph 50Hz	3/4"bsp Male
230V 1Ph 60Hz	26 mm hose barb	110V 1Ph 60Hz	26 mm hose barb
230V 1Ph 60Hz	3/4"bsp Male	110V 1Ph 60Hz	3/4"bsp Male

ITT

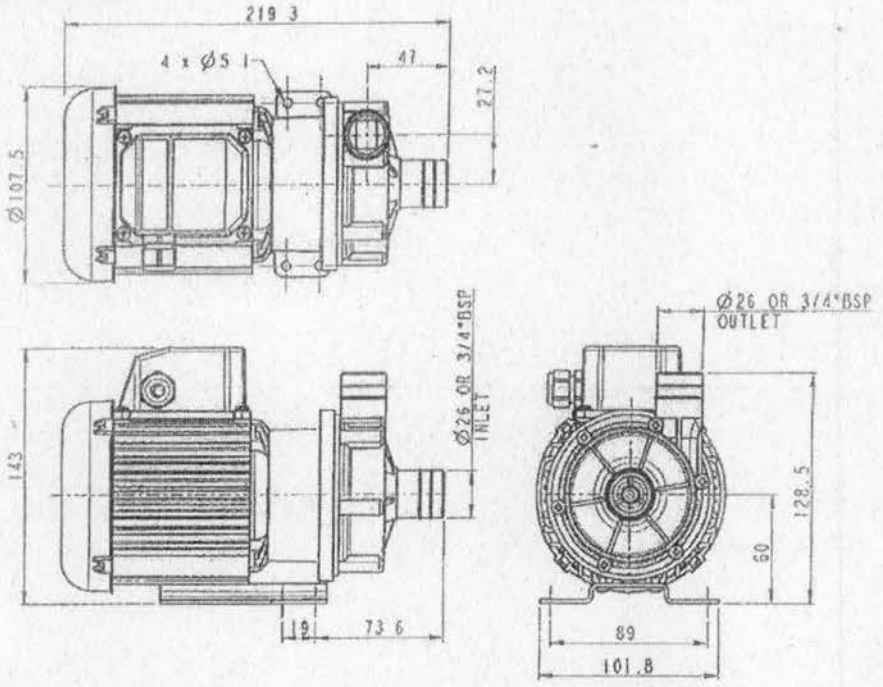
Engineered for life

Issue 3 – September 2008

A50002331

Installation
Drawings not to scale
Dimensions in millimetres

GP80/6

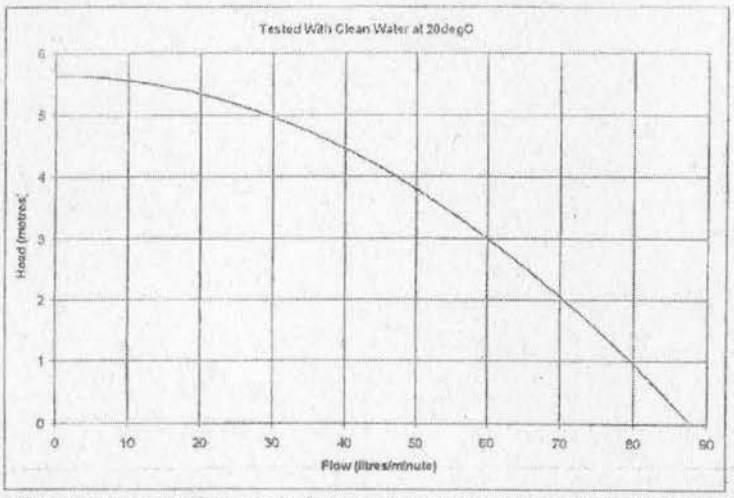


Specification

Model	Overall height (mm)	Overall length (mm)	Overall width (mm)	Weight (kg)	Max body pressure (bar)	Run-out flow rate (l/min)	Closed valve head (m)	Temp range (degC)	*Max specific gravity	Motor output (watts)
GP80/6	143	219	102	3.2	1.4	87	5.7	-20 to +85	1.2	60

*Assuming maximum viscosity of 30cp. Refer to Totton Pumps for higher viscosities and specific gravities

Performance



NOTE: These magnetically coupled pumps are designed for use with clean fluids.
Solids will cause jamming. Abrasives will reduce pump life & invalidate the warranty.
GP pumps are not self priming & are not designed to run dry
The company reserves the right to change specifications

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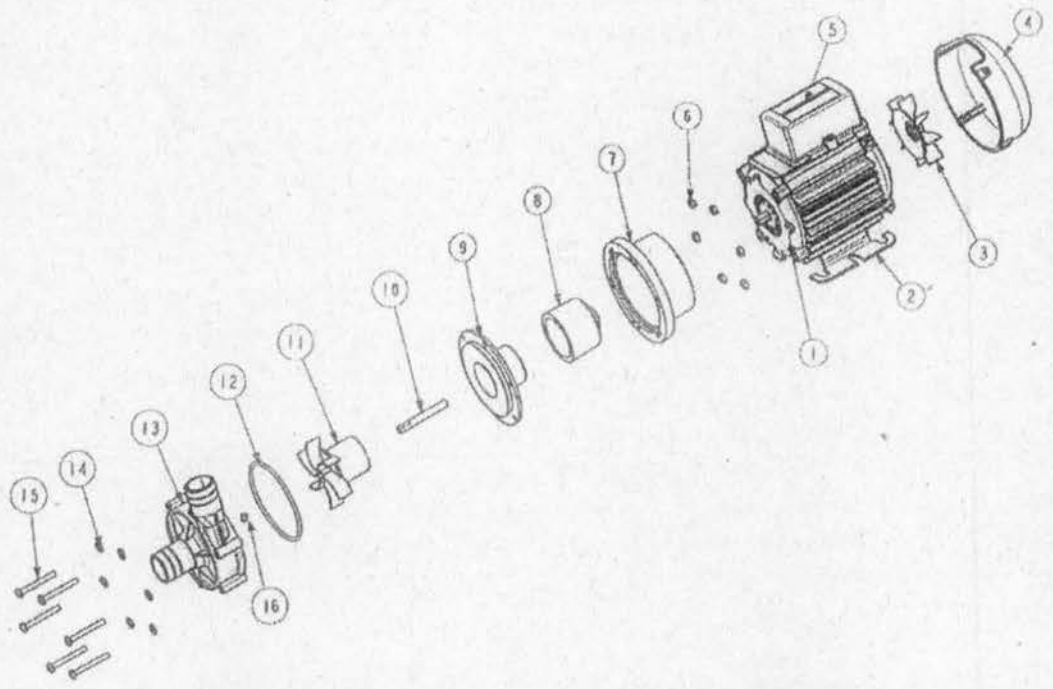
GP80/6

Part List



Item Number	Description	Quantity	Part Number	
1	Motor	1	116842 (230 V)	116875 (110V)
2	Mounting Foot	1	036329	
3	Fan	1	001577	
4	Fan Cowl	1	036085	
5	Terminal Box	1	036078	
6	Nut	6	032105	
7	Adaptor	1	036324	
8	Drive Magnet	1	016541	
9	Spindle Housing	1	016311	
10	Spindle	1	016301	
11	Impeller	1	016267 (50 Hz)	016282 (60 Hz)
12	O ring	1	003398	
13	Pump Body	1	016359 (plain ports PP)	016361 (threaded ports PP)
14	Nut	6	032105	
15	Screw	6	022115	
16	D Washer	1	016225	

Totton Pumps Ltd.
Tel: +44 (0)23 8066 6685
Fax: +44 (0)23 8066 6880
Email: info@totton-pumps.com
Web: totton-pumps.co.uk

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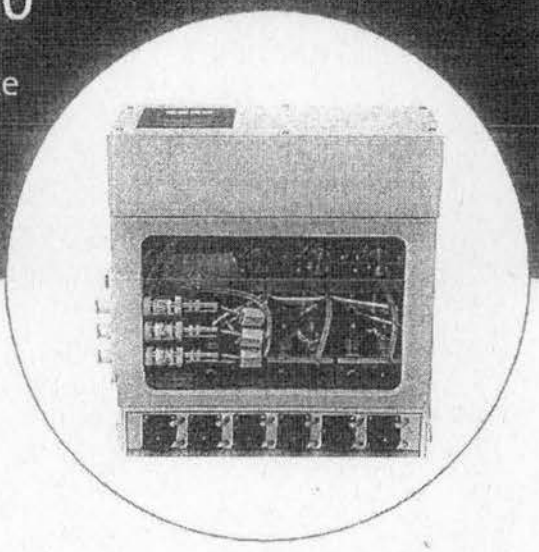
ELGA PROCESS WATER

Cecon 3000

Central Concentrate Supply System



The DWA Cecon 3000 central concentrate supply system transfers the bulk concentrates through a distribution system to individual dialysis points.

ELGA Process Water is the sole UK distributor for DWA's range of dialysis water treatment systems.

Since 1984, DWA has specialised in innovative solutions for the supply of high purity water to dialysis centres worldwide.

Our expertise in water treatment provides solutions from pre-treatment stages, through reverse osmosis, ultrafiltration and hot cleaning systems, directly to the supply connection.

Features and Benefits

- Single centralised concentrate supply system
- Automatic delivery of up to three types of concentrate
- Compact design
- Supply for up to three floors of a building
- Pressure control eliminates the need for additional ventilation

Related Services

Our AQUAservice maintenance agreements are designed to allow you to choose from our wide range of capabilities the level of support you require to meet your application, operational and budgetary needs.

VEOLIA WATER
Solutions & Technologies

Cecon 3000

Dimensions

W x H x D	mm	530 x 520 x 200
Weight	kg	20-22 depending on type

Performance Data

Dialysis Quality		Mixing proportion of 1.35 or 1.44
Supply Capacity	l/hr	48 (per concentrate type)
Minimum Inlet Pressure	bar	0.01
Maximum Inlet Pressure	bar	0.3
Maximum Supply Pressure	bar	2.5
Maximum Ambient Temperature	°C	35

Electrical Connections

Mains Voltage	230 V / 50Hz / 250W
Protection Class	Class 1
Classification according to EN 60601-1	Type B
Protection Category	IP x 2

Equipment

Microprocessor controlled
Automatic pressure control
Automatic ventilation

Manufactured according to MPG/MDD - Group IIa

ELGA Process Water
Marlow International
Parkway, Marlow
Buckinghamshire
SL7 1YL, UK
tel. +44 (0) 1628 897000
fax. +44 (0) 1628 897001
email sales.uk@veoliawater.com
www.elgaprocesswater.co.uk

ELGA Process Water
Orbital House
Redwood Crescent
East Kilbride
G74 5PR, UK
tel. +44 (0) 1355 588140
fax. +44 (0) 1355 588141
email sales.uk@veoliawater.com
www.elgaprocesswater.co.uk

VEOLIA WATER
Solutions & Technologies

NCH/NSGH Renal Plant Meeting – 12/07/13
NSGH Project Offices

Attendees

Brookfield; Darren Pike, Colin Grindlay
Mercury Engineering – Jack Whittam
Currie Brown – David Hall
Elga – Douglas MacAllister
GG&C HB- Andy Barnes, Physics, John McGarrity, Physics (Project team) Margaret McLucas, CSM, Regional Services, Ted Mullen, HOS, Physics

Issues raised from visit to exemplar areas

Drains on media panels – Elgar agreed that 2 drains were specified on these and that all panels will have 2 drains.

Earthing points, Mercury commented that as the panels were plastic coated these were not required to earth bond the panels. MMcL pointed out that these were for patient safety and were required to earth the machines. DP agreed to look at how this is done in other units that have plastic coated panels and indicated that suitable earthing points would be provided at each bed space. BMCE/MEL to revert if they require to view the installation at GRI.

Capping of panel outlets - Brookfield agreed that during the building works, and as part of their QA, all pipe work and outlets will continue to be capped.

Renal Plant Issues

Discussion centred on section 3.2.4 of specifications (SGH CWP Spec. V 3.0 12.02.10)

AB felt that the section 3.2.4 of the specs had not been addressed by the proposals in that 100% redundancy had not been achieved.

DM (Elga) stated their view that this was a matter of interpretation of this section and felt that they had complied with specs set out to them, which required 100% redundancy within the unit. Brookfield & Mercury commented that all other submitted proposals at tender stage were laid out the same way.

AB had experience of an RO control panel failing and therefore whole RO unit not functioning, he felt that contingencies should be put in place for this. Elga stated that there was a manual override (using a key) etc.

In current setup, if RO unit switched to manual, there is no failsafe mechanism in the Nephrosafe. It will not dump to drain automatically on an alarm condition. AB noted that this did not constitute safe operation.

BMCE to explore the possibility of delivering 100% contingency (N+1) via an alternative design solution as the introduction of 5 additional RO units may not be achievable for a variety of reasons.

Elga to clarify where any unused permeate will be recycled to.

Alarm panels

It was agreed as follows: -

Principal panels will all be located within plant areas with mimic/indicator panels provided as follows:

- NSGH OPD workshop – 4 mimic panels (1 for each RO serving inpatients and outpatients)
- NSGH OPD Nurse bases – 2 mimic panels (one for each circuit)
- NSGH Critical care – 1 indicator panel
- NCH workshop – 2 mimic panels (1 for each RO serving NCH and NSGH Critical care)
- NCH Ward areas – 1 mimic panel and 1 indicator panel in main nurse base of GW1 and 2 indicator panels in touchdown base GW1-011.

Other Issues

MM noted an absolute requirement to be able to isolate the Renal water supplies if water treatment is required, for any reason. Brookfield and Mercury to review the current design and advise.

Elga to issue Nephrosafe schematic as the current technical submittal shows excess permeate going back into the system (RO Break Tank) rather than passing through the RO unit.

BMCE to review Outpatient circuits with a view to achieving a 16/14 split of outlets per system rather than the ER requirement for a 15/15 split.

New south Glasgow Hospitals (NSGH)
Renal Water Project

Comments on Elga's response dated 20/03/2013

Andrew Barnes
Section Manager
Medical Physics
Inverclyde Royal Hospital
June 2013

Follow-up to the review of the Technical Submission for the renal water systems, New South Glasgow Hospital

Below are both NHSGG&C and Elga's response with any further action required, the response is as follows:

Section 1 Section of specification that has not been met.
Section 2 Clarification / additional information to Elga.
Section 3 Points of specification that will need to be met by others.

Sections 1 Section of specification that has not been met.

Section 2.10 (2) of specification states "The water treatment plant must have 100% redundancy built in and include duplication of components. There must be appropriate "Bypass" systems installed, with adequate protection to ensure dialysis can take place safely, in the event of a failure of any part of the system."

In relation to the specification section above, please can you confirm that the following is guaranteed for all water treatment plants used for Dialysis treatment?

1. The duplex water softener / scavenger system quoted for all dialysis water treatment plants are capable of this?

2. The Activated carbon filters are duplexed with each filter capable of maintaining the minimum 12 minute empty bed compact time?

Elga- **Point 1:** Confirmed.
Point 2: Confirmed.
GG&C– **No further action needed, Meets specification.**

Section 3.2 of Specification states: "R.O UNITS: The output from the pre treatment system should feed double pass R.O units. The output from the R.O units will be enough to feed dialysis machines at points of use at a minimum 1.5 litres per minute at each outlet with appropriate pressure being maintained throughout the pure water distribution ring. The system must provide ultrapure water as per standards and guidelines referred to in section 1.4 100% redundancy in function within the R.O units is required.

Section 3.2.4: 100% redundancy. The failure of one R.O unit, or one set of membranes / pumps / control circuits should be by-passable and still maintain ultrapure water quality at output rate as detailed in 3.2.1 (1.5 litres per minute at 4 ° C at a pressure between 2.0-5.0 bar.

Elga- Our systems comply with this section. If one stage of our twin pass RO plants should fail, it will produce 100% of the flow on single stage. This will happen automatically. Likewise if a control circuit within the RO plant should fail, pure water flow will continue. The required purified water quality will be maintained throughout, as there are 3 membrane barriers within the system, so the failure of one RO stage will still leave a double membrane barrier in the system.
GG&C–Further information required from Elga process as they mention their RO will still function with the loss of control circuits e.g. how is this done, will it monitor the output, shut down during heat sanitisation etc. However in the Water treatment system overview section 2.10, Point 2 "The water treatment system must have a 100% redundancy built in and include duplication of components. There must be appropriate "Bypass" systems installed, with adequate protection to ensure dialysis can take place safely, In the event of a failure of any part of the system."
The proposed system design includes duplication of reverse osmosis units to comply with this.
This will also need to be discussed by Medical Physics/ Regional services considering the risk's involved compared with elga's proposals and consider ideal plant design e.g. duty/duty/ standby.

In relation to section 3.2 and 3.2.4 I have calculated that in your response you do not meet this requirement. See reasons below.

- **Inpatient area**- 28 off dialysis stations in simultaneous use, each requiring 1.5 litres per minute per station giving a total of 2520 litres per hour.

  In your system details you will provide 2 ELGA Modula 4 twin pass "TP reverse osmosis units plant, each with a design flow of 1500 Litres/hr @ 10° C. This will mean in order to provide 2520 Litres/hr both modula 4 R.O units will be in use to keep up with demand.

  Elga - When read in conjunction with the full text laid out within the client specification document, our system is compliant.
  GG&C–Further action may be required depending on the outcome from section 3.2 and 3.2.4

- **Outpatients, Ready Use & Laboratory area** - 40 off dialysis stations, each requiring 1.5 litres per minute per station giving a total of 3600 litres per hour.

  In your system details you will provide 2 ELGA Modula 5 twin pass "TP reverse osmosis units plant, each with a design flow of 1850 Litres/hr @ 10° C. This will mean in order to provide 3600 Litres/hr both modula 5 R.O units will be in use to keep up with demand.

  In the event of a total R.O failure or if a R.O unit needs to be taken out of service there is not 100% redundancy resulting in a loss of service. If one R.O could maintain both permate loops, no manifold is included to allow this.

  Elga - This area is served by 2 off Modula 6 Twin pass RO plants. These replace the 2 off Modula 5 plants originally proposed and noted on the NHSGG&C comments. The Modula 6 units provide 2,100 litres per hour at 10 deg C. Each of these supplies one Nephro Safe plant which in turn serves one ring main. The points of use are divided equally over the 2 ring mains.
  Therefore each RO/Nephrosafe combination will consistently exceed the requirement
  When read in conjunction with the full text laid out within the client specification document, our system is compliant.
  GG&C–Elga have upgraded the R.O's to a modula 6 to increase the output from 1850 L/hr to 2100 L/hr .Further action may be required depending on the outcome from section 3.2 and 3.2.4

- **Adult critical care Area, National Children's hospital**- In this case each R.O mentioned in the system details has an output of 1800 litres / hr which just meets the 1800 litres / hr demand but there will still be a loss of service as there are no manifold included to allow one R.O to supply both permeate loops.

  Elga - This area is served by 2 off Modula 5 Twin Pass RO plants. Each of these supplies 1 Nephro Safe plant. These then supply 3 off ring mains, one ring main serving 8 points of use (720 litres per hour) is fed from one Nephro Safe. The 2nd Nephro safe plant supplies 2 ring mains (via a manifold system). One ring main serves 7 points of use (630 litres per hour), the other serves 5 points of use within the adult critical care section (450 litres per hour). There is no indication of how many points will be in simultaneous use within the table of user points supplied to us by ZBP. However, even if all points are in simultaneous use, our system is compliant with the full text of the client specification document.
  GG&C–Further action may be required depending on the outcome from section 3.2 and 3.2.4

- All outputs from R.O units are at 10° C please provide at 4° C as output will need to be guaranteed at lower temperatures in the event of a hot water feed failure.

  Elga - Our system has been designed to provide a consistent 10 Deg C incoming feed to the water treatment plants. A hot water feed is no longer required to achieve this, thus the possibility of a hot water failure (as mentioned in the NHSGG&C comments) would not affect the output of our systems.
  GG&C– No further action needed due to the reasons given.

- In your proposals you have included one 0.05 micron ultrafilter to ensure compliance with treated water standards at all times. Since this will be an integral part of the water treatment system we will require 100% redundancy for this. In the event of this failing we will still comply with treated water standards.

  Elga - The client specification makes no mention of ultrafilters - thus there are no requirements in the client specification to comply with relating to ultrafilters. The purpose of this Ultrafilter is to provide a 3rd membrane within our systems to provide additional robustness in producing compliant purified water – although our systems can achieve the required purified water quality without an ultrafilter fitted.

  The supply of a single ultrafilter as part of our NephroSafe unit is a standard arrangement for all ELGA renal systems supplied to NHS hospitals. We have never been required to fit duplex ultrafilters. We have therefore included for a single ultrafilter design as this consistent with NHS requirements. Some users of ELGA systems have opted to purchase and hold a spare Ultrafilter in stock as a contingency measure.

  In summary, the ultra filter fitted should be seen as a design feature in addition to the requirements of the client specification. As a consequence, we comply with the requirements of the client specification on this point.
  GG&C– To be discussed by Regional Service and Medical Physics. Due to Elga's response should we push for 100% redundancy or since this will not affect the water quality we replace when required?

Section 3.4 of specification: "The total volumes of hot water must be provided from pre heated storage tanks without the use of in line instant heaters."

- This has not been met for the Adult critical care area and national children's hospital Heat sanitisation units specified as this includes the use of "instant" heaters.

  Elga - We have selected the HDS heat sanitisation system here as this is the most suitable unit in the ELGA range for the requirements of the Children's Hospital and the Adult Critical Care areas. The HDS consists of a 15 litre capacity tank and has an integral 18kW heating capacity. In-line heaters are also present in some of the ELGA systems, but these are used to maintain the heat sanitisation temperature around the loop once sanitisation temperature has been reached by NephroSafe and HDS units provided.

  In summary, our system complies with the requirements of the client specification.
  GG&C– No further action required due to Elga's response.

Section 5.5 of specification: Contact details (for reference purpose) of two existing users of the system in UK.

- Please provide, so a working example of your system can be viewed.

  Elga- Please find 2 off renal reference sites below:

  Royal Infirmary of Edinburgh
  Supply of renal dialysis water treatment plant for the new "Hub" area within Edinburgh Royal Infirmary, and also provision of new plant together with distribution pipework extension.
  Hub area with duplex water plant and 16 points of use 3rd floor ringmain extension to additional 7 points of use. This extension involved our working around a "Live" ward situation, an illustration our ability to achieve a successful outcome under strict operating conditions.
  For this project ELGA acted as "Principal Contractor" which involved operating within CDM regulations and managing a number of other contractors.
  For further details on this project, please refer to

  John Wilson,
  Engineering Services Manager
  Balfour Beatty Workplace
  Edinburgh Royal Infirmary
  [redacted]

Forth Valley Hospital, Larbert
Supply, installation, commissioning and on-going support of a full central renal dialysis water treatment plant and central concentrate system at Forth Valley Hospital, Larbert.
34 patient stations supplied with renal water and up to 3 off concentrate formulations.
This project illustrates our ability to work within the direction of a main building contractor at a new hospital facility.
For further details on this project, please refer to
Mr Bryan Hynd
Senior Renal Technician
Stirling Road
Larbert
FK5 4WR
Tel: [redacted] e mail bryan.hynd@[redacted]

In addition, we will be happy to provide a full reference list of ELGA renal dialysis water treatment systems in Scotland.
GG&C– No further Action Required. Addition information provided.

Section 2 Clarification / additional information to Elga.

Notes from ELGA Process Water Additional Information/ Clarifications.

- Section 2.1: Please clarify can the supply of ultrapure water be maintained during pre-planned maintenance on the systems?

  Elga- Confirmed. Our systems have been designed to allow the supply of ultrapure water during pre-planned maintenance on the systems.
  GG&C– No further Action Required. Addition information provided.

- Section 2.10: This does not meet specification but due to the reasons stated this may be a justified change. The other solution would be for the R.O's to be specified to maintain the appropriate output at 4° C this would be due to the points stated in Elga process water response regarding bacteria control / running costs. Will speak with clinicians to discuss options.

  Elga- See response to "Bullet Point Relating to RO Outputs (Page 3)" above.
  GG&C– No further action required as Elga state" Our system has been designed to provide a consistent 10 Deg C incoming feed to the water treatment plants. A hot water feed is no longer required to achieve this, thus the possibility of a hot water failure (as mentioned in the NHSGG&C comments) would not affect the output of our systems."

- Section 2.10, Paragraph 5: No stop valve on media panels, using the walther coupling as means of stopping water. Will speak with others if this is an acceptable solution.

  Elga- We refer to our response to this point on our original Technical Submissions. We believe that we comply with client specification on this point - as well as having designed the system correctly and consistently with other ELGA systems successfully operating within the NHS.
  GG&C– This should be discussed by Regional Service and Medical Physics. Would the walther coupling be ok as the only means of turning off the water supply at each bed space?

- Section 3.1.1: This does not meet specification, will liaise with clinicians to confirm this is an acceptable solution.

  Elga- Our original Technical Submissions explain the rationale for the use of general alarms – rather than the specific alarms implied by the client specification.
  GG&C– This should be discussed by Regional Service and Medical Physics. Will a generic be ok for nursing staff?

- Section 3.16: acceptable proposal of additional 2 permate outlets.

  Elga- Noted
  GG&C– No Further action required

- Section 3.2.5: This does not meet specification of heat sanitisible membranes. Since this is not an option elga can provide what are the routine cleaning regimes suggested for non heat sanitisible membranes e.g. Frequency of chemical cleans.

  Elga- The frequency of chemical cleaning of RO membranes depends upon a number of factors, principally;
  1. Permeate Flux. This is a calculation based upon quantity and quality of permeate against system pressure. This allows the determination of membrane fouling
  2. TVC results. Therefore an assessment of bacterial results after the RO will allow the user to trend the performance.
  Chemical cleans on RO membranes are normally carried out by our engineers when required.
  An alternative would be to carry a few spare membranes which would allow any fouled membranes to be removed for "Off Line" cleaning.
  GG&C– Is there a recommendation of minimum number of chemical cleans per annum e.g. 1 per annum.

- Section 3.2.6: see above

  Elga- Please see our response to section 3.2.5 above
  GG&C–No further information requires as membranes provided are not heat sanitisable.

- Section 3.2.8: Does not meet specification. System cannot be monitored / Logged by PC. A number of signals are available for remote monitoring.

  Elga- The ELGA system can provide signals for data logging by PC. We therefore comply with the requirements of the client specification. However, this section within the client specification does not specify what data the client wishes to log and how this is to be done. We will be happy to discuss this aspect further with you, but in the meantime, would refer to our original response to this point in our Technical Submissions.
  GG&C– Please list the information that can be logged and indicate how this is done.

- Section 3.3.2: Due to the length of the Inpatient & Outpatient loops, please provide a sample port in the middle of them.

  Elga- The normal convention would be to take a sample from an appropriate media panel, ie one sited towards the middle of a ring main. This can be easily done from the permeate coupling on the panel.
  Note: We can provide a sterile sampling bag with matching connector to make this process even easier.
  GG&C– Please provide an example of sterile sample bag mentioned.

- Section 3.3.4: Will this label withstand cleaning regimes as per Greater Glasgow and Clyde's infection control policies.

  Elga- We are unclear as to the exact nature of NHS GG&C cleaning regimes, but can comment that the type of labeling proposed has encountered no problems that we know of in the renal systems we have provided previously to other NHS facilities.
  GG&C– Please provide an example of the label.

- Section 3.4.6: Does not meet specification but has an acceptable reason.

  Elga- Noted
  GG&C– No further action required.

- Section 3.5: Please provide a mock up of indicator panel that will be used.

  Elga- We can provide a panel for NHSGG&C to see. However it may be more beneficial to view a working panel on an existing NHS renal installation.
  GG&C– Discuss with regional services / medical physics of the possibility to visit the reference sites.

- Section 4.3 and 4.4: Please explain further how you intend to install pipe work if possible provide drawings for each ward area.
  Further information is required for the 4th floor In-patients area permeate loops size, pipe runs, points of use and number of points in simultaneous use. This may cause future problems as per section 4.2 of specification. This will need to be discussed with Clinical staff.

  Elga- Bearing in mind the requirement to minimise the number of rises and drops in the pipework and the consequent effect that this will have on pressure drops within the system, we have had a number of discussions with Mercury Engineering to optimise the design of the pipe runs. The focus here has been to design out excessive rises and drops. Having completed this process, we have revised the pipework routings, have agreed these with Mercury Engineering and have supplied copies of our revised pipework routing sketches to Mercury Engineering.
  GG&C– Could you describe this further or explain how many excessive rise / drops have been designed out compared to the number that will still be in use

- Section 4.5: This does not meet specification. It is requested testing / validation is done over a period of 4 weeks for each R.O system / water treatment plant. This should not be a one off water quality test.

  Elga- Section 4.5 of client specification states: *"The client must be provided with a set of data demonstrating the correct functioning of the components and compliance of the system with the required standards before the first clinical use of the system. Test procedures and results should be traceable. A period of 4 weeks is required for validation by Renal Technology Department prior to acceptance of the system".*
  This is consistent with the approach to validation taken by most NHS trusts, whereby renal technical staff carries out the 4 weeks water sampling under controlled conditions that they set. The samples are analysed at a laboratory of their choice.
  In our Technical Submission, we have provided for 1 off sample at the conclusion of commissioning – as is standard for the installation of previous renal purified water systems to the NHS.
  If required, ELGA can provide the additional testing implied by the NHSGG&C comments at additional cost.
  GG&C– This meets the specification. Medical Physics and Regional services will need to discuss this further as no technical staff will be onsite during the validation of the new system .

- Section 4.7 & 4.8: Please provide a list of all items within the water treatment system including description, make, model and serial numbers. Also provide electronic drawing of all plant rooms layout, water pipe work and electrical drawings.

  Elga- We have provided lists of all plant items to Mercury Engineering. The plant room layout drawings, pipework schematics and electrical drawings would normally be provided as part of the contract documentation, in finished form, at the conclusion of the contract. Please refer to "Appendix 1" sent with this response for a complete listing of all renal plant items. For completeness, we also send a schematic which you may find helpful.
  GG&C– to clarify, the information required is on completion of installation.

- "All areas" section: This does not meet specification. A key switch would be used so a heat sanitisation cannot be cancelled accidentally. Will need to speak with clinicians if this is acceptable.

  Elga- We note that you plan to discuss this further with clinical colleagues. We will be happy to contribute to this discussion if required.
  GG&C– Discuss with regional services / medical physics. This could be discussed if we visit one of the reference sites.

- 370 Reverse Osmosis units (Page 11, 12 and 13): Further information required to this response.

  Elga- Please let us know what additional information is required so this can be provided.
  GG&C– Will require a copy of specification: Water treatment equipment ref ZBP-XX-XX-SP-500-104 Construction T3, Rev B February 2012 from GG&C project team.

- Addendum A, Renal concentrate system: Please confirm if there are means of monitoring volume and low level alarms, state if this is from main / day tank. If yes, where will this be indicated?

  Elga- We will provide a high and low level indication of the concentrate levels within the 2nd floor plant room where the concentrate day tank and Cecon are sited.
  GG&C– No further action required. As additional information provided.

- Addendum A renal concentrate system: Media panel connector will be ELGA equivalent PEEK plastic not PVDF as in specification. Confirm if this will Mate with the walther LV004-0-SL006 PVDF coupling.

  Elga- The Media panel connector will mate with "Walther" coupling LV004-0-SL006
  GG&C– No further action required, due to information provided.

Section 3 Points of specification that will need to be met by others.

Notes to Contractor

Please confirm that the Feed water supplying both hot and cold water to the plant room is from a designated supply for the renal dialysis water treatment plant. As described in Section 3 of renal association "Guideline on water treatment facilities, dialysis water and dialysis fluid quality for haemodialysis and related therapies".

The following are areas of the specification that will need to be completed by others for the installation of the SGH renal water systems.

- Sect 1.0: Energy and water metering will not be supplied by ELGA.
- Section 2.10, Paragraph 6: Gas, nurse call, power, TV / radio to be provided at bed heads by others.
- Section 3.2.7: Leak detector provided, for this to work the renal water plants will be required to be in a bunded area.
- Section 3.3: Earth potential equalisation points not supplied by elga will need to be provided by others at media panels.

GG&C–these will need to be put to the contractor / Project team for comment.

LF 220

emailed ~~~~ 8/7/15

AIR SAMPLING REQUEST FORM

SAMPLED BY : K Cullen/ B Leave Y
DATE: 29/6/15

Read by.....
Date........ 7/7/15

LOCATION New SGUH 4B

SOURCE	LABORATORY NO.	GROWTH ON SAB 7 DAYS 22°C	30°C	GROWTH ON TSA 7 DAYS 30°C	CUMULATIVE (Ave) PARTICLE COUNTS 0.5μm	ORGANISM ISOLATED (COMMENT)
RM 76	15.1901470.W	✓ 1 Fungi				(F) 22/7 Dematiaceous hyphomycete
RM 76	15.1901471.A		✓ 1 yeast			
RM 77	15.1901472.C	✓ 0				
RM 77	15.1901473.K		✓ 0			
RM 78	15.1901474.J	✓ 0				
RM 78	15.1901475.B	–	✓ 1 yeast			
RM 79	15.1901476.X	✓ 2 yeast				

Sig [redacted] Checked by.. Date ......7/7/15......

Address : Clinical Microbiology, New Lister Building, Alexandra Parade, Glasgow G32 2ER Tel : 0141 201 8546

Fungi sent to Reference Laboratory

A50002331

LF 220

AIR SAMPLING REQUEST FORM

SAMPLED BY : Keller/Blavey
DATE: 29/6/15

Read by.....
Date..... 7/7/15

LOCATION New SGUH 4B

SOURCE	LABORATORY NO.	GROWTH ON SAB 7 DAYS 22°C	GROWTH ON SAB 7 DAYS 30°C	GROWTH ON TSA 7 DAYS 30°C	CUMULATIVE (Ave) PARTICLE COUNTS 0.5µm	ORGANISM ISOLATED (COMMENT)
RM79	15.1901477.L		✓ 0			
RM80	15.1901478.G	✓ 1 FUNGUS				(F) 2217 Dematiaceous hyphomycete
RM80	15.1901479.N		✓ 1 FUNGUS 1 YEAST			(F) 2217 (D) Dematiaceous hyphomycete (E) Yeast Spp
RM81	15.1901480.X	✓ 4 FUNGI				(F) 2217 1) Cladosporium spp 2) Penicillium spp
RM81	15.1901481.L		✓ 1 FUNGUS			(F) 2217 1) Cladosporium spp
RM82	15.1901482.G	✓ 2 FUNGI				(F) 2217 1) Dematiaceous hyphomycete
RM82	15.1901483.N	✓	✓ 0			

Sign [redacted] Checked by..... Date 7/7/15

Address : Clinical Microbiology, New Lister Building, Alexandra Parade, Glasgow G32 2ER Tel : 0141 201 8546

FUNGI SENT TO REFERENCE LABORATORY

A50002331

LF 220

AIR SAMPLING REQUEST FORM

SAMPLED BY : KC/BC
DATE: 29/6/15

Read by....
Date..... 7/7/15

LOCATION New SGH 4B

SOURCE	LABORATORY NO.	GROWTH ON SAB 7 DAYS 22°C	GROWTH ON SAB 7 DAYS 30°C	GROWTH ON TSA 7 DAYS 30°C	CUMULATIVE (Ave) PARTICLE COUNTS 0.5µm	ORGANISM ISOLATED (COMMENT)
RM 83	15.1901484.E	✓ 1 fungi 2 yeast				B 2217 ① Cladosporium spp ② Yeast spp
RM 83	15.1901485.Y		✓ 4 fungi 3 yeast			I 2217 ① Aspergillus sp ② Rhodotorula sp ③ Penicillium sp
RM 84	15.1901486.P	NOT DONE			AS	BOTH DOORS OPEN
RM 84	15.1901487.F	NOT DONE			AS	BOTH DOOR OPEN
RM 85	15.1901488.T	✓ 1 fungi				B 2217 ① Cladosporium sp
RM 85	15.1901489.M	–	✓ 1 yeast			
RM 86	15.1901490.P	✓ 2 yeast				

Sign [redacted] (Actg) Checked by..... Date 7/7/15

Addr [redacted] ter Building, Alexandra Parade, Glasgow G32 2ER Tel : 0141 201 8546

Fungi sent to Mycology

A50002331

LF 220

AIR SAMPLING REQUEST FORM

SAMPLED BY : ICC/BC
DATE: 29/6/15

Read by....
Date.....7/7/15

LOCATION New SGUM 4B

SOURCE	LABORATORY NO.	GROWTH ON SAB 7 DAYS 22°C	GROWTH ON SAB 7 DAYS 30°C	GROWTH ON TSA 7 DAYS 30°C	CUMULATIVE (Ave) PARTICLE COUNTS 0.5µm	ORGANISM ISOLATED (COMMENT)
RM 86	15.1901491.F		✓ 1 yeast			
RM 87	15.1901492.T	✓ 1 yeast				
RM 87	15.1901493.M		✓ 0			
RM 88	15.1901494.V	✓ 1 Fungi				22/7 (F) Cladosporium sp
RM 88	15.1901495.R		✓ 0			
RM 89	15.1901496.D	✓ 1 yeast				
RM 89	15.1901497.S		✓ 0			

Sig [redacted] Checked by..... Date 7/7/15

Address : Clinical Microbiology, New Lister Building, Alexandra Parade, Glasgow G32 2ER Tel : 0141 201 8546

Fungi sent to reference laboratory

A50002331

LF 220

AIR SAMPLING REQUEST FORM

SAMPLED BY: KC/BL
DATE: 29/6/15

Read by.....
Date..... 2/7/15

LOCATION New SGUH 4B

SOURCE	LABORATORY NO.	GROWTH ON SAB 7 DAYS 22°C	GROWTH ON SAB 7 DAYS 30°C	GROWTH ON TSA 7 DAYS 30°C	CUMULATIVE (Ave) PARTICLE COUNTS 0.5µm	ORGANISM ISOLATED (COMMENT)
RM 90	15.1901498.Z	✓ 0				
RM 90	15.1901499.Q		✓ 0			
RM 91	15.1901500.M	✓ 2 Fungi 2 Yeast				F 22/7 1) Dematiaceous hyphomycete 2) Yeast spp
RM 91	15.1901501.V	=	✓ 1 Fungi 1 Yeast			F 22/7 1) Dematiaceous hyphomycete 2) Yeast spp
RM 92	15.1901502.R	✓ 1 Fungi				I Interim 22/7 1) mould
RM 92	15.1901503.D	–	✓ 1 Yeast			
RM 93	15.1901504.S	✓ 4 Fungi 2 Yeast				F 22/7 1) Cladosporium sp 2) mould

[redacted] (Approved)

Checked by..... Date 2/7/15

[redacted] ...ster Building, Alexandra Parade, Glasgow G32 2ER Tel : 0141 201 8546

Fungus send to reference laboratory

A50002331

LF 220

AIR SAMPLING REQUEST FORM

SAMPLED BY : KC/BL
DATE: 29/6/15

Read by.....
Date..... 7/7/15

LOCATION New SGUH 4B

SOURCE	LABORATORY NO.	GROWTH ON SAB 7 DAYS 22°C	GROWTH ON SAB 7 DAYS 30°C	GROWTH ON TSA 7 DAYS 30°C	CUMULATIVE (Ave) PARTICLE COUNTS 0.5µm	ORGANISM ISOLATED (COMMENT)
RM 93	15.1901505.Z		✓ 5 yeast			
RM 94	15.1901506.Q	✓ 1 Fungi				(P) 2217 (1) Dematiaceous hyphomycete (2) Yeast spp
RM 94	15.1901507.H		✓ 0			
RM 95	15.1901508.W	✓ 3 yeast				
RM 95	15.1901509.A		✓ 2 yeast			
RM 96	15.1901510.Q	✓ 3 yeast				
RM 96	15.1901511.H		✓ 2 Fungi			(F) 2217 (1) Alternaria sp (2) Hyaline hyphomycete

Si[redacted] Checked by..... Date 7/7/15

Address : Clinical Microbiology, New Lister Building, Alexandra Parade, Glasgow G32 2ER Tel : 0141 201 8546

Fungi sent to Reference Laboratory

A50002331

LF 220

AIR SAMPLING REQUEST FORM

SAMPLED BY : KC/BC
DATE: 29/6/15

Read by.....
Date..... 7/7/15

LOCATION New SGUH 4/3

SOURCE	LABORATORY NO.	GROWTH ON SAB 7 DAYS 22°C	GROWTH ON SAB 7 DAYS 30°C	GROWTH ON TSA 7 DAYS 30°C	CUMULATIVE (Ave) PARTICLE COUNTS 0.5µm	ORGANISM ISOLATED (COMMENT)
RM 97	15.1901512.W	✓ 1 Fungus 1 yeast				(F) 22/7 1) Cladosporium sp 2) Yeast sp
RM 97	15.1901513.A		✓ 0			
RM 98	15.1901514.C	✓ 5 yeast				
RM 98	15.1901515.K		✓ 3 yeasts			
RM 99	15.1901516.J	✓ 2 Fungi 1 yeast				(F) 22/7 1) Cladosporium sp 2) Yeast sp
RM 99	15.1901517.B	—	✓ 0			
Corridor	15.1901518.X	5 Fungi 2 yeasts				Room 97 END (F) 22/7 1) Cladosporium sp 2) Hyalinehyphomycete 3) Rhodotorula sp

Signed [redacted] (TRW) Checked by..... Date 7/7/15

Addres[redacted] Building, Alexandra Parade, Glasgow G32 2ER Tel : 0141 201 8546

FUNGI SENT TO REFERENCE LABORATORY

A50002331

LF 220

AIR SAMPLING REQUEST FORM

SAMPLED BY : KC/BC
DATE: 29/6/15

Read by.....
Date..... 7/7/15

LOCATION New SGUH 4B

SOURCE	LABORATORY NO.	GROWTH ON SAB 7 DAYS 22°C	GROWTH ON SAB 7 DAYS 30°C	GROWTH ON TSA 7 DAYS 30°C	CUMULATIVE (Ave) PARTICLE COUNTS 0.5µm	ORGANISM ISOLATED (COMMENT)
Corridor	15.1901519.L		1 Fungus 6 yeasts			Rm 97 END (B) 22/7 1) Cladosporium sp 2) Rhodotorula sp 3) Yeast sp

[redacted] (A33mm)

Checked by..... Date 7/7/15

Address : Clinical Microbiology, New Lister Building, Alexandra Parade, Glasgow G32 2ER Tel : 0141 201 8546

FUNGAL SENT TO MYCOLOGY

A50002331

GLASGOW MICROBIOLOGY SERVICES NHS GREATER GLASGOW & CLYDE Enquiries [redacted]
SOUTH SECTOR LABORATORY

Patient / Specimen details

SCREEN ENVIROMENTAL	CHI No.	[redacted]	Cons/GP Not known
	Hosp. No.	U	Loc. Bacteriology GRI
	D.O.B.	NK	Coll'd 29.06.2015 NK
	Sex	U	Rec'd 08.07.2015 14:39
			Senders ref. no.
Mycology Culture	Order No.		[redacted]
Isolate Air sampling			Copy to:
Wd4B Rm.76			Bacteriology GRI

---

* FINAL REPORT *

Direct culture yields :

a) Dematiaceous hyphomycete
b)
c)

S = Sensitive
R = Resistant
D = Sensitive dose dependant

1 colony

Authorised by Lynn Brown
Reported 13.07.2015 16:45

Lab No. [redacted]

A50002331

GLASGOW MICROBIOLOGY SERVICES NHS GREATER GLASGOW & CLYDE Enquiries [redacted]
SOUTH SECTOR LABORATORY

Patient / Specimen details
SCREEN ENVIROMENTAL

CHI No.	[redacted]	Cons/GP	Not known
Hosp. No.	U	Loc.	Bacteriology GRI
D.O.B.	NK	Coll'd	29.06.2015 NK
Sex	U	Rec'd	08.07.2015 14:39
			Senders ref. no.
Order No.			[redacted]
			Copy to:
			Bacteriology GRI

Mycology Culture
Isolate Air sampling
Wd.4B, Rm 80

---

* FINAL REPORT *

Direct culture yields :

a) Dematiaceous hyphomycete
b)
c)

S = Sensitive
R = Resistant
D = Sensitive dose dependant

1 colony

Authorised by Lynn Brown
Reported 13.07.2015 16:45

Lab No. [redacted]

A50002331

GLASGOW MICROBIOLOGY SERVICES NHS GREATER GLASGOW & CLYDE Enquiries [redacted]
SOUTH SECTOR LABORATORY

Patient / Specimen details

SCREEN ENVIROMENTAL

CHI No.	[redacted]	Cons/GP	Not known
Hosp. No.	U	Loc.	Bacteriology GRI
D.O.B.	NK	Coll'd	29.06.2015 NK
Sex	U	Rec'd	08.07.2015 14:39
			Senders ref. no.
Order No.			[redacted]
			Copy to:
			Bacteriology GRI

Mycology Culture
Isolate Air sampling
Wd.4B, Rm.80

---

* FINAL REPORT *

Direct culture yields :

a) Dematiaceous hyphomycete
b) Yeast species
c)

S = Sensitive
R = Resistant
D = Sensitive dose dependant

1 colony of both

Authorised by Lynn Brown
Reported 13.07.2015 16:46

Lab No. [redacted]

GLASGOW MICROBIOLOGY SERVICES NHS GREATER GLASGOW & CLYDE Enquiries [redacted]
SOUTH SECTOR LABORATORY

Patient / Specimen details

SCREEN ENVIROMENTAL

CHI No.	[redacted]	Cons/GP	Not known
Hosp. No.	U	Loc.	Bacteriology GRI
D.O.B.	NK	Coll'd	29.06.2015 NK
Sex	U	Rec'd	08.07.2015 14:39
			Senders ref. no.
Order No.			[redacted]
			Copy to:
			Bacteriology GRI

Mycology Culture
Isolate Air sampling
Wd.4B, Rm.81

---

* FINAL REPORT *

Direct culture yields :

a) Cladosporium species
b) Penicillium species
c)

S = Sensitive
R = Resistant
D = Sensitive dose dependant

4 colonies of Clad. sp
1 colony of Pen sp.

Authorised by Lynn Brown
Reported 13.07.2015 16:46

Lab No. [redacted]

GLASGOW MICROBIOLOGY SERVICES NHS GREATER GLASGOW & CLYDE Enquiries [redacted]
SOUTH SECTOR LABORATORY

Patient / Specimen details
SCREEN ENVIROMENTAL

CHI No.	[redacted]	Cons/GP	Not known
Hosp. No.	U	Loc.	Bacteriology GRI
D.O.B.	NK	Coll'd	29.06.2015 NK
Sex	U	Rec'd	08.07.2015 14:39
			Senders ref. no.
Order No.			[redacted]
			Copy to:
			Bacteriology GRI

Mycology Culture
Isolate Air sampling
Wd.4B, Rm 81

---

* FINAL REPORT *

Direct culture yields :

a) Cladosporium species
b)
c)

S = Sensitive
R = Resistant
D = Sensitive dose dependant

1 colony

Authorised by Lynn Brown
Reported 13.07.2015 16:46

Lab No. [redacted]

A50002331

GLASGOW MICROBIOLOGY SERVICES NHS GREATER GLASGOW & CLYDE Enquiries [redacted]
SOUTH SECTOR LABORATORY

Patient / Specimen details

SCREEN ENVIROMENTAL	CHI No.	[redacted]	Cons/GP Not known
	Hosp. No.	U	Loc. Bacteriology GRI
	D.O.B.	NK	Coll'd 29.06.2015 NK
	Sex	U	Rec'd 08.07.2015 14:39
			Senders ref. no.
Mycology Culture	Order No.		[redacted]
Isolate Air sampling			Copy to:
Wd.4B, Rm.82			Bacteriology GRI

---

* FINAL REPORT *

Direct culture yields :

a) Dematiaceous hyphomycete
b)
c)

S = Sensitive
R = Resistant
D = Sensitive dose dependant

5 colonies

Authorised by Lynn Brown
Reported 13.07.2015 16:46

Lab No. [redacted]

A50002331

GLASGOW MICROBIOLOGY SERVICES NHS GREATER GLASGOW & CLYDE Enquiries [redacted]
SOUTH SECTOR LABORATORY

Patient / Specimen details

SCREEN ENVIROMENTAL	CHI No.	[redacted]	Cons/GP Not known
	Hosp. No.	U	Loc. Bacteriology GRI
	D.O.B.	NK	Coll'd 29.06.2015 NK
	Sex	U	Rec'd 08.07.2015 14:39
			Senders ref. no.
Mycology Culture	Order No.		[redacted]
Isolate Air sampling			Copy to:
Wd.4B, Rm.83			Bacteriology GRI

---

* FINAL REPORT *

Direct culture yields :

a) Cladosporium species
b) Yeast species
c)

S = Sensitive
R = Resistant
D = Sensitive dose dependant

1 colony of Clad.sp
2 cols of yeast sp

Authorised by Lynn Brown
Reported 13.07.2015 16:46

Lab No. [redacted]

A50002331

GLASGOW MICROBIOLOGY SERVICES NHS GREATER GLASGOW & CLYDE Enquiries [redacted]
SOUTH SECTOR LABORATORY

Patient / Specimen details

SCREEN ENVIROMENTAL

CHI No.	[redacted]	Cons/GP	Not known
Hosp. No.	U	Loc.	Bacteriology GRI
D.O.B.	NK	Coll'd	29.06.2015 NK
Sex	U	Rec'd	08.07.2015 14:39
			Senders ref. no.
Order No.			[redacted]
			Copy to:
			Bacteriology GRI

Mycology Culture
Isolate Air sampling
Wd.4B, Rm.83

---

* INTERIM REPORT * - Further report to follow

Direct culture yields :

a) Aspergillus species
b) Penicillium species
c) Rhodotorula species

S = Sensitive
R = Resistant
D = Sensitive dose dependant

1 colony of Aspergillus sp.
3 colonies of Pen. sp.
1 colony of Rhod.sp.
plus 1 colony of yeast sp.
Further/additional results may follow.

Authorised by Lynn Brown
Reported 15.07.2015 09:24

Lab No. [redacted]

GLASGOW MICROBIOLOGY SERVICES NHS GREATER GLASGOW & CLYDE Enquiries [redacted]
SOUTH SECTOR LABORATORY

Patient / Specimen details
SCREEN ENVIROMENTAL

CHI No.	[redacted]	Cons/GP	Not known
Hosp. No.	U	Loc.	Bacteriology GRI
D.O.B.	NK	Coll'd	29.06.2015 NK
Sex	U	Rec'd	08.07.2015 14:39
			Senders ref. no.
Order No.			[redacted]
			Copy to:
			Bacteriology GRI

Mycology Culture
Isolate Air sampling
Wd.4B, Rm.85

---

* FINAL REPORT *

Direct culture yields :

a) Cladosporium species
b)
c)

S = Sensitive
R = Resistant
D = Sensitive dose dependant

1 colony

Authorised by Lynn Brown
Reported 13.07.2015 16:47
A50002331

Lab No. [redacted]

GLASGOW MICROBIOLOGY SERVICES NHS GREATER GLASGOW & CLYDE Enquiries [redacted]
SOUTH SECTOR LABORATORY

Patient / Specimen details
SCREEN ENVIROMENTAL

CHI No.	[redacted]	Cons/GP	Not known
Hosp. No.	U	Loc.	Bacteriology GRI
D.O.B.	NK	Coll'd	29.06.2015 NK
Sex	U	Rec'd	08.07.2015 14:39
			Senders ref. no.
Order No.			[redacted]
			Copy to:
			Bacteriology GRI

Mycology Culture
Isolate Air sampling
Wd.4B, Rm.88

---

* FINAL REPORT *

Direct culture yields :

a) Cladosporium species
b)
c)

S = Sensitive
R = Resistant
D = Sensitive dose dependant

1 colony

Authorised by Lynn Brown
Reported 13.07.2015 16:47

Lab No. [redacted]

A50002331

GLASGOW MICROBIOLOGY SERVICES NHS GREATER GLASGOW & CLYDE Enquiries [redacted]
SOUTH SECTOR LABORATORY

Patient / Specimen details
SCREEN ENVIROMENTAL

CHI No.	[redacted]	Cons/GP	Not known
Hosp. No.	U	Loc.	Bacteriology GRI
D.O.B.	NK	Coll'd	29.06.2015 NK
Sex	U	Rec'd	08.07.2015 14:39
			Senders ref. no.
Order No.			[redacted]
			Copy to:
			Bacteriology GRI

Mycology Culture
Isolate Air sampling
wd.4B, rm.91

---

* FINAL REPORT *

Direct culture yields :

a) Dematiaceous hyphomycete
b) Yeast species
c)

S = Sensitive
R = Resistant
D = Sensitive dose dependant

Dem. hyphomycete = 1 colony
yeast sp. = 2 cols

Authorised by Lynn Brown
Reported 13.07.2015 16:47

Lab No. [redacted]

A50002331

GLASGOW MICROBIOLOGY SERVICES NHS GREATER GLASGOW & CLYDE Enquiries [redacted]
SOUTH SECTOR LABORATORY

Patient / Specimen details

SCREEN ENVIROMENTAL	CHI No.	[redacted]	Cons/GP Not known
	Hosp. No.	U	Loc. Bacteriology GRI
	D.O.B.	NK	Coll'd 29.06.2015 NK
	Sex	U	Rec'd 08.07.2015 14:39
			Senders ref. no.
Mycology Culture	Order No.		[redacted]
Isolate Air sampling			Copy to:
wd.4B, r.91			Bacteriology GRI

---

* FINAL REPORT *

Direct culture yields :

a) Dematiaceous hyphomycete
b) Yeast species
c)

S = Sensitive
R = Resistant
D = Sensitive dose dependant

1 colony of both

Authorised by Lynn Brown
Reported 13.07.2015 16:47

Lab No. [redacted]

GLASGOW MICROBIOLOGY SERVICES NHS GREATER GLASGOW & CLYDE Enquiries [redacted]
SOUTH SECTOR LABORATORY

Patient / Specimen details

SCREEN ENVIROMENTAL	CHI No.	[redacted]	Cons/GP Not known
	Hosp. No.	U	Loc. Bacteriology GRI
	D.O.B.	NK	Coll'd 29.06.2015 NK
	Sex	U	Rec'd 08.07.2015 14:39
			Senders ref. no.
Mycology Culture	Order No.		[redacted]
Isolate Air sampling			Copy to:
wd.4B, rm. 9			Bacteriology GRI

---

* INTERIM REPORT * - Further report to follow

Direct culture yields :

a) Mould
b)
c)

S = Sensitive
R = Resistant
D = Sensitive dose dependant

1 colony
Further/additional results may follow.

Authorised by Lynn Brown
Reported 15.07.2015 09:24

Lab No. [redacted]

A50002331

GLASGOW MICROBIOLOGY SERVICES NHS GREATER GLASGOW & CLYDE Enquiries [redacted]
SOUTH SECTOR LABORATORY

Patient / Specimen details

SCREEN ENVIROMENTAL	CHI No.	[redacted]	Cons/GP Not known
	Hosp. No.	U	Loc. Bacteriology GRI
	D.O.B.	NK	Coll'd 29.06.2015 NK
	Sex	U	Rec'd 08.07.2015 14:39
			Senders ref. no.
Mycology Culture	Order No.		[redacted]
Isolate Air sampling			Copy to:
wd.4B, rm.93			Bacteriology GRI

---

* FINAL REPORT *

Direct culture yields :

a) Cladosporium species
b) Mould
c)

S = Sensitive
R = Resistant
D = Sensitive dose dependant

4 colonies of Clad.sp.
Environmental mould not recognised as a mould commonly associated with humans.

1 colony of mould sp.

Authorised by Lynn Brown
Reported 15.07.2015 08:59

Lab No. [redacted]

A50002331

GLASGOW MICROBIOLOGY SERVICES NHS GREATER GLASGOW & CLYDE Enquiries [redacted]
SOUTH SECTOR LABORATORY

Patient / Specimen details

SCREEN ENVIROMENTAL

CHI No.	[redacted]	Cons/GP	Not known
Hosp. No.	U	Loc.	Bacteriology GRI
D.O.B.	NK	Coll'd	29.06.2015 NK
Sex	U	Rec'd	08.07.2015 14:39
			Senders ref. no.
Order No.			[redacted]
			Copy to:
			Bacteriology GRI

Mycology Culture
Isolate Air sampling
wd.4B, rm.94

---

* FINAL REPORT *

Direct culture yields :

a) Dematiaceous hyphomycete
b) Yeast species
c)

S = Sensitive
R = Resistant
D = Sensitive dose dependant

1 colony of both

Authorised by Lynn Brown
Reported 13.07.2015 16:48

Lab No. [redacted]

A50002331

GLASGOW MICROBIOLOGY SERVICES NHS GREATER GLASGOW & CLYDE Enquiries [redacted]
SOUTH SECTOR LABORATORY

Patient / Specimen details

SCREEN ENVIROMENTAL

CHI No.	[redacted]	Cons/GP	Not known
Hosp. No.	U	Loc.	Bacteriology GRI
D.O.B.	NK	Coll'd	29.06.2015 NK
Sex	U	Rec'd	08.07.2015 14:39
			Senders ref. no.
Order No.			[redacted]
			Copy to:
			Bacteriology GRI

Mycology Culture
Isolate Air sampling
wd.4B, rm.96

---

* FINAL REPORT *

Direct culture yields :

a) Alternaria species
b) Hyaline hyphomycete
c)

S = Sensitive
R = Resistant
D = Sensitive dose dependant

1 colony of both

Authorised by Lynn Brown
Reported 13.07.2015 16:48

Lab No. [redacted]

GLASGOW MICROBIOLOGY SERVICES NHS GREATER GLASGOW & CLYDE Enquiries [redacted]
SOUTH SECTOR LABORATORY

Patient / Specimen details

SCREEN ENVIROMENTAL

CHI No.	[redacted]	Cons/GP	Not known
Hosp. No.	U	Loc.	Bacteriology GRI
D.O.B.	NK	Coll'd	29.06.2015 NK
Sex	U	Rec'd	08.07.2015 14:39
			Senders ref. no.
Order No.			[redacted]
			Copy to:
			Bacteriology GRI

Mycology Culture
Isolate Air sampling
wd.4B, rm.97

---

* FINAL REPORT *

Direct culture yields :

a) Cladosporium species
b) Yeast species
c)

S = Sensitive
R = Resistant
D = Sensitive dose dependant

1 colony of both

Authorised by Lynn Brown
Reported 13.07.2015 16:48

Lab No. [redacted]

A50002331

GLASGOW MICROBIOLOGY SERVICES NHS GREATER GLASGOW & CLYDE Enquiries [redacted]
SOUTH SECTOR LABORATORY

Patient / Specimen details

SCREEN ENVIROMENTAL	CHI No.	[redacted]	Cons/GP Not known
	Hosp. No.	U	Loc. Bacteriology GRI
	D.O.B.	NK	Coll'd 29.06.2015 NK
	Sex	U	Rec'd 08.07.2015 14:39
			Senders ref. no.
Mycology Culture	Order No.		[redacted]
Isolate Air sampling			Copy to:
wd.4B, rm.99			Bacteriology GRI

---

* FINAL REPORT *

Direct culture yields :

a) Cladosporium species
b) Yeast species
c)

S = Sensitive
R = Resistant
D = Sensitive dose dependant

2 colonies of Clad. sp.
1 colony of yeast

Authorised by Lynn Brown
Reported 13.07.2015 16:48

Lab No. [redacted]

GLASGOW MICROBIOLOGY SERVICES NHS GREATER GLASGOW & CLYDE Enquiries [redacted]
SOUTH SECTOR LABORATORY

Patient / Specimen details
SCREEN ENVIROMENTAL

CHI No.	[redacted]	Cons/GP	Not known
Hosp. No.	U	Loc.	Bacteriology GRI
D.O.B.	NK	Coll'd	29.06.2015 NK
Sex	U	Rec'd	08.07.2015 14:39
			Senders ref. no.
Order No.			[redacted]
			Copy to:
			Bacteriology GRI

Mycology Culture
Isolate Air sampling
wd4B,corrido

---

* FINAL REPORT *

Direct culture yields :

a) Cladosporium species
b) Hyaline hyphomycete
c) Rhodotorula species

S = Sensitive
R = Resistant
D = Sensitive dose dependant

3 colonies of Clad.sp
2 colonies of Hyaline hyphomycete
1 colony of Rhod.sp
plus 1 colony of yeast species.

Authorised by Lynn Brown
Reported 13.07.2015 16:49

Lab No. [redacted]

GLASGOW MICROBIOLOGY SERVICES NHS GREATER GLASGOW & CLYDE Enquiries [redacted]
SOUTH SECTOR LABORATORY

Patient / Specimen details
SCREEN ENVIROMENTAL

CHI No. [redacted]
Hosp. No. U
D.O.B. NK
Sex U

Cons/GP Not known
Loc. Bacteriology GRI
Coll'd 29.06.2015 NK
Rec'd 08.07.2015 14:39
Senders ref. no.
[redacted]

Mycology Culture
Isolate Air sampling
wd4B,corrid

Order No.

Copy to:
Bacteriology GRI

---

* FINAL REPORT *

Direct culture yields :

a) Cladosporium species
b) Rhodotorula species
c) Yeast species

S = Sensitive
R = Resistant
D = Sensitive dose dependant

1 colony of Clad.sp
2 colonies of Rhod.sp
4 colonies of yeast sp.

Authorised by Lynn Brown
Reported 13.07.2015 16:49

Lab No. [redacted]

A50002331

NHS Greater Glasgow & Clyde

Acute Services Committee **March 2017**

Gary Jenkins
Director, Regional Services

Paper No: 17/??

BONE MARROW TRANSPLANTATION: OPTIONS APPRAISAL

Recommendation

The Acute Services Committee is asked to agree the temporary relocation of BMT Services to 4B QEUH.

At the same time, BMT services should be considered as part of the acute services review of cancer services to deliver a longer term sustainable option that meets both service and environmental considerations.

This recommendation is made on the basis that service delivery considerations require prioritisation over the Infection Control and Prevention Teams concerns on meeting national standards and HPS recommendations.

Purpose of Paper

This paper details the option appraisal of potential locations for the Adult BMT service within NHS Greater Glasgow and Clyde.

It describes the options considered against agreed benefit criteria with clear recommendations on the preferred option to deliver this service both in the short and longer term.

Key Issues to be considered

Key issues that need to be considered are:

- Impact on Staffing arrangements including out of hours cover
- Delivery of environmental standards
- Delivery of service standards
- Strategic fit with longer term direction of cancer services
- Timescale to deliver; and
- Long term sustainability.

Any Patient Safety /Patient Experience Issues

There are patient safety/experience issues with the current arrangements.

Any Financial Implications from this Paper

There are capital works required to implement Option Two.

Any Staffing Implications from this Paper

Yes

Any Equality Implications from this Paper

No

Any Health Inequalities Implications from this Paper

No

Has a Risk Assessment been carried out for this issue? If yes, please detail the outcome.

A service risk assessment of the current arrangement was carried out in 2016. A risk assessment of each option is detailed in section six of this paper.

Highlight the Corporate Plan priorities to which your paper relates

BMT Services are specifically highlighted in the corporate plan.

Author Gary Jenkins
Contact gary.jenkins@[redacted]
Date 1st March, 2017

1. Introduction

This paper details the option appraisal of potential locations for the Adult BMT service within NHS Greater Glasgow and Clyde.

It describes the options considered against agreed benefit criteria as well as a risk assessment of each option with clear recommendations on the preferred option to deliver this service both in the short and longer term.

2. Background

The BMT service moved to the QEUH in May 2015 due to concerns that the planned level of support for acutely unwell patients on the Gartnavel General Hospital (GGH) site would be insufficient for such a high intensity speciality and would not meet the JACIE accreditation standards. The move also allowed for an increase of beds from 19 to 24 to support the agreed increase in the national transplant programme. Capital funding of [redacted] was invested to support enabling works to 4B such as the upgrade air filtration plant.

Unfortunately, the unit had to return to the Beatson West of Scotland Cancer Centre in July 2015 following the identification of air quality issues in the new transplant unit. This return was predicated on it being short-term with further remedial works to be undertaken to improve the air quality in ward 4B, QEUH to acceptable levels. Remedial works were completed by October 2015 and at this time the service began to make plans to move back to QEUH.

The Infection Control Team raised concerns regarding the specification of works that had been completed and requested input from Health Protection Scotland (HPS) at this time. Following the receipt of recommendations from HPS with regard to the required specification (Appendix One), the Infection Control Team advised that the specification did not meet the required environmental standards for a BMT Unit and therefore, they were unable to support return to the QEUH.

A further schedule of works was agreed and scoped in early 2016 requiring additional costs of c. [redacted] which would deliver further improvements but would still fail to meet the full specification outlined by HPS in the following areas:

- HEPA Filtered Corridors;
- Room Air Changes of 10/hour;
- Room Positive Pressure of 10pa.

It was therefore concluded that whilst further improvements could be made to facilities within 4B, due to limitations of the current plant and lack of space to expand, the fourth floor QEUH could not be configured to meet the full specification of requirements as detailed by HPS/Infection Control.

In the autumn of 2016, a further feasibility study commenced into potential options utilising retained estate on the QEUH site as well as the Laboratory Building and GRI, the study was supported by Currie and Brown. A report was produced in January 2017 detailing a technical and financial analysis of 6 options to be considered as part of the optional appraisal exercise.

A group representing the Clinical Team, Infection Control, Capital Planning, Estates and Regional Service Management met twice in February, 2017 to consider the report, review the options within the

feasibility study and make recommendations on the options to the Board. The membership of this group is detailed in Appendix Two.

3. Current Service

NHS Greater Glasgow and Clyde is commissioned by National Services Division to provide all adult donor stem cell transplantation for the population of Scotland. The national service covers both stem cell donation from family members and unrelated donors. The SLA value in 2016/17 was [redacted] for 70 transplants. This is proposed to increase to [redacted] for 73 in 2017/18.

The West of Scotland Haemopoietic Stem Cell Transplant Service was established in 1980, when the first sibling donor transplant was performed. Autologous stem cell transplantation was introduced in 1982 and the use of unrelated donors for allogeneic transplant from 1988. From 2006, the Service was designated to provide a National Service for alternative donor transplantation, which includes volunteer unrelated, cord blood and haplo-identical donors.

In 2012, NSD performed a review of adult allogeneic transplant provision in Scotland. This concluded that there should only be a single centre providing allogeneic haemopoietic stem cell transplantation in Scotland and that Centre should be in Glasgow. The Service started taking all the sibling donor transplants from Edinburgh and Aberdeen in 2015.

The review had suggested that the number of patients being transplanted in Scotland was less than elsewhere in the UK and predicted 75 patients a year should be receiving allogeneic transplants, increasing to 85 p.a. It is expected that transplant activity will increase to this level and possibly beyond short to medium term. It was anticipated that the Service would move to the new QEUH in summer 2015 and would have more beds to accommodate the predicted increase in activity.

Transplant numbers are predicted to continue rising. This is because the incidence of haematological malignancy is rising in the population and also increases with age. Transplant outcomes have improved significantly in the past few years for older patients and so, the median age of patients at the time of transplant has also risen. In addition, the improvement in outcome for transplants using haplo-identical donors broadens, meaning these are being utilised in patients who otherwise would not previously have had a donor option.

Currently the unit is performing around 70 allografts per year, the agreed level of activity with NSD is 70 allografts for 2016-17, and 73 for 2017-2018. In addition, the unit performs almost all the autologous transplants for the West of Scotland, currently around 90 transplants per annum, which is also increasing (~60 in 2015, 80 in 2016). This activity is also likely to continue to rise.

4. Option Appraisal

The option appraisal was conducted over two meetings in February 2017. The first meeting was to agree the options to be considered as well as benefits criteria and weighting. The second meeting then proceeded to scoring of the agreed options to provide a ranking of the available options.

4.1 Options Considered

A long list of 8 options was included in the feasibility study, and these were discussed in depth at the Group's first meeting. The capital cost of the options range from [redacted], however, the group's appraisal did not take cost into account, using the preferred Capital Investment Manual methodology of Weighted Benefits Scoring.

At the initial meeting, the Group agreed that four of the options were not feasible at all, based on the findings of Currie and Brown.

This left four options to take forward to scoring:

- remain at BWOSCC;
- return to Level 4 QEUH;
- relocate to the roof of the existing QEUH maternity building;
- relocate to the Institute of Neurological Sciences' Neurology Building at QEUH.

No	Description	Comments
1.	**Remain at BWOSCC**	Would require significant changes to level of clinical support on site
2.	**Return to QEUH Level 4**	Unlikely to be a long term option Quality of build environment is main issue
3.	**QEUH Maternity roof**	Difficult to sustain services during construction, but technically feasible
4.	Neurology Levels 1 and 2	Only technically feasible on paper
5.	Neurology Ground and 1st Floor	Only technically feasible on paper Significant concerns that building could never be fit for purpose
6.	**Neurology Ground Floor with external extension**	Only realistic Neurology option Difficult, but feasible
7.	QEUH Laboratory roof	Feasibility report indicates that building cannot support extension
8.	St Mungo Building, GRI	Only technically feasible on paper Not feasible from service delivery point of view

4.2 Benefits Criteria and Weighting

At the initial meeting, the group also agreed the benefits Criteria, against which the proposals would be ranked.

No	Description	Definition
A.	Improves the patient journey	Services should be delivered on as few sites as possible to minimise the need for patient and carer travel. The site(s) should be easily accessible with good patient/carer facilities.

No	Description	Definition
B.	Staffing	The extent to which there is adequate safe staffing, both within the unit's staff complement and within other services, e.g. Hospital at Night/resident on-call support.
C.	Meets published/recognised environmental standards	The extent to which the option satisfies both SGHD guidelines on Infection Control and other technical standards (SHTM, HSE, etc). This will take into account the ability to manage the risk associated with not meeting the standards, and any need for derogations.
D.	Meets published/recognised service standards	The service will meet standards set by JACIE and within the NSD service level agreement, and meets BSH Level 3. This includes immediate 24/7 access to the full range of acute services required to support patients who undergo stem cell transplant, including ITU-level critical care services and specialist support and review by other clinical teams.
E.	Minimises service disruption	The extent to which clinical services can be maintained during any required construction and/or implementation phase.
F.	Strategic fit	Links to national, regional and local clinical strategies for delivering cancer services, but with specific reference to wider GGC discussions on future location of BWOSCC and the configuration of haematology services.
G.	Timescale to deliver	There is a clinical urgency to make a decision on the location of the service.
H.	Long-term sustainability	The extent to which the facility improves the current and future capacity to deliver appropriate services to the population of Scotland, in line with ongoing planned expansion.

Prior to completing the benefits matrix, there had been two separate criteria identified for *Clinical Adjacencies* and *Meets Service Standards:*

Description	Definition
Delivers clinical co-dependencies and adjacencies	Having immediate 24/7 access to the full range of acute services required to support patients who undergo stem cell transplant, including ITU-level critical care services and specialist review.
Meets published/recognised service standards	The service will meet standards set by JACIE and within the NSD service level agreement, and meets BSH Level 3.

Whilst completing the Benefits Matrix to agree the weighting to be given to each criteria, the group agreed that the content of point A was encompassed within the service standards, particularly JACIE, referenced in point E, and that these two criteria should be amalgamated under *Meets Service Standards.*

Following identification of Benefit Criteria, the Benefits Matrix was completed, in which individual criteria are compared against each other.

The results were:

		A	B	C	D	E	F	G	H
Improves Patient Journey	A		B	C	D	A	F	G	H
Staffing	B			B	B	B	B	B	B
Environmental standards	C				D	C	C	C	H
Service standards	D					D	D	D	D
Minimises disruption	E						F	G	H
Strategic fit	F							F	H
Timescale to deliver	G								H
Sustainability	H								
		Improves Patient Journey	Staffing	Environmental standards	Service standards	Minimises disruption	Strategic fit	Timescale to deliver	Sustainability

This represented the majority decision of those in the room at the time of the exercise.

The identified benefit criteria were therefore ranked as follows:

	Criteria	Score	Rank
B	Staffing	7	1
D	Service standards	6	2
H	Sustainability	5	3
C	Environmental standards	4	4
F	Strategic fit	3	5
G	Timescale to deliver	2	6

A	Improves patient journey	1	7
E	Minimises disruption	0	8

Following the scoring of the Benefits Matrix, *Minimises Service Disruption* scored 0. It was agreed at the Options Scoring meeting on Monday 20 February 2017 that this would be dropped from the scoring process.

Converting this to weighted scoring, this left the options with the following weights:

No	Description	Score
A.	Improves the patient journey	4
B.	Staffing	25
C.	Meets published/recognised environmental standards	14
D.	Meets published/recognised service standards	21
E.	Minimises service disruption	0
F.	Strategic fit	11
G.	Timescale to deliver	7
H.	Long-term sustainability	18

4.3 Option Scoring

The second meeting held was to agree the scoring of each option against the weighted benefits criteria with the membership of the scoring team detailed in Appendix Two.

Each member of the scoring team agreed to provide an individual score from 1-10 which would then be collated to provide an average.

OPTION 1: REMAIN AT BWOSCC

Option one scored low against ability to meet service standards. There are internationally agreed Standards for the staffing, facilities and management for transplant provision, inspected in Europe by JACIE. The Glasgow service was accredited in 2011, but this has now lapsed as the Beatson-based unit cannot meet the necessary Standards for the provision of critical care. Likewise, as option one would involve the continued split of outpatient services on QEUH and inpatients on BWoSCC, it scored low against improvements to the patient journey.

Benefit criteria		Weight	Score	Weighted score
1	Improves Patient Journey	4	4	**14**
2	Staffing	25	6	**150**
3	Environmental standards	14	8	**109**
4	Service standards	21	1	**21**
5	Minimises disruption			
6	Strategic fit	11	5	**54**
7	Timescale to deliver	7	9	**64**
8	Sustainability	18	2	**36**
Total		**100**		**448**

Individual scores given were:

				Service Clinicians			Infection Control		
Benefit criteria		**IP**	**MM**	**DI**	**MC**	**GM**	**TW**	**SM**	**TI**
1	Improves Patient Journey	4	4	3	3	3	4	5	5
2	Staffing	6	6	6	6	6	6	6	6
3	Environmental standards	8	8	7	7	7	8	8	8
4	Service standards	1	1	1	1	1	1	1	1
5	Minimises disruption								
6	Strategic fit	5	5	5	5	5	5	5	5
7	Timescale to deliver	9	9	9	9	9	9	9	9
8	Sustainability	2	2	2	2	2	2	2	2

The two clinical groups, the service team and the Infection Control team, evaluated this option only slightly differently, with service clinicians feeling that split-site working deserved a lower rating due to sub-optimal patient care caused by the requirement to transfer patients off site as well as having inpatient and outpatient services split over two sites.

OPTION 2: QEUH, LEVEL 4B

Option two was felt to deliver both an improved patient journey with the consolidation of services onto one site and the most likely to enable the service to meet their specific standards. However, option

two did not score well against criteria to meet environmental standards for the reasons identified above, nor was it felt to be a sustainable option for the longer term.

Benefit criteria		Weight	Score	Weighted score
1	Improves Patient Journey	4	7	**25**
2	Staffing	25	9	**225**
3	Environmental standards	14	2	**29**
4	Service standards	21	8	**171**
5	Minimises disruption			
6	Strategic fit	11	5	**54**
7	Timescale to deliver	7	6	**43**
8	Sustainability	18	3	**54**
Total		**100**		**600**

Individual scores given were:

				Service Clinicians			Infection Control		
Benefit criteria		**IP**	**MM**	**DI**	**MC**	**GM**	**TW**	**SM**	**TI**
1	Improves Patient Journey	7	7	7	7	7	7	7	7
2	Staffing	9	9	9	9	9	9	9	9
3	Environmental standards	1	3	3	3	3	1	1	1
4	Service standards	8	8	8	8	8	8	8	8
5	Minimises disruption								
6	Strategic fit	5	5	5	5	5	5	5	5
7	Timescale to deliver	6	6	6	6	6	6	6	6
8	Sustainability	3	3	3	3	3	3	3	3

OPTION 3: MATERNITY BUILDING, QEUH

Benefit criteria		Weight	Score	Weighted score
1	Improves Patient Journey	4	5	**18**
2	Staffing	25	7	**175**
3	Environmental standards	14	9	**129**
4	Service standards	21	6	**129**
5	Minimises disruption			
6	Strategic fit	11	3	**32**
7	Timescale to deliver	7	1	**7**
8	Sustainability	18	7	**125**
Total		**100**		**614**

Option three scored well against criteria to meet environmental standards given it would be purpose built to the required specification. However, there were concerns regarding strategic fit in terms of the longer term strategy for cancer services as well as the ability to adequately staff the unit e.g. Hospital at Night given the relative distance to the main Hospital.

The group agreed a consensus score against each of the criteria.

OPTION 4: GROUND FLOOR + EXTENSION, INSTITUTE OF NEUROLOGICAL SCIENCES

Benefit criteria		Weight	Score	Weighted score
1	Improves Patient Journey	4	5	**18**
2	Staffing	25	7	**175**
3	Environmental standards	14	9	**129**
4	Service standards	21	6	**129**
5	Minimises disruption			
6	Strategic fit	11	3	**32**
7	Timescale to deliver	7	1	**7**
8	Sustainability	18	7	**125**
Total		**100**		**614**

The group again agreed a consensus score against each of the criteria and option four therefore, scored identical to option three for the same reasons.

5. Ranking of Options

The scoring of options resulted in both options three and four ranking first with a score of 614 with option two scoring 600 and therefore, a very close second in terms of non financial benefits criteria. Option one scored 448 and was therefore, the ranked last by a clear margin.

6. Risk Assessment

There are a number of potential and actual risks associated with each of the four options in the following areas:

- Clinical;
- Infrastructure;
- Infection Control/Environmental;
- Patient Experience;
- Service Capacity;
- Accreditation Process;
- Strategic Direction.

Each option presents different risks as identified below. There are additional measures that could be taken to mitigate the risk.

OPTION 1: REMAIN AT BWOSCC

Clinical

The service completed a risk assessment which was submitted to the Strategic Management Group in 2016.

The service is admitting patients for an elective procedure in the knowledge that around 10% of them will require critical care levels that are not available on the Gartnavel site. This is contrary to current quality standards required for HSCTS in NHS England and for JACIE Accreditation and was the major drive for the service to move to the QEUH in 2015. This has also been highlighted by the BWoSCC Future Steering Group.

Whilst of huge value overall, the provision of a High Acuity Unit/Critical Care Outreach service on the Beatson site is of limited benefit to the BMT transplant population. The majority of these patients are being treated with curative intent and therefore will be for full supportive care, including ventilation and inotropes if needed. HAU can deliver level 1 care but if a patient is deteriorating and predicted to require level 2 care or beyond, they need to be transferred early to the critical care service at QEUH before that requirement is reached. This means that some patients are transferred, who do not ultimately deteriorate to level 2. It is also important to ensure that patients have recovered sufficiently and that their condition is stable before transferring them back to the BWOSCC when they could have been sent back to a QEUH ward at an earlier date. If the BMT unit was on the same site as critical care services, patients would not require pre-emptive transfer and delayed returns with reduced requirement for critical care beds. The BMT service is the highest user of the HAU/CCO service, with 46 transfers since returning to the BWOSCC 18 months ago. Of particular concern is that 10 patients required more than one transfer, one patient being moved four times during their inpatient stay. Patients also have to be transferred to QEUH if they require specialist opinon and or interventions such as endoscopy, cystoscopy, ureteric stent placement.

BMT in patients on the QEUH site are placed in wards whose staff are unaware of the requirements and complexities of BMT patients. They struggle to manage the demands of unfamiliar problems even in the critical care setting, due to high numbers of unfamiliar drugs, frequently given as multiple IV infusions. There have been several instances of patients not getting prescribed drugs in this

situation. BMT patients require frequent infection and drug level monitoring which can at times be missed either due to failure to request or incorrect samples being sent when they are the QEUH.

There is no dedicated transplant nursing, pharmacy or AHP staff on site at QEUH and it is extremely challenging to ensure optimal management for these complex patients. If the BMTU was on the same site there would be far greater input from the multidisciplinary BMT team to patients admitted to critical care.

Some medical and surgical wards are not capable of managing patients with central access so that peripheral venepuncture and cannulas are used unnecessarily if nursing staff are untrained in the use of these lines.

Certain types of transplant bring a high risk of cytokine storm with requirement for intensive support for both circulatory and respiratory systems and it is not safe to have these patients on the BWOSCC at certain times during their inpatient stay. Patients have been electively transferred to the QEUH critical care facility for observation and, if required critical care support, at the time of highest risk. BMT nursing staff have been seconded as chemotherapy needs to be given as part of the management, impacting on nursing numbers available for the BWOSCC ward.

Mitigation

In an effort to mitigate against the risks identified above, patients who are transferred to the QEUH site are reviewed daily by a member of the BMT consultant team. They direct the care of the patient and try to ensure that all appropriate tests, drugs etc. are arranged and available. They can be contacted via switchboard or mobile phone at any time.

Nursing staff who attend the BMT clinics at the QEUH on Monday, Tuesday and Thursday visit patients admitted to the QEUH to provide a familiar face and help the nursing staff with any problems they have.One of the consultant clinical psychologists visits any patients who have been transferred to the QEUH.

There are information sheets for the different drugs detailing how they should be administered and contact details for the BWOSCC ward for advice. A supply of any unusual drugs are transferred with the patient.

BMT outpatients from GGC, who present with symptoms that might indicate they are having GI blood loss, respiratory distress or cardiac symptoms although BMT complications can also cause similar symptoms, have to be told to go to their local ED for assessment as it is not safe to see them at the BWOSCC due to lack of critical care support.

Infrastructure

The BWoSCC Unit is now 10 years old and it is becoming more common for rooms to be closed for repair for water leaks, flood damage etc. The HEPA filtration plant has no back up and cannot be switched off for maintenance. With increasing age comes concern about risk of catastrophic failure with loss of a safe environment.

Patient Experience

NHS GGC provides the national service for patients which by definition have a life-threatening disease and are receiving treatment which could also be life-threatening. Patients and their families are coming from all over Scotland. Many will have formed strong attachments to their referring unit following prolonged stays and find it hard to make the transition to a new team. This formation of a relationship with the BMT team can be disrupted by the transfer. Psycho-social care and support for patients and their families is critical, during what is likely to be the most stressful experience of their lives, potentially a long way from home and their own support network. This is an integral part of the service provided, but cannot be delivered effectively when patients are transferred off-site.

A number of patients and their families have felt very isolated at QEUH, during a very traumatic and critical part of their treatment, being moved to an unfamiliar environment, to be managed by unfamiliar staff, who have limited or no experience in transplant.

The following comment is from correspondence from the wife of a patient who recently passed away:

"In total xxx spent 59 nights at the Beatson and 47 nights at QEUH!!!! For 47 nights xxx was nursed by people with no post transplant experience despite the Leaflet 'A patient's guide to Allogenic Bone Marrow Stem Cell Transplant' stating "the nursing staff involved in your care have specialist experience in transplantation"

Several patients have vowed they will not return, even if this is deemed medically necessary. Patients who do not recover sufficiently to transfer back to the BWOSCC have to remain at the QEUH for palliative care.

Service Capacity

It had been planned to increase bed capacity from 19 to 24 beds to accommodate anticipated growth in activity as the designated single centre for NHS Scotland. As the service remains in BWoSCC, this has not been possible and capacity is limited to 20 beds.

Every effort is made to admit a patient once they are fit for transplant and a donor has been identified. However, some patients do have to receive additional therapy or are not admitted as promptly as they might be, particularly those who have a relatively indolent disease eg. MDS, myelofibrosis. It is very difficult to quantify this number, but probably 5-6 patients per year are admitted 2-3 months later than they needed to be, because of lack of bed space. So far no patient has developed accelerated disease during the delay, however, it could occur with any of these individuals.

It is often not possible to admit patients to a BMT bed, who have been transplanted and developed complications requiring specialist care. All patients are managed in their local hospitals whenever possible, but some should be transferred and are not due to lack of beds.

Accreditation

There is an expectation from commissioners that the nationally commissioned service will be JACIE accredited. Whilst the service will meet environmental requirements as outlined in appendix five, it is unlikely to be accredited due the lack of support services including critical care on site.

OPTION 2: QEUH, LEVEL 4B

Infection Control/Environmental

As noted, the facility in 4B QEUH does not meet the standards set out by SHTM 03-01 (Appendix six) for neutropenic rooms or HPS guidance and therefore, the main concern is that of airborne infection particularly invasive fungal infection (IFI) due to organisms such as aspergillus and zygomycosis due to air quality. Based on published literature, mortality rates in outbreaks related to construction or demolition in patients with Haematological malignancies are quoted at 57.6%. Concentrations of aspergillus species below 1 colony forming unit/m3 are sufficient to cause infection in high risk patients.

Currently, the BMT Unit in NHS GGC's Royal Hospital for Children does not meet the standard either however, the rooms do have a positive pressure of 10 PA hepafiltration and have anterooms. It has been agreed to upgrade four of these rooms to meet the full standards.

Mitigation

Appendix three provides benchmarking of BMT units across the UK. NHS GGC's Lead Infection Control Doctor has contacted two of the centres – Nottingham and Devon (two adult units with a specification that does not meet HPS guidance) to ascertain their infection rates and what if any mitigating actions they have in place.

Improvements to the environment in ward 4B are achievable with additional capital expenditure including the sealing of the bathroom ceilings and creation of a double door entry system. Further measures would include introduction of twice daily cleaning of the ward as well as the use of portable HEPA filtration units in the corridors.

There is now very effective anti-fungal prophylaxis and sensitive screening tests, which can be used to manage risk in this patient population. A strategy of effective prophylaxis and confining patients to their rooms with the ward closed to all through traffic will minimise the risk of acquiring fungal infection whilst an inpatient.

A robust monitoring regime as detailed in Appendix Four and which is currently in place in the current BMT unit in B8/9 at BWoSCC.

Infrastructure

In addition to the fact that ward 4B does not provide the required specification for BMT services, it is also served by only one air handling plant. As a consequence, there is no way to carry out maintenance\service PPM\annual verification without shutting down the ventilation plant, which would affect all isolation rooms served by the single air handling unit. This would require the ward to be vacated during each period of planned preventative maintenance.

Mitigation

The recently proposed upgrade works to ward 4B includes the addition of a standby air handling unit, albeit of reduced capacity which would mitigate against the concerns identified above. This would require significant capital investment as previously identified.

Accreditation

There remain a risk to JACIE accreditation given the infrastructure/environmental risks highlighted above. That said, JACIE does not specify environmental requirements to the standard previously provided by HPS as outlined in Appendix five. Therefore, it is anticipated that provided the monitoring regime does not identify any issues, that this should provide sufficient evidence that this requirement is being met.

OPTION 3: MATERNITY BUILDING, QEUH

Clinical

There are concerns that the risk of this option is around the ability to safely staff the unit 24/7. The BMT service does not have their own junior medical team and is instead supported by the BWoSCC. Should services relocate, they will require to be covered by the Hospital at Night team as is currently the case. Whilst this is likely to be deliverable within the main ward block of QEUH, there is concern that the service will not be safely covered in an option that would see them relocate outwith the main QEUH ward block.

Further, any option that requires a significant build is unlikely to be delivered within a timeframe of less than two – three years. The clinical risk associated with remaining on the BWoSCC site for this period of time has already been highlighted above.

Strategic Direction

There is concern with the strategic fit of this option with the long term direction of cancer services. Work is ongoing regarding the long term direction of cancer services. The preference would be to remain co-located with cancer services in the future but capital investment in this option may preclude this in the future.

OPTION 4: GROUND FLOOR + EXTENSION, INSTITUTE OF NEUROLOGICAL SCIENCES

The risks identified with this option are identical to those with option 3.

7. Conclusions

Whilst Options three and four clearly scored the highest with regard to delivery of environmental standards, there are concerns regarding the staffing, strategic fit and timescale for delivery.

Given the close scoring between options two, three and four against non financial benefits criteria the group discussed option two as an interim solution for a time limited period.

Whilst option two would not provide the required environmental standards, benchmarking across the Centres in the UK has demonstrated that only those services that have moved into purpose built facilities are currently delivering this standard as outlined in Appendix Three.

8. Recommendations

The Acute Services Committee is therefore, asked to consider option two as an interim solution and support the relocation of BMT Services to 4B QEUH. To support the move, it is proposed that further refurbishment works be commissioned as detailed in the risk assessment. Thereafter, a period of air

quality monitoring should be undertaken as outlined in Appendix Four. To enable this, the ward will need to be vacated and positive pressure switched on which will preclude the use of the ward for medical surge capacity.

At the same time, BMT services should be considered as part of the acute services review of cancer services to deliver a longer term sustainable option that meets both service and environmental considerations as detailed in Appendix one.

This recommendation is made on the basis that service delivery considerations require prioritisation over the Infection Control and Prevention Teams concerns on meeting national standards and HPS recommendations.

Appendix One

Recommendation	To allow the provision of a protective environment for patients within the bone marrow transplant unit (Ward 4B) • The rooms must be positively pressured at 10 pa • ALL air entering the room must be via the HEPA filter • The HEPA filter should as a minimum be E12 (H13) and located within the supply air diffuser • The rooms must be sealed and no air which has not passed via the HEPA filter should access the room • A strict protocol which minimises the length of time the door is opened and reduces air entry via an open door is required. • There must be a continuous pressure monitoring system for each room which alarms and gives an early indication of a pressure drop within the room • Bedroom Air changes of 10 ACH must be achieved • The walls and ceilings within the rooms and ensuite must be sealed. • All room services must be sealed • All service access hatches within the bedrooms/ensuite must be sealed • The pentamidine room must be negatively pressured and comply with health and safety legislation • There must be at least one room available in the critical care unit capable of providing the same level of protection as those proposed in ward 4B • HPS will continue to co-ordinate and provide support with this issue and subsequently the Children's unit and additional areas of ventilation concern (Critical care, ID Unit, theatres) • HPS will co-ordinate and provide support a required relating to water control and testing in this unit

Appendix Two

Option Appraisal: National Adult Stem Cell Transplant Programme – Agreement of Options/Benefits Criteria and Weighting.

Meeting 8th February 2017
Dr Anne Parker
Dr Grant McQuaker
Ms Myra Campbell
Mr David Louden
Dr Teresa Inkster
Ms Melanie McColgan
Ms Marjorie Johns (Facilitator - did not score or rate options)

Option Appraisal: Adult BMT Service - Scoring of Options

Meeting 20th February 2017
Dr Grant McQuaker
Dr Dave Irvine
Ms Myra Campbell
Mr Ian Powrie
Dr Teresa Inkster
Mrs Sandra McNamee
Mr Tom Walsh
Ms Melanie McColgan
Ms Marjorie Johns (Facilitator - did not score or rate options)

Appendix Three

UK Benchmarking

Of the 9 centres who responded to a local survey (across the UK), all are operating within varying environments as follows:

Hospital	HEPA filtered Rooms Y / N	HEPA filtered Corridors Y / N	Room Air Changes 10/hour Y / N (if different, please specify)	Room Pressure Positive 10Pa Y / N (if different please specify)	Sealed Rooms (fixed ceilings etc) Y / N	Air Lock Entrance to Ward Y / N	Is Air Pressure Monitoring System Alarmed Y / N	Is there a "Back-up" air handling plant for Wards Or Separate plant for each room	Rooms with anteroom at negative pressure for infectious BMT patients Y / N (Please state approx. Pa)	Do you operate a programme of Environmental Monitoring (Particle Counting / Microbial air sampling etc – please state acceptable limits)	HDU / ICU on-site	Comment
QEUH Proposal	Y	N	N Approx. 6 AC/hr	N 6-8 Pa running pressure	Y	Y	Y Audible alarm outside each room	N Independent (back-up) AHU unit available if primary unit fails	Y (Available via adjacent Renal Ward)	Y Monthly programme of Microbial Air Sampling and Particle Monitoring	Y	
Beatson WoSCC (current position)	Y	Y	Y	Y Rooms vary between 6-15Pa	N	Y	No, pressure gauge on wall	Y Each Ward has dedicated AHU – each Ward is back-up for each other	Y Approx -5Pa	Y Monthly programme of Microbial Air Sampling and Particle Monitoring	N	
UCLH	Y	N	Y	Y	Y	N	No, pressure gauge on wall	No	-10KPa on separate floor	Micro sampling of all wards (contact plates etc) led by infection control. HEPA qualified annually by external company.	ITU + HDU	
St Bartholomews (Barts Health)	Y	Y	Y	Y	Y	Y	Y	Back up	Y	Done by infection control. No SOP that I'm aware of.	ICU on-site for BMT patients. Other ICU'/HDU' for cardiac patients	Whole floor is HEPA filtered (Brand new facility – last year)
Nottingham University Hospital	Y	N	Y	Y Runs at <10	N Suspended ceilings	N	N But is checked every morning by	Y Back up generators Monitored by estates dept	N/Y Negative pressure can be achieved by leaving the	Y NUH Infection control dept coordinates this – air particle sampling and micro sampling	Critical Care Unit on-site	

							ward staff and then alarm raised if out of range.		bathroom door open. ?Pa	done. Also water sampling showers and sinks. Throughout ward. Results go through to ward Manager.		
KCH	Y	Y	Y	Y	Y	Some	Y	N	Y	No. Rooms verified on opening. Regular HEPA filter replacement.	HDU + ICU	
ANON	Y	No. Each room positive to corridor	Y	Y	Y	Y	Yes, local and central	Separate AHU for each patient room. Main Ward on separate system.	Yes, 15Pa in anteroom and 10Pa in patient room.	No. Rooms verified on opening. Regular HEPA filter replacement.	ICU (ITU)	
Royal Devon & Exeter	Y	N	Y	Y	Y	N	N	N	Y	Y	ITU (+HDU)	
Leeds Adult	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	ICU + HDU	
Sheffield Children's Hospital	Y	N	N	N	N	N	N	N	N	Y	ICU + HDU	
Manchester Children's Hospital	Y	Y	N	N	N	Y	No air pressure monitoring of any rooms just a general alarm should the AHU or booster fan fail. This is displayed at the nurses' station via a red LED showing airflow fail.	N	TOILET ONLY	Particle counts to ISO 14644 Class 5 and 6	ICU + HDU	

Appendix Four

SBAR – Air sampling , BMT units
Dr T Inkster 09/03/17

Situation	Air sampling has been performed on a monthly basis in B8/9 as a quality assurance check. There is no requirement as such to air sample and no agreed standards or guidance for interpretation of air sampling for UK BMT units. Practice is variable across the UK and three units which meet a high ventilation specification do not routinely air sample. The ventilation spec in 4B, QEUH is less than that of B8/9 therefore it is unclear what interpretative criteria to apply and what actions to take when results are elevated. Currently medical patients are housed in 4B with positive pressure ventilation turned off
Background	Particle counts and air sampling are undertaken in B8/9 unit on a monthly basis. Particle counts < 1000 are deemed acceptable limits (ISO standard for clean rooms) and fungal air sampling results <0.1 CFU/m3. Particle count results are available in real time however it is important to note the environmental conditions while sampling. Particles are not just fungus or bacteria but can be skin, dust, hair, cosmetics etc The commonest explanation for high particle counts are people in the vicinity of sampling or failure of the sampling to be carried out remotely. Particle counts can be higher when rooms have just been cleaned . If the aforementioned factors have been excluded high particle counts can alert infection control teams early to possible air quality issues and fungal contamination. They cannot be used in isolation as an accurate indicator or air quality. Air sampling results and fungal culture take 7 days to initial identification and a further 7 days for species identification .
Assessment	Literature review; <u>Indications for air sampling</u> Indications for air sampling are listed in the table below from Morris *et al.*[1] Note that regular maintenance is considered more important than air sampling. Air sampling is only one parameter of many with regards to assessment of the efficacy of a ventilation system.

Table I *Objectives of air sampling*

To correlate outbreaks of invasive aspergillosis with hospital construction/demolition
To identify potential sources of nosocomial aspergillosis, eg, potting soil, damp ceiling voids, damp fire proofing material, carpeting, etc.
To predict environmental spore contamination from outside sources
To identify defects/breakdown in hospital ventilation/filtration systems*
To monitor cleaning procedures that may release bursts of airborne *Aspergillus conidia*
To determine the efficacy of HEPA filters in laminar flow facilities
To monitor efficacy of procedures to contain hospital building work from hospital wards and other areas where high-risk patients are managed
To determine level of contamination prior to initial occupancy of special controlled environments

*regular engineering maintenance of the air supply system (whether HEPA-filtered or not) is more important than regular air sampling

Result interpretation

Interpretation of results can be difficult. The table below gives some recommendations. [1] For BMT rooms the HEPA filtered air value would apply i.e. <0.1 CFU/m^3

Table III Interpretation of air sampling data and recommendations

Levels of fungal spores vary by several orders of magnitude during the course of a day due to:
- Activity levels in any one particular area
- Fluctuations in temperature
- Fluctuations in humidity
- Fluctuations in air flow
- Changes in light level

A single air sample will often underestimate the fungal contamination in the air: multiple air sampling has to be performed
No strict numerical guidelines are available which are appropriate for assessing whether the contamination in a particular location is acceptable or not but the following threshold levels have been recorded:
- Outdoor air: total fungal count: 10^3 to 10^5 CFU/m^3
  - Aspergillus: 0·2–3·5 conidia/m^3
  - Note: seasonal variation recognised
- HEPA filtered air (> 95% efficiency and > 10 air changes per hour): < 0·1 CFU/m^3
- No air filtration: 5·0 conidia/m^3
- Construction/defective ventilation: 2·3–5·9 conidia/m^3
- If total fungal count exceeds 1·0 CFU/m^3 on several occasions the air systems or procedural practice in patient areas requires intensive evaluation.

There is no agreed level at which the risk can be numerically defined for Invasive Aspergillosis . Vonberg et al state that concentrations below 1 cfu/m^3 were sufficient in high risk patients. [2] It is best to conduct a series of samples over time to detect trends. [3]

Burst phenomenon

Understanding the burst phenomenon of fungi particularly Aspergillus is important. Spores can be released in bursts and the difficulty is capturing these bursts .No amount of air sampling will yield a preventative response to this phenomenon. [4]Negative air sampling may provide false reassurance. Striefel et al suggest that the emphasis should

	be on maintaining environmental controls and minimising the in house release of spores[4]
Recommendations/ Conclusions	1. In the absence of any definitive guidance the BOC parameters could be applied to level 4B, QEUH i.e. particle counts <1000/m^3, fungal counts <0.1/m^3 2. Air sampling has been performed on a monthly basis in BOC as a quality assurance check, however, this would not be an accurate indicator of air quality in an area where we know that the ventilation is of a lesser specification. The specified parameters are less reliable in an area where we expect to encounter higher counts. 3. Difficulties are likely to arise in the management of sustained elevated particle counts and repeated fungal growth with no obvious source should they occur – this is a possible scenario given the ventilation specification in 4B and the inability to HEPA filter all air entering the unit 4. Negative air sampling may provide false reassurance due to the burst phenomenon 5. To enable a period of monitoring prior to BMT patients moving in to 4B medical patients would have to be vacated and the positive pressure reinstated. 6. Ideally a minimum period of 4-6 weeks monitoring prior to BMT patients occupying the ward should be undertaken

References

1. Morris G et al Sampling of Aspergillus spores in air. Journal of Hospital infection 2000;44:81-92

2. Vonberg RP, Gastmeier P. Nosocomial aspergillosis in outbreak settings. Journal of Hospital Infection 2006;63:246-254

3.Humphreys H. Positive pressure isolation and the prevention of invasive aspergillosis. What is the evidence? Journal of Hospital Infection 2004;56:93-100

4. Falvey DG, Striefel A. Ten year air sample analysis of Aspergillus prevalence in a University hospital. Journal of Hospital Infection 2007; 67: 35-41

Appendix Five

STANDARD:

B2.1 There shall be a designated inpatient unit of appropriate location and adequate space and design that minimizes airborne microbial contamination.

Explanation:

Clinical unit facilities may vary among centers. Variability may reasonably be based on a number of factors, including the number and/or type (autologous or allogeneic) of transplants performed, the

patient case mix, the graft source, epidemiological factors influencing the prevalence of opportunistic infections, potential economic factors, and an increasing use of ambulatory facilities for transplantation.

This standard is not meant to imply that every clinical unit must have laminar airflow available, but HEPA filtration with positive pressure is recommended for high risk patients. If non-HEPA filtered rooms are used for lower risk patients or if there is a shortage of HEPA filtered rooms, the SOP(s) on infection control, biosafety, and chemical and radiological safety should indicate how allocation of rooms is prioritized. Further, auditing of airborne microbial infections in non-HEPA rooms should be performed as part of the QM Program.

Evidence:

The inspector will tour the inpatient unit during the on-site inspection. Because different patients have different infection control needs, the Clinical Program must have policies and procedures that define infection control requirements based upon differing patient conditions and room configurations. The type of air handling should be documentable from a facilities management office. An SOP detailing alternatives in case there is a shortage of isolation rooms; steps for preventing and controlling specific healthcare-associated infections, such as *MRSA, C. Difficile* and community respiratory virus infections; and procedures for monitoring airborne infections will provide evidence of compliance.

Signs posted around the clinical unit and the behavior of the staff consistent with expectations for the type of infection control described in the policies and procedures demonstrate compliance with this Standard. If there are renovation or construction projects underway, the appropriate environmental controls must be present. The risk of spread of communicable disease agents must be minimized in any setting where patients could reasonably be expected (including dialysis or intensive care units). Care should be taken that the ventilation from other isolation rooms (where infected patients may reside) does not pass through the rooms used for HPC patients. Evidence of compliance with this Standard will require preinspection documentation of infection control policies, specifications of air handling, and floor plans.

When an accredited Clinical Program is to be relocated, qualification and validation must be performed to confirm the new space meets the Standards. The requirements for maintaining FACT accreditation in the event of relocation are outlined in the FACT accreditation policies, available on the FACT website. The Clinical Program is expected to submit a description and floor plans of the new facility, QM documents, and an expected relocation date. If a JACIE-accredited facility intends to relocate, the program should submit plans and descriptions of the relocation to the JACIE office. Most relocations will be assessed during regularly scheduled inspections or interim audits; however, if there are any concerns with the information submitted by the facility, a relocation inspection may be necessary.

Example(s):

HEPA filtration with positive pressure is recommended for high-risk patients, but is not required for every unit. Single patient rooms should be located on a patient care unit where infection control policies can be implemented. Portable, industrial-grade HEPA filters may be available to accommodate vulnerable patients in case of a shortage of rooms.

Visitors should receive information concerning communicable infections. Signs posted to inform the public about visitation restrictions could also include information about incubation periods and risks of live vaccines.

In ambulatory settings, patients may be accommodated in a hostel, hotel, or home-based setting for periods of the transplant with frequent day case review and potential rapid inpatient admission. Clinical Programs should share criteria with these facilities regarding practices to prevent the spread of communicable infections.

Appendix Six

Recommended air-change rates

Application	Ventilation	Ac/Hour	Pressure (Pascals)	Supply Filter	Noise (NR)	Temp (°C)	Comments For further information see Section 6
General ward	S / N	6	-	G4	30	18-28	
Communal ward toilet	E	10	-ve	-	40	-	
Single room	S / E / N	6	0 or -ve	G4	30	18-28	
Single room WC	E	3	-ve	-	40	-	
Clean utility	S	6	+ve	G4	40	18-28	
Dirty utility	E	6	-ve	-	40	-	
Ward isolation room	-	-	-	-	-	-	See SHPN 4; Supplement 1
Infectious disease Iso room	E	10	-5	G4	30	18-28	Extract filtration may be required
Neutropenic patient ward	S	10	+10	H12	30	18-28	
Critical Care Areas	S	10	+10	F7	30	*18-25*	Isolation room may be -ve press
Birthing Rooms	S & E	15	-ve	G4	40	*18-25*	Provide clean air-flow path
SCBU	S	6	+ve	F7	30	*18-25*	Isolation room may be -ve press
Preparation room (Lay-up)	S	>25	35	F7*	40	*18-25*	*H12 if a lay-up for a UVC Theatre
Preparation room/ bay sterile pack store	S	10	25	F7	40	*18-25*	*50NR if a bay in a UCV Theatre
Operating theatre	S	25	25	F7	40	*18-25*	
UCV Operating theatre	S	25*	25	H12	40	*18-25*	Fresh air rate; excludes re-circulation

Anaesthetic room	S & E	15	>10	F7	40	*18-25*	Provide clean air-flow path
Theatre Sluice/ dirty utility	E	>20	-5	-	40	-	
Recovery room	S & E	15	0	F7	35	*18-25*	Provide clean air-flow path

We were all present when discussing the recommendations. I have however amended wording to reflect ranking rather than recommendations and your previously noted concerns.
M

From: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]
Sent: 03 March 2017 15:35
To: McColgan, Melanie; Walsh, Tom
Cc: McNamee, Sandra
Subject: Re:

Hi Melanie,

Nothing further to add although I remain concerned about the process. I left the meeting after the ranking and did not participate in any discussion with regards to the recommendation.

It would be useful to see David's comments regarding the paeds vs 4B spec as I disagree with the statement that the environmental standards are similar.

Kind regards
Teresa

Dr Teresa Inkster
Lead Infection Control Doctor NHSGGC
Training Programme Director Medical Microbiology
Dept of Microbiology
Queen Elizabeth University Hospital
Glasgow
Direct dial : [redacted]

From: McColgan, Melanie [redacted]
Sent: 03 March 2017 11:59
To: Walsh Thomas (NHS GREATER GLASGOW & CLYDE); INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)
Cc: Mcnamee Sandra (NHS GREATER GLASGOW & CLYDE); Loudon David (NHS GREATER GLASGOW & CLYDE)
Subject: RE:

I will be here to after 5pm so as long as I got comments by 5pm? I plan to re-circulate the amended version to the group however, in the next 15 mins.
M

From: Walsh, Tom
Sent: 03 March 2017 11:54
To: McColgan, Melanie; Inkster, Teresa (NHSmail)
Cc: McNamee, Sandra; Loudon, David
Subject: RE:

Hi Melanie

I'm not sure what your timescales are for responses but I know Teresa is in back to back clinical meetings at RHC.

I would be keen that she is able to respond to the paper as well.

Kr

Tom

From: McColgan, Melanie
Sent: 03 March 2017 11:21
To: Walsh, Tom; Inkster, Teresa (NHSmail)
Cc: McNamee, Sandra; Loudon, David
Subject: RE:

Does this read better

The Acute Services Committee is therefore, asked to consider option two as an interim solution and support the relocation of BMT Services to 4B QEUH. To support the move, it is proposed that further minor refurbishment works be commissioned e.g. sealing of ceiling tiles in en-suites and thereafter, a period of air quality monitoring be undertaken against clear parameters following discussion and agreement with Microbiology.

From: Walsh, Tom
Sent: 03 March 2017 10:00
To: McColgan, Melanie; Inkster, Teresa (NHSmail)
Cc: McNamee, Sandra; Loudon, David
Subject: RE:

Thanks Melanie

The final recommendation reads much better in terms of context and perspective.

In terms of further air sampling I will leave Teresa to comment in detail. I would however point out that the Infection Control Team don't undertake air sampling (nor do we have the equipment to do so). This would need to be agreed with colleagues in Diagnostics and I would suggest that clarity is still required on what is being sampled and what standards are being applied.

Kr

Tom

From: McColgan, Melanie
Sent: 03 March 2017 09:46
To: Inkster, Teresa (NHSmail)
Cc: Walsh, Tom; McNamee, Sandra; Loudon, David
Subject: RE:

Hi
I am hoping this makes it a bit clearer? I have left the RHC section in as need David to advise re spec,
Thanks
M

From: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]
Sent: 02 March 2017 09:44
To: McColgan, Melanie
Cc: Walsh, Tom; McNamee, Sandra; Loudon, David
Subject: Re:

Thanks Melanie,

Please find attached comments from Tom, Sandra and myself.

Our understanding of the process was that the groups function was to rank the options for consideration at board level rather than reach a definitive conclusion/recommendation.

We ask that all comments be considered but our particular concern is deviation from the the national standards (SHTM) and our agreed 'Role of the IPCT in capital projects' SOP.

Kind regards
Teresa, Tom, Sandra

Dr Teresa Inkster
Lead Infection Control Doctor NHSGGC
Training Programme Director Medical Microbiology
Dept of Microbiology
Queen Elizabeth University Hospital
Glasgow
Direct dial [redacted]

From: McColgan, Melanie [redacted]
Sent: 01 March 2017 10:10
To: McQuaker, Grant; Irvine, David; Campbell Myra (NHS GREATER GLASGOW & CLYDE); Walsh Thomas (NHS GREATER GLASGOW & CLYDE); Mcnamee Sandra (NHS GREATER GLASGOW & CLYDE); INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE); Powrie Ian (NHS GREATER GLASGOW & CLYDE)
Cc: Johns Marjorie (NHS GREATER GLASGOW & CLYDE); Scott, Lyndsey
Subject:

Dear all .
Can you let me have comments on attached asap –need by 12md Friday 3/3 at latest please.
Thanks
Melanie

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BMT Unit Relocation to QEUH meeting

3rd October 2017 @ 1pm

Meeting Room LEVEL 3 FMA3-008 Core D FM, Level 3, QEUH

Attendees:-

McColgan, Melanie (Chair) (MMcC)	General Manager CH & SOS
Myra Campbell (MC)	CH Clinical Service Manager
Mary Anne Kane (MAK)	Associate Director Facilities
Peter Croan (PC)	Associate Programme Director, NSD
Alan Gallacher (AG)	General Manager Estates
Susan Grant (SG)	Health Facilities Scotland
Alistair Hart (AH)	Consultant Haematologist
Brian Jones (BJ)	Head of Service, Microbiology
Alyson McArdle (AMcA)	CH Lead Nurse
Sandra McNamee (SMcN)	Associate Nurse Director, Infection Prevention & Control
Grant McQuaker (GMcQ)	BMTU Consultant
Ian Powrie (IP)	Deputy General Manager, Estates QEUH.
Geraldine O'Brien (GO'B)	Research Manager - Health Facilities Scotland
Annette Rankin (AR)	Nurse Consultant, Health Protection Scotland
Anke Roexe (AR)	Programme Manager, NSD
Mike Winter (MW)	Medical Director, Procurement Commissioning and Facilities SBU - NSS.

Apologies:-

Anne Morrison	Clinical Director, Clinical Haematologist
Ian Storrar	Principal Engineer - HFS

Background

Introductions were made and MMcC summarised the background for the meeting. The BMT service relocated to ward 4B when the QEUH opened but had to return when it became clear that particle counts were high. Since then, the air flow has been improved and monitors placed outside each room to demonstrate the positive pressure. Following several meetings in March 2017 a paper was submitted to Acute Services Committee recommending further work in ward 4B and a 6 month monitoring period to assist decision making with regard to the BMT service returning to ward 4B. The Acute Services agreed to these recommendations at their meeting in March 2017.

Deleted:

The work in ward 4B has commenced as agreed and includes installation of solid ceilings in en-suite bathrooms, filters replaced and installation of a HEPA filtration unit in the preparation area. Work is expected to take 6 weeks followed by a period of validation/testing of 2 weeks.

MMcC advised that the purpose of today's meeting is to establish who will take responsibility for monitoring the effectiveness of the work, what will be monitored as well as appropriate timelines

MW asked for clarification on what was the trigger for the original move back to BWoSCC in July 2015. The group reported that this decision was taken due to high particle counts in 4B and therefore, concerns about the air pressures in the rooms as well as non-sealed rooms.

Current work

It was discussed and agreed that the groups recommendation would be that the ward would need to empty for the 2 week verification period following the completion of the work. IP stated that H+V were scheduled to start the verification process on 31/10/17. The recommendation of the committee was that during this validation period the ward should be empty. MMcC agreed to take this recommendation back to the Director of Regional Services.

IP confirmed Revalidation process is as follows:

- Replace all HEPA Filters (24 off) 1 day
- Filter challenge tests
- Service & Re-commission ventilation plant to provide 5 – 7Pa (DP) & 6 ACH. (3 days)
- Reinstate room pressure alarm system. (0.5 days)
- Carry out revalidation of each room Including (5 days)
    i. Air permeability tests
    ii. Room Differential pressure tests
    iii. ACR tests
    iv. Test heating and cooling controls
- Deep clean rooms and corridors (2 days)
- Hand over to ICD for environmental\microbiological testing

- SG stated that SHPN 04 supplement 2 will be issued next week which has more detail on testing and validation. IP said that this may enhance the validation process.

Monitoring

MMC asked BJ if this would be performed by microbiology at QEUH. BJ replied that they would need advice for HPS about how this should be performed. AR agreed to discuss this at HPS and come back with a response by 20/10/17. SG said the monitoring was required to ensure the air quality in the QEUH was as good as or better than that in the Beatson. GM replied that the air handling unit in the QEUH would never be as good as that in the Beatson as it was of a lower specification, however, there were other, significant clinical risks that needed to be taken into consideration.

PC emphasised that the viability of the transplant programme could be compromised if a solution could not be found. MW reiterated the importance of considering all the clinical concerns in the decision making process.

BJ pointed out that effective protection against fungal infection could be achieved using prophylactic medication (chemoprophylaxis) and monitoring for infection in conjunction with environmental issues. He also suggested discussion with Dr P Hoffman, Public health England, Colindale.

Annual verification checks

I Powrie stated that, because there is only one plant, annual verification checks would require the ward to shut between 2-3 days. However it is not clear how this would be achievable as we have no alternative accommodation to allow these works to be carried out. Further consideration will need to be taken regarding this issue. MC asked IP/MAK to confirm current arrangements for BWoSCC as they have never been asked to close off rooms for annual verification.

Contingency planning

A plan will be required for dealing with critical failure. MC will take this forward.

MMcC closed the meeting and all agreed that further discussion will take place when results of monitoring are available.

Action Points

1. MMcC to take recommendation that the ward should be empty during verification process back to the Director of Regional Services.
2. AR to seek advice from HPS re monitoring and submit response by 20.10.17.
3. IP/MAK to confirm current closure arrangements for BWoSCC when rooms are shut during annual verification checks.
4. MC to take forward critical failure contingency planning.

Health Protection Scotland

NHS National Services Scotland

Queen Elizabeth University Hospital (NHSGGC) Bone Marrow Transplant Unit	
Situation	NHS Greater Glasgow and Clyde (NHSGGC) requested support from Health Protection Scotland (HPS) in 2015 in the review of their Bone Marrow Transplant Unit within Queen Elizabeth University Hospital (QEUH) prior to transfer of patients from the Beatson Oncology Centre (WOSBOC). This review focussed mainly on the ventilation and provision of a safe environment for the care of these patients within the QEUH. HPS liaised with HFS and support has continued since the initial request.
Background	The decision to transfer the care of bone marrow transplant patients from the Beatson Oncology Unit to the QEUH was made in June 2013. Construction of the QEUH was well established at this point and therefore the new unit was not purpose built. When the new hospital opened patients transferred to ward 4b from the Beatson Oncology unit. Concern was raised following environmental and air sampling which yielded high particulate counts and fungal spore growth. On identification of these results the patients were relocated back to the WOSBOC as a temporary measure whilst remedial work was undertaken in ward 4b. Currently the patients remain in the WOSBOC whilst works have been ongoing in ward 4b in an attempt to make the unit compliant. It is noted that there is no current UK guidance on BMT isolation rooms. General ventilation guidance is contained within SHTM 03-01 (Parts A and B) and SHPN 04-01 Supplement 01. An SBAR was produced in May 2015 which provided NHSGGC with recommendations to allow the provision of a protective environment for patients within the bone marrow transplant Unit. The SBAR focussed primarily on the adult BMT transfer to ward 4B was produced by HPS/HFS in December 2015. Whilst NHSGGC has continued to work towards these recommendations it is noted that the solution proposed does not meet the guidance nor does it seek to address all the recommendations in the SBAR(2015). As a result HFS cannot comment on the effectiveness of the measures intended to be put in place. NHSGGC are working towards transfer of the patients from the BOSWOC to ward 4B by early 2018. A staged approach to repatriation of the BOSWOC BMT patients back to ward 4B has been proposed. This includes; • transfer of existing medical patients to other areas within the hospital, • positive pressure?? ventilation within the area turned back on once medical patients have vacated the area and • external validation and commissioning of the unit undertaken. Once this has been completed and agreed with facilities, IPCT and

A50002331

	management haemato-oncology patients from South Glasgow will occupy ward 4b for a period of 6 months whilst microbiological monitoring is undertaken. HPS have been requested to provide support relating to initial monitoring of the environment prior to transfer of haemato-oncology patients and during the first six months of their transfer to allow early identification of airborne fungal spore risks. A rapid literature review relating to microbiological risks was undertaken and support sought from Peter Hoffman (Public Health England)
Assessment	The recommendations outlined in the SBAR (2015) relating to ventilation included: To allow the provision of a protective environment for patients within the bone marrow transplant unit (Ward 4b) • The rooms must be positively pressured at 10pa • ALL air entering the room must be via the HEPA filter • The HEPA filter should as a minimum be E12 (H13) and located within the supply air diffuser • The room ceilings must be sealed so no air which has not passed via the HEPA filter should access the room • A strict protocol minimising the length of time the door is opened and reduces air entry via an open door is required. • There must be a continuous pressure monitoring system for each room which alarms and gives an early indication of a pressure drop within the room • Bedroom Air changes of 10 ACH must be achieved • The walls and ceilings within the rooms and ensuite must be sealed. • All room services must be sealed • All service access hatches within the bedrooms/ensuite must be sealed NHSGGC have confirmed that the rooms meet 10Pa however fall short on air changes at 6 AC/hr instead of the recommended 10 AC/hr. Air changes dilute the microbial content of the room from what is already dispersed within the room. The main focus from protection of the immune-compromised patient is to ensure protection is provided from outdoor contamination via hepa filtration. The integrity of the hepa filter requires to be insitu checked with particles to ensure its efficiency to ISO 14644-3:2005 and correct fitting as far as reasonably practicable. It should be noted that BSRIA are recommending that air permeability should be between 2.5-1.0m3/hr/m2 at 50Pa and given the limitations of the existing solution. Extract ventilation ductwork should be separate and terminate as described in SHPN 04 Supplement 01.

	Ventilation rates: The validation of the entire system should be as detailed in the generic guidance given in SHTM 03-01 part A and verification of the entire system should be as outlined in SHTM 03-01 part B. These may have to be adapted to meet the requirements of this situation. The frequency of verification should be at least annually, or more frequently if issues arise. **Sampling:** There are two ways of sampling: • Active air sampling • Passive air sampling Active air sampling involves using the air sampler and monitoring all patient rooms and corridor on the same day and sampling a high volume of air of at least 1 cubic metre of air from each room. There is no requirement for rooms to be empty during sampling as the testing is to identify fungi not bacteria Passive air sampling involves using settle plates in every room and allowed to remain in situ for a period of approximately 5-6 hours. Settle plates will sample fungal spores relatively inefficiently but can sample over a far longer time than active air samplers and so capture isolated contamination dispersion events that active sampling is likely to miss. The medium used should be selective medium which only allows the growth of fungi. (e.g Sabaraud's with appropriate selective supplements), Sampling should take place in an adjacent unprotected environment simultaneously to those within the rooms. Fungal levels in the outdoor environment (i.e. the challenge to any system of patient protection) will vary over time. A finding of low fungal counts in the protected environment may just be the result of a low challenge level. This sampling strategy allows the determination of a contamination ratio of the protected environment versus unprotected environment. A combined approach of both passive and active air sampling undertaken in parallel utilising media which selects fungi only, is the preferred method for commissioning and monitoring purposes, with both methods being undertaken simultaneously including an external unprotected control sample. Samples taken at weekly intervals for a period of 4-6 weeks at varying times should provide sufficient information on the integrity of the ventilation system with consideration being given to a follow up one month later. Thereafter sampling should return to the agreed boards protocol. Microbiological sampling is used as a validation of engineering and engineering controls and should only be done after the engineering parameters have been assured as adequate. Annual validation of engineering is important and must be undertaken. **Results:** Fungal growth does not require to be speciated. If controls are in place the optimal level should be zero growth. The presence of any fungal spores on active sampling should prompt a review. The

	following strategy per cubic metre of air sampled is proposed • Zero growth = optimal • Single digit = review room air supply, confirm direction of outward air passage at multiple gaps in the room's integrity, examine room for areas of dampness or fungal growth. Investigate possible errors in sampling technique and resample • Double digits and above = indication of a serious problem. Urgent investigation and clinical consideration of fungal prophylaxis It is worth noting that a zero result, whilst optimal, does not always assure engineering efficacy as it may be reflective of no circulating fungal spores at the time of testing. **Lighting and power:** Luminaires to be recessed into a solid ceiling and be (minimum) IP44 with clear access strategy for maintenance including gear and lamp replacement. Any power, trunking or other services penetrations into the space must be sealed. **Water:** The water systems should be to SHTM 04-01 and free of any waterborne pathogens at the point of use. **Contingency:** As it is proposed that only one air handling unit serves the BMT isolation rooms at the QEUH (ward 4b), planned shut downs or unplanned events (such as motor failures or power failures) require to be addressed. The result of these shutdowns may mean that patients may need to be relocated. It is suggested that contingency plans include:- • AHU complete failure for prolonged period • AHU complete failure for short duration • AHU maintenance (air related – filters, fans, cleaning, etc) • AHU maintenance (water related - cleaning, testing, inspecting) • Cleaning or deep cleaning of rooms following occupation. • If the AHU does not have a duty/standby arrangement, spare supply fans are sourced and stored locally to the AHU. • If ALL the ductwork is not fire rated, what happens in the event of a fire scenario. It may also be prudent to have contingency plans for local power failure and in the event of pathogens found in the local water supplies to the BMT isolation facilities

Recommendation	• Both active and passive air sampling should be undertaken in parallel • Sampling should be undertaken weekly at varying times for a period of 4 -6 weeks and a follow up one month later • All patient rooms within 4b should be included in each sample period • An external adjacent unprotected area should be identified and passive sampling undertaken in parallel with protected (BMT unit rooms) sampling • Standard sample plates should be used which are selective for fungi and that inhibit bacterial growth • Any fungal colonies identified require to be counted but not speciated • As the medium used are selective for fungi and not bacteria, the rooms do not require to be vacated during the sampling period. • Passive sampling/settle plates should be left insitu for 4-6 hours approximately ensuring the plates do not dry out. • Active sampling volume should be approx 1,000 litres per room. • The air sampler should be placed on a clean trolley or stand • The medium for both passive and active sampling should be the same • Results should be interpreted: • Zero growth = optimal • Single digit = review room air supply, confirm direction of outward air passage at multiple gaps in the room's integrity, examine room for areas of dampness or fungal growth. Investigate possible errors in sampling technique and resample • Double digits and above = indication of a serious problem. Urgent investigation and clinical consideration of fungal prophylaxis • Annual validation of ventilation should be undertaken in line with the agreed protocol, based on selected components of SHTM 03-01 part B. • Once completion of commission monitoring as outlined above the normal monitoring protocol endorsed by NHSGGC should be resumed.

QUEEN ELIZABETH UNIVERSITY HOSPITAL

NHS Greater Glasgow and Clyde

QEUH – WARD 4B

VENTILATION REPORT

NHS Greater Glasgow and Clyde

Area:	Queen Elizabeth University Hospital	**AHU:**	31AHU63
Client:	NHS Greater Clyde & Glasgow	**Client Contact:**	David Brattey
Site Address:	1345 Govan Rd, Glasgow, G51 4TF	**Report No:**	A11356
System Condition:	Good	**Date of Test:**	6th - 10th November 2017
Test Engineer & Report Preparation:	Daniel Kane	**Signature:**	[redacted]
H&V Approval:	Ian Stewart	**Signature:**	[redacted]
Client Reviewed by:	David Brattey	**Signature:**	

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16 BARRMILL ROAD
GALSTON
AYRSHIRE
KA4 8HH

Table of Contents

Section 1 – Scope of Works

Adults Ward 4B is located on the 4th floor in Queen Elizabeth University Hospital. Adults Ward 4B is supplied by 3 Air Handling Units located on level 3 plant room, just below one level from the department.

Main traverse readings will be taken from both the supply and extract ducts and the invertor readings recorded.

To ensure compliance with SHTM03-01, the following tests will be carried out;

1 - Supply volume flow rates from each terminal grille and air change rates calculated.
2 – Record room pressures and compare with the Digital Pressure Panel
3 – DOP integrity test all supply HEPA filters
4 – Provide an electronic validation report

Section 2 – Executive Summary

Recorded the supply volumes and calculated the air change rates, all achieve or are acceptable to the required specification.

The room pressures are above the minimum required limits.

The change of HEPA filters in each individual Isolation Room was carried out and old filters boxed ready for disposal.

The DOP Filter integrity test all HEPA Filters was carried out. All filters achieved an integrity of 99.99% MPPS.

Section 3 – Air Volumes & Air Change Rates

Air Volume Methodology

Objective:

To provide documented evidence to verify the supply air volume rates through individual filter terminals are in accordance with their design volumes.

Prerequisites – Supply and Extract Air Handling Unit maintenance complete.

Test Method

- Micromanometer – calibrated and used in conjunction with Pitot tube to measure air velocity in appropriate ducting, to calculate air volume for Balometer factor.
- The HVAC System(s) is operational and stable.

Methodology:

- Hold the balometer hood over the diffuser/grille face and ensure balometer is set in the correct direction and read off the measured air volume flow rate.

Acceptance Criteria

- Calibration certificates for all test equipment are appended to the report.

Room Air Change Rate Calculation Methodology

Objective

To provide documented evidence to verify the room air change rate to each room within the Area based on measurement of the total supply air volume to the room in accordance with the design specification.

Pre-Requisites

- The tests described in the air volume methodology have been completed.

Methodology

- Insert all supply air volumes into the results table.
- Calculate the total supply air volume to each room by the addition of all supply HEPA filter flow rates within the room.
- Calculate the air change rate per hour for each room using the following equation:

$$\frac{\text{Total volume of all supply terminal HEPA filter flowrates } (m^3/h)}{\text{Volume of the room } (m^3)}$$

Acceptance Criteria

- All rooms must achieve the minimum number of air change rates specified in the design data.

QUEEN ELIZABETH UNIVERSITY HOSPITAL

NHS
Greater Glasgow and Clyde

Section 3 – Air Volumes & Air Change Rates

AHU Invertor Readings & Filter Pressure Drops

AHU 31-63		Primary Filter PD	55Pa
Supply Invertor	44Hz (A)	Secondary Filter PD	120Pa
Extract Invertor	30Hz (B)	Extract Filter PD	15Pa

Supply Duct Traverse

Test Point / Location	Design Volume m³/s	Duct Size mm	Duct Area m²	Design Velocity m/s
TP2 / 4th Floor Riser	0.899	700 x 350	0.245	3.67
	A	B	C	D
1	6.10	4.70	5.00	7.00
2	5.80	3.90	5.30	6.30
3	5.60	3.60	5.10	4.30
4	5.60	3.50	5.10	4.40
Total	23.10	15.70	20.50	22.00
Overall Total		81.30		
Average Velocity m/s	Test Volume m³/s	% Design	Static Pressure Pa	
5.08	1.245	139	380	

Test Point / Location	Design Volume m³/s	Duct Size mm	Duct Area m²	Design Velocity m/s
TP1 / 4th Floor Riser	1.04	500 x 500	0.25	4.16
	A	B	C	
1	5.96	5.70	5.00	
2	5.48	5.90	5.30	
3	5.31	5.20	5.10	
4	5.15	5.60	5.10	
Total	21.90	22.40	20.50	
Overall Total		64.80		
Average Velocity m/s	Test Volume m³/s	% Design	Static Pressure Pa	
5.40	1.35	130	369	

QUEEN ELIZABETH UNIVERSITY HOSPITAL

Greater Glasgow and Clyde

Section 3 – Air Volumes & Air Change Rates

Extract Duct Traverse

Test Point / Location	Design Volume m³/s	Duct Size mm	Duct Area m²	Design Velocity m/s
Main TH	1.392	700 x 450	0.315	4.42
	A	B	C	D
1	3.80	3.20	3.30	3.90
2	3.30	3.40	3.50	3.10
3	3.60	2.50	2.50	2.80
4	3.60	2.50	2.10	2.00
Total	14.30	11.60	11.40	11.80
Overall Total		49.10		
Average Velocity m/s	Test Volume m³/s	% Design	Static Pressure Pa	
3.069	0.967	69	120	

AHU Invertor Readings & Filter Pressure Drops

AHU 31-63EF01			
Extract Invertor	70Hz (B)	Extract Filter PD	15Pa

Extract Main Test Point

Test Point / Location	Design Volume m³/s	Duct Size mm	Duct Area m²	Design Velocity m/s
Main TH	0.698	500 x 350	0.175	3.99
	A	B	C	
1	6.00	5.80	5.80	
2	5.70	6.00	5.80	
3	5.80	5.70	5.90	
4	5.70	5.90	5.80	
Total	23.20	23.40	23.30	
Overall Total		69.90		
Average Velocity m/s	Test Volume m³/s	% Design	Static Pressure Pa	
5.825	1.019	146	204	

Extract Test Point

Test Point / Location	Design Volume m³/s	Duct Size mm	Duct Area m²	Design Velocity m/s
TH1	0.0898	250 ϕ	0.0491	1.83
	A	B		
1	1.90	1.80		
2	2.00	1.90		
3	1.90	2.20		
4	1.90	1.70		
Total	7.70	7.60		
Overall Total		15.30		
Average Velocity m/s	Test Volume m³/s	% Design	Static Pressure Pa	
1.9125	0.0939	105	9	

Section 3 – Air Volumes & Air Change Rates

Supply Grille Volume Flow Rates

Room	Room ID	Test Volume		Design Volume	% of Design
		m³/hr	l/s	l/s	
76	A4-HOW-190	324	90	80	113
77	A4-HOW-193	392	109	80	136
78	A4-HOW-195	324	90	80	113
79	A4-HOW-198	364	101	80	126
80	A4-HOW-202	385	107	80	134
81	A4-HOW-050	324	90	80	113
82	A4-HOW-053	302	84	80	105
83	A4-HOW-055	338	94	80	118
84	A4-HOW-058	328	91	80	114
85	A4-HOW-059	306	85	80	106
86	A4-HOW-062	385	107	80	134
87	A4-HOW-064	342	95	80	119
88	A4-HOW-067	335	93	80	116
89	A4-HOW-031	403	112	100	112
90	A4-HOW-029	407	113	80	141
91	A4-HOW-026	371	103	80	129
92	A4-HOW-024	382	106	80	133
93	A4-HOW-021	317	88	80	110
94	A4-HOW-020	310	86	80	108
95	A4-HOW-017	317	88	80	110
96	A4-HOW-015	396	110	80	138
97	A4-HOW-012	356	99	80	124
98	A4-HOW-011	392	109	80	136
99	A4-HOW-009	378	105	80	131

Section 3 – Air Volumes & Air Change Rates

Extract Grille Volume Flow Rates

Room	Room ID	Test Volume		Design Volume l/s	% of Design
		m³/hr	l/s		
76	A4-HOW-190	104	29	30	97
77	A4-HOW-193	104	29	30	97
78	A4-HOW-195	115	32	30	107
79	A4-HOW-198	108	30	30	100
80	A4-HOW-202	104	29	30	97
81	A4-HOW-050	94	26	30	87
82	A4-HOW-053	104	29	30	97
83	A4-HOW-055	126	35	30	116
84	A4-HOW-058	90	25	30	83
85	A4-HOW-059	95	26	30	87
86	A4-HOW-062	126	35	30	116
87	A4-HOW-064	94	26	30	87
88	A4-HOW-067	86	24	30	80
89	A4-HOW-031	94	26	30	87
90	A4-HOW-029	86	24	30	80
91	A4-HOW-026	108	30	30	100
92	A4-HOW-024	108	30	30	100
93	A4-HOW-021	108	30	30	100
94	A4-HOW-020	108	30	30	100
95	A4-HOW-017	94	26	30	87
96	A4-HOW-015	94	26	30	87
97	A4-HOW-012	112	31	30	103
98	A4-HOW-011	108	30	30	100
99	A4-HOW-009	97	27	30	90

Section 3 – Air Volumes & Air Change Rates

31-63/EF01 Extract Volume Flow Rates

Room	Grill Reference	Test Volume		Design Volume l/s	% of Design
		m³/hr	l/s		
Corridor Area	512-EG002	346	96	90	107
Corridor Area	514-EG008	274	76	75	101
Corridor Area	513-EG006	281	78	75	104
Corridor Area	513-EG008	284	79	75	105
Corridor Area	514-EG009	360	100	75	133
Corridor Area	513-EG007	310	86	77	112
Corridor Area	513-EG004	342	95	63	151
Corridor Area	513-EG003	328	91	55	165
Corridor Area	513-EG002	328	91	54	169
Corridor Area	513-EG001	389	108	60	180

125AHU05 Clean Utility Volume Flow Rates

Room	Grill Reference	Test Volume		Design Volume l/s	% of Design
		m³/hr	l/s		
Clean Utility	Supply Grille	131	36	tbc	107
Clean Utility	Extract Grille	130	36	Tbc	101

Pentamidine Treatment Room Volume Flow Rates

Room	Grill Reference	Test Volume		Design Volume l/s	% of Design
		m³/hr	l/s		
HOW-003	Supply Grille	284	79	tbc	107
HOW-003	Extract Grille	395	110	Tbc	101

QUEEN ELIZABETH UNIVERSITY HOSPITAL

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Section 3 – Air Volumes & Air Change Rates Continued.....

Air Change Rates

Room Reference	Recorded Air Volume m^3/hr	Room Volume m^3	Recorded ac/hr	Design Air Change Rates ac/hr
Room 76	324	45.9	7.1	6
Room 77	392	45.9	8.5	6
Room 78	324	45.9	7.1	6
Room 79	364	45.9	7.9	6
Room 80	385	54.0	7.1	6
Room 81	324	48.6	6.7	6
Room 82	302	45.9	6.6	6
Room 83	338	45.9	7.4	6
Room 84	328	48.6	6.7	6
Room 85	306	48.6	6.3	6
Room 86	385	45.9	8.4	6
Room 87	342	45.9	7.5	6
Room 88	335	45.9	7.3	6
Room 89	403	45.9	8.8	6
Room 90	407	45.9	8.9	6
Room 91	371	48.6	7.6	6
Room 92	382	48.6	7.3	6
Room 93	317	48.6	6.5	6
Room 94	310	48.6	6.4	6
Room 95	317	45.9	6.9	6
Room 96	396	45.9	8.6	6
Room 97	356	48.6	7.3	6
Room 98	392	48.6	8.1	6
Room 99	378	64.80	5.8	6
Clean Utility	131	36.4	3.6	6
Pentamidine	395	45.3	8.7	6
A balometer factor of 1.0 was used.				

Equipment Used

Test Instruments Used	Serial No.	Calibration Due
Balometer	90526046	September 2018

Section 4 – Filter Integrity Test

Objective

To provide documented evidence to verify that each HEPA filter installation within the HVAC System(s), comprising the filter, seal and housing, does not permit the passage of particulate material in sufficient quantities to compromise the design intent of the filter. This will be achieved by smoke integrity testing.

Prerequisites

- **Aerosol generator** – calibrated to be capable of generating a poly-dispersed aerosol having the size distribution given in PD6609:2000 Annex B, Clause C.2.1.
- **Photometer** – calibrated and suitable for the measurement of mass concentration of airborne particles having the size distribution given in PD6609:2000 Annex B, Clause C.2.1 and having an accuracy of better than ±5% over the range of a five expandable, six decade resolution and a minimum threshold sensitivity 0.0001µg/l and capable of measuring aerosol concentration in the range of 10 to 100mg/m^3. The photometer shall have a sample flow rate 0.4 ± 0.05 l/s
- **Sampling probe** - a suitable sampling probe is required which is designed for maximum coverage of isokinetic flow rates.
- **Calibration certificates** – are required for the above and must be appended to the test report.

Methodology

The test will be performed by introducing an aerosol challenge upstream of each HEPA filter and scanning immediately downstream of the filters and support frame.

A test report will be prepared which will include confirmation of the methodology used, results of testing for each filter, whether each test is a **pass** or **fail**, the location of any detected leaks and indication of the position and extent of any repairs and calibration certificates for all test equipment used.

Acceptance Criteria

- Aerosol concentration readings must be ≤ 0.01 % of the upstream concentration within all grade of rooms.
- A test report is prepared which includes confirmation of the methodology used, results of testing for each filter, whether each test is a **pass** or **fail.** If a fail is recorded replace the filter and retest.
- Attach copy of calibration certificates for all test equipment.
-

QUEEN ELIZABETH UNIVERSITY HOSPITAL

NHS Greater Glasgow and Clyde

Section 4 – Filter Integrity Test

Filter Integrity Results

Room	Room Reference ID	Filter Pressure Drop Pa	Set Upstream Concentration mg/m³	Downstream % penetration	% Upstream Aerosol Concentration Post Scan	Pass/Fail
76	A4-HOW-190	New Filter	47	0.0001	100	Pass
77	A4-HOW-193	New Filter	52	0.0004	97	Pass
78	A4-HOW-195	New Filter	28	0.0001	98	Pass
79	A4-HOW-198	New Filter	67	0.0003	102	Pass
80	A4-HOW-202	New Filter	63	0.0009	100	Pass
81	A4-HOW-050	New Filter	34	0.0001	97	Pass
82	A4-HOW-053	New Filter	40	0.0002	100	Pass
83	A4-HOW-055	New Filter	46	0.0008	103	Pass
84	A4-HOW-058	New Filter	78	0.0005	101	Pass
85	A4-HOW-059	New Filter	65	0.0007	100	Pass
86	A4-HOW-062	New Filter	80	0.0009	100	Pass
87	A4-HOW-064	New Filter	88	0.0003	102	Pass
88	A4-HOW-067	New Filter	82	0.001	100	Pass
89	A4-HOW-031	New Filter	77	0.0002	103	Pass
90	A4-HOW-029	New Filter	74	0.0004	104	Pass
91	A4-HOW-026	New Filter	80	0.0009	100	Pass
92	A4-HOW-024	New Filter	64	0.0003	99	Pass
93	A4-HOW-021	New Filter	80	0.001	102	Pass
94	A4-HOW-020	New Filter	63	0.0008	102	Pass
95	A4-HOW-017	New Filter	21	0.0001	100	Pass
96	A4-HOW-015	New Filter	28	0.002	101	Pass
97	A4-HOW-012	New Filter	39	0.003	100	Pass
98	A4-HOW-011	New Filter	31	0.004	98	Pass
99	A4-HOW-009	New Filter	23	0.001	103	Pass
Clean Utility	HOW-039	New Filter	80	0.007	100	Pass

Test Instruments Used	Serial No.	Calibration Due
Photometer	11200	March 2018
Aerosol Generator	12198	June 2018

Section 5 - Room Pressure Differentials

Room Pressure Differential Methodology

Objective

To provide documented evidence to verify the room pressure regime throughout the Cleanroom suite is in accordance with their design values.

Pre-Requisites

All supply and extract volumes are set to client specification

- All LAF unit(s) are operational, where applicable.
- The HVAC System(s) must have been operating normally and continuously for at least 24 hours prior to commencement of the test.
- The tests are to be carried out "unmanned at rest". Ensure that area supervision have been informed to keep personnel out of the area.
- The test operator has been trained to use the test equipment and is wearing appropriate clean area clothing.
- Room pressure alarms/information;
    - High room pressure set at 15Pa
    - Low room pressure alarm set at 5Pa
    - Door open or out of specification alarm is set for a 2 minute period before alarming.
    - Room pressure alarms can be silenced from the button on the digital display set at each room door entry (on the stainless steel plate).

Methodology

- With the Micromanometer properly zeroed, attach the tubing to the positive connection on the instrument, then place the other end of the tubing underneath the room door, with the tubing going into the higher pressured room.
- Record the reading into the appropriate position on the table below.

QUEEN ELIZABETH UNIVERSITY HOSPITAL

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Greater Glasgow and Clyde

Section 5 - Room Pressure Differentials

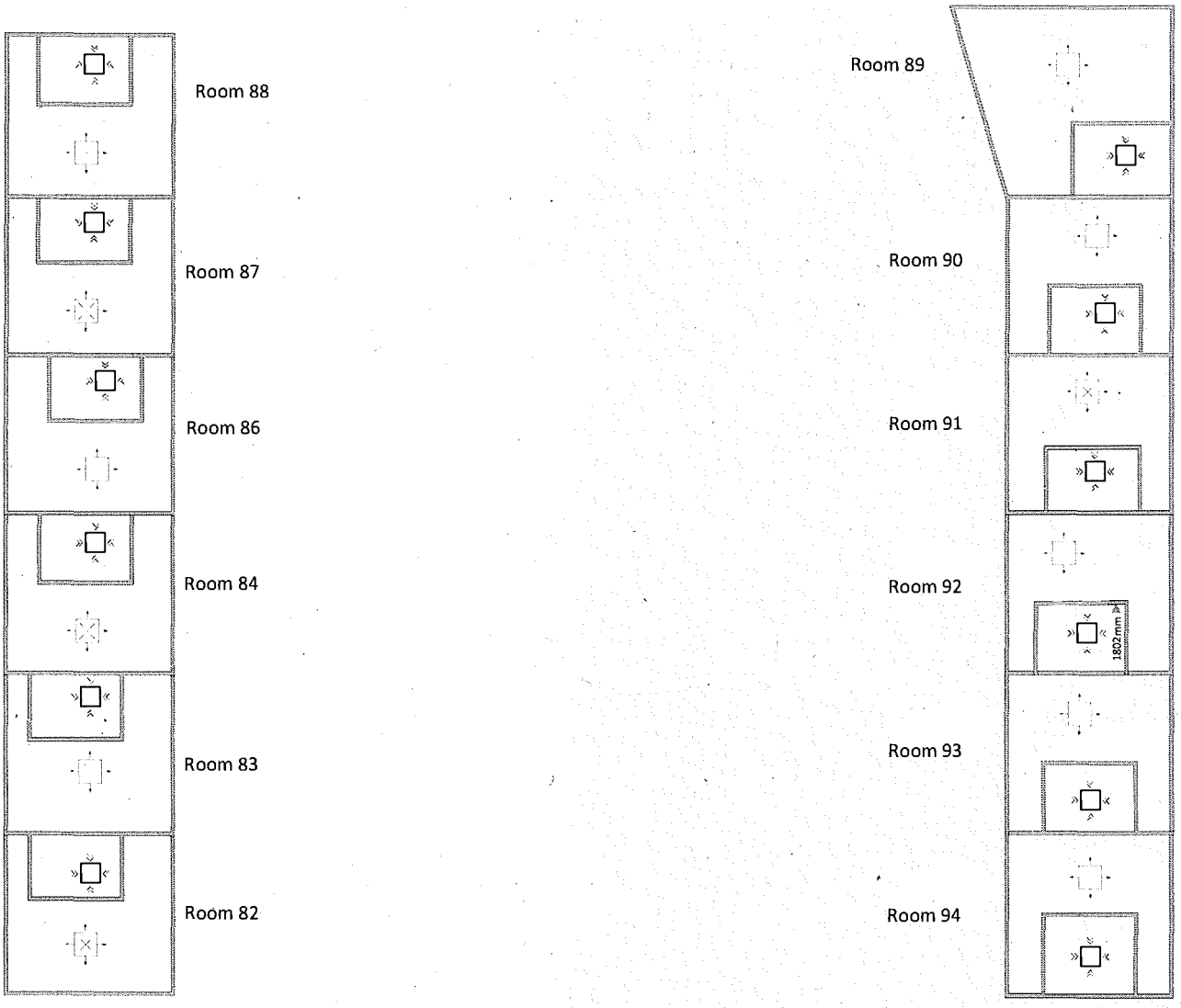
Room Pressure Differentials, Temperature, Humidity & Noise Levels

Room	Room	Recorded Pressure Pa	Target Pa	Recorded Temp Target 18-28°C	Recorded Noise Target 35dba
Room 76	Corridor	7.6	5 – 10	23.5	28.2
Room 77	Corridor	7.0	5 – 10	23.2	29.5
Room 78	Corridor	6.8	5 – 10	25.0	30.0
Room 79	Corridor	9.2	5 – 10	23.9	31.0
Room 80	Corridor	7.4	5 – 10	23.5	29.8
Room 81	Corridor	7.0	5 – 10	22.4	29.2
Room 82	Corridor	8.1	5 – 10	21.0	29.0
Room 83	Corridor	9.4	5 – 10	20.0	29.7
Room 84	Corridor	8.7	5 – 10	23.4	32.0
Room 85	Corridor	7.2	5 – 10	22.9	31.1
Room 86	Corridor	8.6	5 – 10	23.1	28.0
Room 87	Corridor	8.4	5 – 10	23.5	29.5
Room 88	Corridor	8.4	5 – 10	19.8	30.2
Room 89	Corridor	8.5	5 – 10	19.3	28.4
Room 90	Corridor	8.4	5 – 10	23.6	29.7
Room 91	Corridor	10.0	5 – 10	18.9	29.3
Room 92	Corridor	11.2	5 – 10	19.2	28.5
Room 93	Corridor	8.3	5 – 10	27.7	29.6
Room 94	Corridor	7.4	5 – 10	19.8	29.8
Room 95	Corridor	13.0	5 – 10	22.9	27.4
Room 96	Corridor	10.6	5 – 10	23.2	26.2
Room 97	Corridor	7.2	5 – 10	19.3	28.1
Room 98	Corridor	7.5	5 – 10	19.8	29.6
Room 99	Corridor	6.5	5 – 10	22.2	27.9
Clean Utility	Corridor	0.5	+	-	-
Ward 4B	Link Corridor	6	+	-	-
Ward 4B	Ward 4C	6	+	-	-
Ward 4B	Stairwell	4	+	-	-

Equipment Used

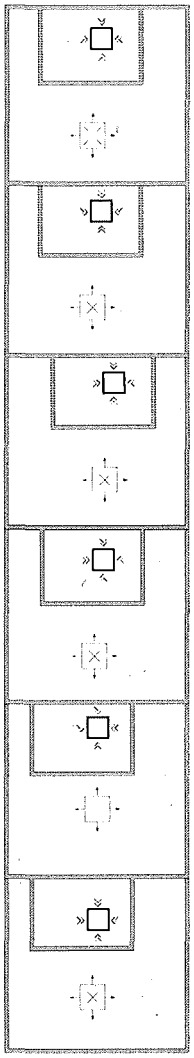
Test Instrument Used	Serial Number	Calibration Due Date
Micromanometer	7827	November 2017
Environmental Meter	160506299	September 2018

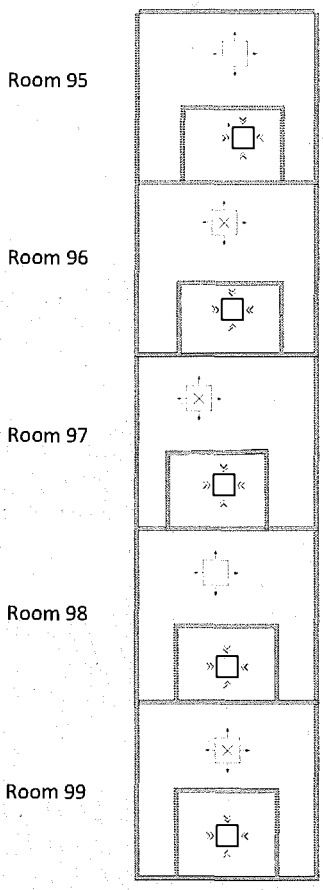
Section 6 – Ward 4B Schematic



QUEEN ELIZABETH UNIVERSITY HOSPITAL

Greater Glasgow and Clyde






H&V
COMMISSIONING
SERVICES LTD


NHS
Greater Glasgow
and Clyde

CERTIFICATE OF CALIBRATION

Issued By IRC Ltd

Date of Issue 19 September 2017

Certificate Number
224854

Page 1 of 2 Pages

Instrument Repairs & Calibration
7 Howard Court Industrial Estate
East Kilbride, G74 4QZ
Tel: 01355 264120 Fax: 01355 264150
www.instrument-repairs.com

Approved Signatory
[redacted]
Digitally signed by Keith Low
DN: cn=Keith Low, o=IRC Ltd, ou=IRC Ltd, email=keith.low@instrument-repairs.com, c=GB
Date: 2017.09.19 11:21:41 +01'00'

☐ N.Anderson ☐ K.Low ☐ C.Moore ☐ A.Rae

Customer : H&V Commissioning Services Ltd
Kilknowe Offices, 16 Barrmill Road
Galston KA4 8HY

Date Received : 07 September 2017

Instrument -

System ID :	IRC02204	Job Number :	R87915
Description :	Balometer	Ref. Number :	AC-C-06
Manufacturer :	Alnor	Site :	
Model Number :	EBT-721	Location :	
Serial Number :	90526046	Last Certificate Number :	
Procedure Version :	2592	Last Calibration Date :	

Environmental Conditions

Temperature :	23°C +/- 2°C	Mains Voltage :	230V +/- 10V
Relative Humidity :	50% +/- 20%	Mains Frequency :	50Hz +/- 1Hz

Comments

A. All prime parameters found to be within specification.
Results at the time of test carry no long term stability of the instrument.
This certificate records the ON RECEIPT calibration status.
Recalibration period 52 weeks by customer request.

Traceability Information

Instrument description	*Serial number*	*Certificate number*	*Cal. Date*	*Cal. Period*
Mensor CP6000	610020	13027/8/9/30/33	09/11/2015	104

Calibrated By : K Low **Date of Calibration :** 19 September 2017

CERTIFICATE OF CALIBRATION

Certificate Number
224854

Test Title	Tolerance	Applied Value	Reading	Pass/Fail
Pressure				
Pascals	2.8pa	249.0pa	250.0pa	Pass
	22.9pa	1 992.0pa	1 995pa	Pass
	40.4pa	3 736.0pa	3 737pa	Pass

End of Results

Uncertainties

Pressure TE69 0- 1000mBar +/- 0.01% of reading

TRACEABLE CERTIFICATION & CALIBRATION REPORT

Digital Aerosol Photometer

Customer :

H & V Commissioning Services
Kilknowe Office
16 Barrmill Road
Galston
Ayshire

P.O#

Environmental Conditions		
Temperature	22.4	°C
Ambient Pressure	100	kPa

Model	ATI-2G
Serial No.	11200
ID#	2248

Calibration Equipment

	Multimeter	Electronic Balance	Flowmeter
Model	U3402A	HP220DC	Flow Meter
Serial Number	MY50060007	D455800028	F165086/01
Cal Due Date	Apr-17	May-17	Oct-18

Calibration Data

Volumetric Flow: L/min ± 5% of reading

Test Point	Measurement	2G Output	ABS ERROR	Allowed ERROR	Cal status
As Found	28.30	27.60	0.70	1.4	Pass
As Left	28.30	28.20	0.10	1.4	Pass

Stray Light: Volts

	As Found	As Left
Stray Light	0.0027	0.0076

P1 = ONDINA Concentration: 100 µg/L +/- 10% of Reading*

Test Point	Generator	2G Output	ABS ERROR	ALLOWED ERROR	CAL Status
As Found	100.00	81.30	18.70	10	Fail
As Left	100.00	100.60	-0.60	10	Pass

P2 = Emery Concentration: 100 µg/L +/- 10% of Reading*

Test Point	Generator	2G Output	ABS ERROR	ALLOWED ERROR	CAL Status
As Found	100.00	80.80	19.20	10	Fail
As Left	100.00	99.04	0.96	10	Pass

P3 = HIGH Concentration: 100 µg/L +/- 30µg/L

Test Point	Generator	2G Output	ABS ERROR	ALLOWED ERROR	CAL Status
As Found	100.00	85.00	15.00	30	Pass
As Left	100.00	103.00	-3.00	30	Pass

Notes:

Cleaned internal filters, tubing & rewired optical chamber lamp due to intermittent fault.

TUR 1:1

Condition of Unit

AS FOUND				AS LEFT			
☐	In tolerance	☐	Inoperable	☑	Calibrated as left	☐	New instrument
☑	Out of tolerance			☐	No calibration performed		

Maintenance Performed

☐	Rework scattering chamber	☑	Test scanning probe	☑	Leak Check	
☑	Clean Sampling System	☐	Test Absolute Filter	☐	Printer	
☐	Replace Cell Lamp	☐	Replace Gaskets	☑	Voltage Checks	
☑	Align Optics	☑	Tighten Loose Hardware	☑	Final Test	

Calibration Statement

The instrument listed on this certificate has been calibrated against standards traceable to NIST or other recognized national metrology institutes, derived from ratio type measurements, or compared to nationally recognized consensus standards. A test uncertainty ratio of 4:1 [k-2, approx. 95% confidence level] was maintained unless otherwise stated. All results contained within this certificate relate only to the item(s) calibrated. Any number of factors may cause the calibrated item to drift out of calibration before the instruments calibration interval has expired. This certificate shall not be reproduced except in full and with written consent of ATI. This unit has been calibrated to the most recent revision of PCL-030-WI .

Calibrated by	L . HANTEA	Signed	[redacted]
Cal Date	02 March 2017	Cal Due	[redacted] 2018

ATI UK Ltd
Unit 10
Protea way
Pixmore Avenue
Letchworth
Hertfordshire
SG6 1JT
United Kingdom

Telephone:
+44 (0)1462 676446
Facsimile:
+44 (0)1462 486078

Email: saleuk@atitest.com

Web:
www.atitest.co.uk

Registered Office
Unit 10
Protea way
Pixmore Avenue
Letchworth
Hertfordshire
SG6 1JT

Registered in England
No. GB 3889548

VAT Number
GB 770 8627 05000

OptiCal Sciences

CERTIFICATE OF COMPLIANCE AEROSOL GENERATOR

No G/29466

The Standards used have been calibrated by internal and external procedures traceable to National Standards.
This Aerosol Generator has been tested with Finavestan A80 B

Date of Calibration: 15-Jun-17		Model	Serial No
Customer	H & V Commisioning Services	CF Taylor	12198
Address	Kilknowe Office		
	16 Barrmill Road		
	Galston		
	KA4 8HH		
Service Report No 29466			

STANDARDS USED

INSTRUMENT DESCRIPTION	MANUFACTURER	SERIAL No	LAST RECAL	CERT NO
Photometer	Air Techniques	12076	19-Apr-17	29181
Airflow Meter	Airflow Developments	115135	19-May-17	12574
Airflow HLF Bench	Gelman Sciences	9436-89	25-Nov-16	28644
Electrical Safety Tester	Martindale MPAT+	78491386	27-Apr-17	386428
Aerosol Diluter	Air Techniques	13940	27-Jul-16	28001

AEROSOL OUTPUT CONCENTRATION RESULTS

Inlet Bottle Pressure (PSI)	Oil Flow Valve	Heater Block Temperature (°C)	HLF Bench Airflow (L/min)	Upstream Concentration (µg/L)
5	N/A	355	13,336.2	165
10	N/A	355	13,336.2	500
15	N/A	355	13,336.2	775
20	N/A	355	13,336.2	920
25	N/A	355	13,336.2	1,100
30	N/A	355	13,336.2	1,200

ELECTRICAL SAFETY TEST RESULTS

Test No: 0452	
Test Mode: Class one	
Visual: Pass	
Earth Test: 0.09Ω	
Insulation Test: ^19.9MΩ	
Load Test: 0.91KVA	
Leakage Test: 00.1mA	
FLOW RATE	
ATI TDA-5B	N/A LPM

CALCULATED RESULTS

Generator Output (g/min) = Upstream Concentration (µg/L) x HLF Bench Airflow (L/min) / 1,000,000

Pressure	Output (g/min)	Pressure	Output (g/min)
5psi	2.20	25psi	14.67
10psi	6.67	30psi	16.00
15psi	10.34		
20psi	12.27		

Out Of Limit Errors As Found. Comments: None.

[redacted]

Next Calibration Due 15-Jun-18 | Engineer A.Laurance | S

OptiCal Sciences Limited
Envirotest House
Anglia Way, Moulton Park Industrial Estate, Northampton NN3 6JA
Telephone: 0844 334 0100 Fax: 0844 334 0101 Email: info@optical-sciences.co.uk
Visit our Website at www.optical-sciences.co.uk

CERTIFICATE OF CALIBRATION

Issued By **Cuthbertson Laird Group**
Date of Issue **28 November 2016**
Date Received **22 November 2016**

Certificate Number
HAM13016

Cuthbertson Laird Group
Parkburn Court
Glasgow Road
Hamilton
ML3 0QQ

[redacted]

Approved Signatory
D. Semple

Electronically Signed

Customer : H & V Commisioning
16 Barmill Road
Ayrshire
Galston
KA4 8HH

Instrument -

System ID :	ID216
Description :	AutoZeroing Micromanometer
Manufacturer :	DPM
Model Number :	TT470S
Serial Number :	7827
Customer Ref:	
Procedure Version	2227

Environmental Conditions

Temperature :	20°C ± 1°C	Mains Voltage :	240V ± 10V
Relative Humidity :	50%RH ± 15%RH	Mains Frequency	50Hz ± 1Hz

Comments
This Certificate Records The On Receipt Calibration Status Of The Instrument.

Traceability Information

Instrument Description	*Serial Number*	*Certificate Number*	*Cal. Date*	*Cal. Period Weeks*
Air Neotronics MP6KS	0141232	20637	20/07/2015	104
Druck DPI142	2562944	24756	29/10/2016	52

Calibrated By : **D Semple**
Date of Calibration : **28 November 2016**

This is to certify the above instrument was fully tested and calibrated. Work carried out was in accordance with procedures laid down in BS·EN ISO/IEC 17025:2005. The accuracies of the standards used are traceable to National Standards, via UKAS approved laboratories.

CERTIFICATE OF CALIBRATION

Certificate
HAM13016

Test Title	Applied Value	Reading	Uncertainties
Pressure			
7kPa	1.000kPa	1.01kPa	10Pa
7kPa	2.000kPa	2.01kPa	10Pa
7kPa	3.000kPa	3.01kPa	10Pa
7kPa	4.000kPa	4.02kPa	10Pa
7kPa	5.000kPa	5.03kPa	10Pa
7kPa	6.000kPa	6.03kPa	10Pa
1999Pa	400Pa	399Pa	1Pa
1999Pa	800Pa	798Pa	1Pa
1999Pa	1600Pa	1595Pa	1Pa
199.9Pa	40.0Pa	39.9Pa	0.1Pa
199.9Pa	80.0Pa	79.9Pa	0.1Pa
199.9Pa	160.0Pa	159.7Pa	0.1Pa
Velocity			
100m/s	5.0m/s	5.0m/s	1Pa
100m/s	10.0m/s	10.0m/s	1Pa
100m/s	25.0m/s	25.0m/s	1Pa
100m/s	50.0m/s	50.0m/s	1Pa

End Of Results

CERTIFICATE OF CALIBRATION

Issued By **Cuthbertson Laird Group**
Date of Issue **04 September 2017**
Date Received **31 August 2017**

Certificate Number
HAM18771

Cuthbertson Laird Group
Parkburn Court
Glasgow Road
Hamilton
ML3 0QQ

[redacted]

Approved Signatory
D. Semple

Electronically Signed

Customer : H & V Commisioning
16 Barmill Road
Ayrshire
Galston
KA4 8HH

Instrument -

System ID :	ID23629
Description :	Environment Meter
Manufacturer :	Precision Gold
Model Number :	N09AQ
Serial Number :	160506299
Customer Ref:	
Procedure Version	2491

Environmental Conditions

Temperature :	20°C ± 1°C	Mains Voltage :	240V ± 10V
Relative Humidity :	50%RH ± 15%RH	Mains Frequency	50Hz ± 1Hz

Comments
This Certificate Records The On Receipt Calibration Status Of The Instrument.

Traceability Information

Instrument Description	*Serial Number*	*Certificate Number*	*Cal. Date*	*Cal. Period Weeks*
Pulsar P100B	035219	G002819	14/09/2016	52
Vaisala HMI41 Indicator	S1330009	A22418029-1	29/08/2017	52
Vaisala HMP41/45 Probe	J3215002	A22418029-1.	29/08/2017	52

Calibrated By : **D Semple**
Date of Calibration : **04 September 2017**

This is to certify the above instrument was fully tested and calibrated. Work carried out was in accordance with procedures laid down in BS EN ISO/IEC 17025:2005. The accuracies of the standards used are traceable to National Standards, via UKAS approved laboratories.

CERTIFICATE OF CALIBRATION

Certificate
HAM18771

Test Title	Applied Value	Reading	Uncertainties
Sound Level Meter			
Lo C	94dB	92.8dB	0.6dB
Hi C	94dB	93.5dB	0.6dB
Hi C	104dB	103.3dB	0.6dB
Humidity Meter			
%Rh	47.2%Rh	44.8%Rh	1.6%Rh
Temperature Meter			
°C	21.1°C	21.3°C	0.33°C

End Of Results

2A and 4B work is all signed off by Brian and myself and is progressing as planned.
Regards
Sandra
Sandra Devine
Associate Nurse Director
Infection Prevention & Control
[redacted]

From: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]
Sent: 12 January 2018 12:34
To: Jones, Brian
Cc: Devine, Sandra; Walsh, Tom
Subject: [ExternaltoGGC]handover

Hi Brian,

Having had a chance to read all my emails it would be useful to have a handover on the following ;

- .M Chimaera - any outstanding actions. Has ECMO sampling issue been resolved?
- M Abscessus - any outstanding actions from the IMT
- ICU Rooms - have HPS reviewed and produced a report and what is the plan moving forward
- 2A BMT
- 4B BMT
- 2A in general - line infections, outbreaks, outcome of public health input
- Neuro - SSIs, ICE theatres, water leaks
- Ortho SSIs
- CF - where are the policies at, decon of resp equipment , decon areas in adult and paeds- ? any progress
- Anything else you think is relevant

Thanks
Kind regards
Teresa
Dr Teresa Inkster
Lead Infection Control Doctor NHSGGC
Training Programme Director Medical Microbiology
Dept of Microbiology
Queen Elizabeth University Hospital
Glasgow

[redacted]

BMT Unit relocation meeting

18th May 2018, Lab Building, QEUH

Attendees:-

McColgan, Melanie (Chair) (MMcC)	General Manager CH & SOS
Myra Campbell (MC)	CH Clinical Service Manager
Teresa Inkster (TI)	Consultant Microbiologist
Annie Latif	BMTU Consultant
Susan Grant (SG)	Health Facilities Scotland
Grant McQuaker (GMcQ)	BMTU Consultant
Annette Rankin	Nurse Consultant, Health Protection Scotland
Ian Powrie (IP)	Deputy General Manager, Estates QEUH.

Blip with air monitoring results discussed, several rooms with fungal counts

1st set of results - low level fungal counts in all rooms – view is operator error.
2nd set of results – fungal counts in rooms adjacent to store room.

Likely causes –

1. store room door open with air / dust going into corridor .
2. Inadequate ward cleaning.

Actions –

1. Store room door closed - sign on door to remind staff door to remain closed at all times.
2. 2 x portable IQ Air Units in store room
3. All rooms and corridors in ward deep cleaned

Outcome-
Fungal counts down – majority of rooms 0 fungal count.

Cleaning
Meeting with Karen Connelly - agreed enhanced cleaning schedules in line with current provision in Ward B8&9 . Karen acknowledged the importance of training domestic staff and ensuring continuity.

Store room
Option to improve air flow in store room discussed – explore option to add hepa filter to store room without compromising clean prep.

Contingency
We have a contingency in place for supply plant failure to rooms.

At present we have no contingency for any other failure e.g. failure of extract from corridor or en-suite. Ian Powrie advised that in this situation the patients are protected as the rooms would remain positively pressured. .
If supply goes down the alarms in the rooms will sound, they are also connected to BMS.
Recommendation is that we arrange a dynamic simulation on contingency as a desk top exercise.

Water
All outlets will have filters fitted. There will be disruption further down the line when pipework and taps require replacement.

Annual verification
As previously agreed 6 hour plant shut down, the programme will be carried out over 2 weeks closing 2 rooms at a time.

Clinical Haematology – Ward 4B
Air Particle + Microbiological Monitoring Summary – Validation Data

Date	Room	SAB cfu@22	SAB cfu@30	ID cfu@22	ID cfu@30	Particle counts	Outside count	% Clearance	Room Closed	Comments
25/01/2018	76	1 Fun	0	Cladosporium Sp		672	231741			Validation
01/02/2018	76	0	0			583	55208			Settle Plates - Passive Air Sampling
01/02/2018	76	2 Bact	0							
08/02/2018	76	7 Bact	9 Bact							
08/02/2018	76	0	1 Fun							Settle Plates - Passive Air Sampling
15/02/2018	76	5 Bact	3 Bact			441	193662			
15/02/2018	76	0	0							Settle Plates - Passive Air Sampling
25/01/2018	77	0	0			238	231741			
01/02/2018	77	0	0			164	55208			Settle Plates - Passive Air Sampling
01/02/2018	77	0	1 Bact							
08/02/2018	77	11 Bact	1 Bact							
08/02/2018	77	0	1 Bact							Settle Plates - Passive Air Sampling
15/02/2018	77	2 Bact	2 Bact			249	193662			
15/02/2018	77	0	0							Settle Plates - Passive Air Sampling
25/01/2018	78	0	0			189	231741			
01/02/2018	78	0	0			116	55208			Settle Plates - Passive Air Sampling
01/02/2018	78	1 Bact	0							
08/02/2018	78	7 Bact	5 Bact 1 Fun							
08/02/2018	78	0	0							Settle Plates - Passive Air Sampling
15/02/2018	78	5 Bact	0			225	193662			
15/02/2018	78	1 Bact	1 Bact							Settle Plates - Passive Air Sampling

Clinical Haematology – Ward 4B
Air Particle + Microbiological Monitoring Summary – Validation Data

Date	Room	SAB cfu@22	SAB cfu@30	ID cfu@22	ID cfu@30	Particle counts	Outside count	% Clearance	Room Closed	Comments
25/01/2018	79	0	0			202	231741			
01/02/2018	79	0	1 Bact			98	55208			Settle Plates - Passive Air Sampling
01/02/2018	79	1 Bact 1 Fun	1 Bact	Mycelia sterilia						
08/02/2018	79	11 Bact	7 Bact							
08/02/2018	79	0	0							Settle Plates - Passive Air Sampling
15/02/2018	79	0	0			420	193662			
15/02/2018	79	1 Bact	0							Settle Plates - Passive Air Sampling
25/01/2018	80	0	0			96	231741			
01/02/2018	80	7 Bact 1 Fun	1 Bact	Cladosporium Sp		2797	55208			Settle Plates - Passive Air Sampling 2 visitors in room
01/02/2018	80	1 Bact 2 Fun	0	Cladosporium Sp						
08/02/2018	80	0	0							
08/02/2018	80	1 Bact	1 Bact							Settle Plates - Passive Air Sampling
15/02/2018	80	2 Bact	0			1498753	193662			Door opened twice during air sampling
15/02/2018	80					5084	193662			Repeat test
15/02/2018	80	1 Bact	0							Retest
15/02/2018	80	1 Bact 1 Fun	0							Settle Plates - Passive Air Sampling
25/01/2018	81					242	231741			
01/02/2018	81	0	0			513	55208			
08/02/2018	81	0	0							
08/02/2018	81	0	0							Settle Plates - Passive Air Sampling
15/02/2018	81	0	0			203	193662			
15/02/2018	81	0	0							Settle Plates - Passive Air Sampling

Clinical Haematology – Ward 4B
Air Particle + Microbiological Monitoring Summary – Validation Data

Date	Room	SAB cfu@22	SAB cfu@30	ID cfu@22	ID cfu@30	Particle counts	Outside count	% Clearance	Room Closed	Comments
25/01/2018	82					93	231741			
01/02/2018	82	0	0			530	55208			
08/02/2018	82	0	0							
08/02/2018	82	0	0							Settle Plates - Passive Air Sampling
15/02/2018	82	0	0			182	193662			
15/02/2018	82	0	0							Settle Plates - Passive Air Sampling
25/01/2018	83					176	231741			
01/02/2018	83	2 Fun	0	Aspergillus Sp		5305	55208			5 visitors in room
08/02/2018	83	0	0							
08/02/2018	83	1 Bact 1 Fun	0							Settle Plates - Passive Air Sampling
15/02/2018	83	0	0			282	193662			
15/02/2018	83	0	0							Settle Plates - Passive Air Sampling
25/01/2018	84					262	231741			
01/02/2018	84	1 Bact	1 Bact			155	55208			
08/02/2018	84	0	0							
08/02/2018	84	0	1 Bact							Settle Plates - Passive Air Sampling
15/02/2018	84	14 Bact	6 Bact			970	193662			
15/02/2018	84	1 Bact	2 Bact							Settle Plates - Passive Air Sampling
25/01/2018	85					772	231741			
01/02/2018	85	1 Bact	0			122	55208			
08/02/2018	85	9 Bact	14 Bact							
08/02/2018	85	0	0							Settle Plates - Passive Air Sampling
15/02/2018	85	0	0			197	193662			
15/02/2018	85	0	0							Settle Plates - Passive Air Sampling

Clinical Haematology – Ward 4B
Air Particle + Microbiological Monitoring Summary – Validation Data

Date	Room	SAB cfu@22	SAB cfu@30	ID cfu@22	ID cfu@30	Particle counts	Outside count	% Clearance	Room Closed	Comments
25/01/2018	86					412	231741			
01/02/2018	86					90	55208			
08/02/2018	86	2 Fun 2 Bact	3 Bact							
08/02/2018	86	0	0							Settle Plates - Passive Air Sampling
15/02/2018	86	0	0			145	193662			
15/02/2018	86	0	0							Settle Plates - Passive Air Sampling
25/01/2018	87					443	231741			
01/02/2018	87					20	55208			
08/02/2018	87	11 Bact	6 Bact							
08/02/2018	87	0	0							Settle Plates - Passive Air Sampling
15/02/2018	87	0	0			159	193662			
15/02/2018	87	0	0							Settle Plates - Passive Air Sampling
25/01/2018	88					219	231741			
01/02/2018	88					53	55208			
08/02/2018	88	0	1 Bact							
08/02/2018	88	0	0							Settle Plates - Passive Air Sampling
15/02/2018	88	2 Bact	0			95	193662			
15/02/2018	88	0	0							Settle Plates - Passive Air Sampling
25/01/2018	89					4175	231741			
25/01/2018	89					1163	231741			Retest
01/02/2018	89					69	55208			
08/02/2018	89	0	0							
08/02/2018	89	0	0							Settle Plates - Passive Air Sampling
15/02/2018	89	0	2 Bact			673	193662			
15/02/2018	89	0	0							Settle Plates - Passive Air Sampling

Clinical Haematology – Ward 4B
Air Particle + Microbiological Monitoring Summary – Validation Data

Date	Room	SAB cfu@22	SAB cfu@30	ID cfu@22	ID cfu@30	Particle counts	Outside count	% Clearance	Room Closed	Comments
25/01/2018	90					852	231741			
01/02/2018	90					327	55208			
08/02/2018	90	0	0							
08/02/2018	90	0	1 Fun							Settle Plates - Passive Air Sampling
15/02/2018	90	0	0			125	193662			
15/02/2018	90	0	0							Settle Plates - Passive Air Sampling
25/01/2018	91	0	0			2108	231741			Settle Plates - Passive Air Sampling Visable leak. Watermark on floor
01/02/2018	91	0	0			608	55208			
08/02/2018	91	0	0							
08/02/2018	91	0	0							Settle Plates - Passive Air Sampling
15/02/2018	91	0	0			58	193662			
15/02/2018	91	0	0							Settle Plates - Passive Air Sampling
25/01/2018	92	6 Fun	1 Fun	Aspergillus Sp, Penicillium Sp	Penicillium Sp	2766	231741			Settle Plates - Passive Air Sampling
01/02/2018	92	0	1 Fun		Penicillium Sp	433	55208			
08/02/2018	92	0	0							
08/02/2018	92	0	0							Settle Plates - Passive Air Sampling
15/02/2018	92	1 Bact	1 Fun			153	193662			
15/02/2018	92	0	0							Settle Plates - Passive Air Sampling
25/01/2018	93	0	0			1453	231741			Settle Plates - Passive Air Sampling
01/02/2018	93	2 Bact	1 Bact			1739	55208			
08/02/2018	93	16 Bact	19 Bact							
08/02/2018	93	0	0							Settle Plates - Passive Air Sampling
15/02/2018	93	0	0			91	193662			
15/02/2018	93	0	0							Settle Plates - Passive Air Sampling

Clinical Haematology – Ward 4B
Air Particle + Microbiological Monitoring Summary – Validation Data

Date	Room	SAB cfu@22	SAB cfu@30	ID cfu@22	ID cfu@30	Particle counts	Outside count	% Clearance	Room Closed	Comments
25/01/2018	94	0	0			1060	231741			Settle Plates - Passive Air Sampling
01/02/2018	94	0	0			1082	55208			Rpt 3183 - room empty
08/02/2018	94	0	0							
08/02/2018	94	0	0							Settle Plates - Passive Air Sampling
15/02/2018	94	0	0			189	193662			
15/02/2018	94	0	0							Settle Plates - Passive Air Sampling
25/01/2018	95	0	0			5444	231741			Settle Plates - Passive Air Sampling
25/01/2018	95					2181	231741			Particle Count Retest
01/02/2018	95	6 Bact	2 Bact			216	55208			
08/02/2018	95	9 Bact	11 Bact							
08/02/2018	95	0	0							Settle Plates - Passive Air Sampling
15/02/2018	95	2 Bact	0			1667	193662			2 Visitors in room
15/02/2018	95	0	1 Fun							Settle Plates - Passive Air Sampling
25/01/2018	96	0	0			286	231741			
25/01/2018	96	0	0							Settle Plates - Passive Air Sampling
01/02/2018	96	0	0			199	55208			
08/02/2018	96	0	0							
08/02/2018	96	0	0							Settle Plates - Passive Air Sampling
15/02/2018	96	5 Bact	11 Bact			359	193662			
15/02/2018	96	0	0							Settle Plates - Passive Air Sampling
25/01/2018	97	0	0			1191	231741			
25/01/2018	97	0	0							Settle Plates - Passive Air Sampling
01/02/2018	97	0	1 Bact			949	55208			
08/02/2018	97	4 Bact	5 Bact							
08/02/2018	97	0	1 Bact							Settle Plates - Passive Air Sampling
15/02/2018	97	9 Bact	9 Bact 2 Fun			514	193662			

Clinical Haematology – Ward 4B
Air Particle + Microbiological Monitoring Summary – Validation Data

Date	Room	SAB cfu@22	SAB cfu@30	ID cfu@22	ID cfu@30	Particle counts	Outside count	% Clearance	Room Closed	Comments
15/02/2018	97	0	0							Settle Plates - Passive Air Sampling
25/01/2018	98	0	0			357	231741			
25/01/2018	98	3 Fun	0	Cladosporium Sp H. hyphomycete						Settle Plates - Passive Air Sampling
01/02/2018	98	0	0			118	55208			
08/02/2018	98	1 Fun	0							
08/02/2018	98	2 Bact	1 Bact							Settle Plates - Passive Air Sampling
15/02/2018	98	0	0			290	193662			
15/02/2018	98	0	0							Settle Plates - Passive Air Sampling
25/01/2018	99	0	0			59	231741			
25/01/2018	99	0	0							Settle Plates - Passive Air Sampling
01/02/2018	99	0	0			364	55208			
08/02/2018	99	0	0							
08/02/2018	99	1 Bact	1 Bact							Settle Plates - Passive Air Sampling
15/02/2018	99	0	0			59	193662			
15/02/2018	99	0	0							Settle Plates - Passive Air Sampling
25/01/2018	C78					1871	231741			
01/02/2018	C78	2 Bact 1 Fun	1 Bact 1 Fun	Penicillium Sp	Penicillium Sp	4189	55208			AAS ? Second sample
01/02/2018	C78	0	0							AAS
08/02/2018	C78	4 Bact	7 Bact 1 Fun							
08/02/2018	C78	3 Bact	2 Bact							Settle Plates - Passive Air Sampling
15/02/2018	C78	3 Bact	1 Bact 1 Fun			203561	193662			
15/02/2018	C78	0	1 Bact							Settle Plates - Passive Air Sampling

Clinical Haematology – Ward 4B
Air Particle + Microbiological Monitoring Summary – Validation Data

Date	Room	SAB cfu@22	SAB cfu@30	ID cfu@22	ID cfu@30	Particle counts	Outside count	% Clearance	Room Closed	Comments
25/01/2018	C86					5809	231741			
01/02/2018	C86	2 Bact	0			1976	55208			AAS ? Second sample
01/02/2018	C86	3 Fun	5 Fun	Penicillium Sp	Cladosporium Sp H. hyphomycete					AAS
08/02/2018	C86	13 Bact 1 Fun	10 Bact							
08/02/2018	C86	0	1 Bact							Settle Plates - Passive Air Sampling
15/02/2018	C86	2 Bact	3 Bact			3912	193662			
15/02/2018	C86	0	1 Bact							Settle Plates - Passive Air Sampling
25/01/2018	C93					3860	231741			
01/02/2018	C93	1 Bact	1 Bact			2683	55208			AAS ? Second sample
01/02/2018	C93	2 Fun	0		Aspergillus Sp					AAS
08/02/2018	C93	8 Bact	16 Bact							
08/02/2018	C93	0	0							Settle Plates - Passive Air Sampling
15/02/2018	C93	1 Bact	0			4812	193662			
15/02/2018	C93	0	0							Settle Plates - Passive Air Sampling
25/01/2018	Outside					231741	231741			
01/02/2018	Outside	>100 Fun	90 Fun	Penicillium Sp	Aspergillus niger Penicillium Sp	55208	55208			
08/02/2018	Outside	6 Fun	41 Fun							
15/02/2018	Outside					193662	193662			
25/01/2018	Treat Rm	1 Fun	0	Aspergillus versicolor		1303	231741			
25/01/2018	Treat Rm	0	0							Settle Plates - Passive Air Sampling
01/02/2018	Treat Rm	3 Bact 1 Fun	1 Bact			4095	55208			
08/02/2018	Treat Rm	8 Bact	5 Bact							
08/02/2018	Treat Rm	0	0							Settle Plates - Passive Air Sampling

Clinical Haematology – Ward 4B
Air Particle + Microbiological Monitoring Summary – Validation Data

15/02/2018	Treat Rm	1 Bact	3 Bact			1972	193662			
15/02/2018	Treat Rm	0	0							Settle Plates - Passive Air Sampling

Comment:
e.g. C78 = Corridor outside room 78

NHSGGC Water damage policy - DRAFT

Dr T Inkster 24.4.17

Background

Aspergillus and other fungi are ubiquitous and are found in soil, water and decaying vegetation. These pathogenic fungi survive well in air, dust and moisture present in health-care facilities.

Site renovation and construction can disturb Aspergillus contaminated dust and produce bursts of airborne fungal spores. Absorbent building materials serve as ideal substrate for the proliferation of Aspergillus and other fungi if they become and remain wet. In addition equipment and patient care items can become contaminated with fungal spores and serve as sources of infection.

Because Aspergillus is ubiquitous in the environment it is not unusual for non-immunocompromised patients to become colonised with it in their respiratory tracts. This is particularly the case in individuals with asthma, other chronic lung diseases or cavitating lung disease e.g. Tuberculosis.

A major risk factor for the development of Invasive Aspergillosis is a host's severe immunosupression and therefore transplant patients are at particular risk. Other at risk groups include, patients undergoing chemotherapy, those with immune system deficiencies, haemodialysis patients, ICU patients, those who have received prolonged and high dose steroids and those with Cystic Fibrosis.

Concentrations of Aspergillus species below 1 colony forming unit / m^3 are sufficient to cause infection in such high risk patients. Mortality rates can be as high as 100% if neutropenia persists.

Reporting water damage

All ward staff must be made aware of the importance of water leakage/damage and should report it to the nurse in charge immediately.

Any water ingress/leakage must be reported to the Estates department to whom and what number

If the room is occupied by a patient they should be moved elsewhere

Estates management of water damage.

In general water leaks identified and controlled within 48 hours of occurring are low risk for subsequent fungal contamination .

If plaster is involved and a moisture meter is available Sub 20% Moisture Content within 48hrs is considered satisfactory and therefore the material does not require removal.

If the area affected is not dry beyond 48 hours there will be a requirement to remove the affected materials and carry out reconstruction work. All materials should be removed with full HAI scribe measures in place.

Ceiling Tiles

If ceiling tiles are involved these must also be replaced within 48 hours.

The area surrounding the tiles should be sealed off and HAI scribe measures implemented .Tiles should be placed directly into black bin bags , double bagged, sealed and disposed of.

It is important that the area adjacent to the affected tiles should be visually inspected by Estates/ prior to fitting replacement tiles. This is due to water tracking which may have occurred. If there is any evidence of ongoing dampness infection control should be contacted. Any tiles that are stained with water or with visible black mould should be removed .

It is worth inspecting the ceiling void for any old building materials as these are often conducive to mould growth and they should be removed.

Depending on the clinical area where the water damage has occurred and the extent of the damage it may be necessary to perform air sampling after repair work . The Infection control doctor will advise.

Reference Details

1) Guidelines for Environmental Infection Control in Health-Care Facilities. Recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC). 2003
2) Vonberg R-P, Gastmeirer P. Nosocomial Aspergillosis in outbreak settings. Journal of Hospital Infection 2006;63:246-254
3) Falvey D.G, Streifel A.J. Ten-year air sample analysis of Aspergillus prevalence in a university hospital. Journal of Hospital Infection 2007;67:35-41

Inkster, Teresa

From: Walsh, Tom
Sent: 17 September 2018 12:25
To: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE); Hill, Kevin; Kane, Mary Anne; Rodgers, Jennifer
Subject: Water Systems 14th September
Attachments: Water Systems 14th September.docx

Hi Both

Jane has asked today for a note of our meeting on Friday.

Jennifer has passed this to me this morning and I'm afraid my notes weren't very comprehensive.

I've attached a short resume of my notes and would welcome and additions or amendments

Thanks

Tom

RHC Water from meeting on 14th September

Jane Grant welcomed all attending to the meeting and introductions were made round the table.

Dr Inkster and Kevin Hill provided an update on the current clinical situation and the key points of discussion at the IMT meeting held earlier in the afternoon.

The group noted the update and debated the IMT recommendation to decant from wards 2a/2b to facilitate the 4 main issues to be progressed in the area. Additional information form discussions with external experts on the potential for areolisation of droplets compounded by the ventilation system and the POU filters.

The meeting unanimously noted and agreed that any decant of clinical services carried a degree of risk and that any decant needed to be for the minimum period and with the minimum of disruption.

Through the discussion it was agreed that risk assessed options for decanting would be formulated into a paper for consideration to allow the following 4 main issues to be undertaken over a four week period.

- **Further cleaning of drains by facilities colleagues**
- **Shock dosing of the water system with Chlorine Dioxide**
- **Endoscopic review of the Drainage system**
- **Review of ventilation system.**

The meeting agreed the following actions and Jane Grant requested an update for 5pm on Monday 17th September.

Examine all drains in RHC for visible signs of black biofilm. SD/ IPCT.

Define works to be completed in wards 2a/ 2b over 4 week timeframe MAK

Consider and risk assess options for decant of patients from wards 2a/2b for a 4 week period to enable works to progress. Ensure minimal disruption/ risk to all services. KH/JR

Discuss with adult services options for optimising access to BMT facilities for both adult and children's services during the decant KH/AH

QUEEN ELIZABETH UNIVERSITY HOSPITAL

QEUH – WARD 4B

VENTILATION REPORT

Area:	Queen Elizabeth University Hospital	**AHU:**	31AHU63
Client:	NHS Greater Clyde & Glasgow	**Client Contact:**	David Brattey
Site Address:	1345 Govan Rd, Glasgow, G51 4TF	**Report No:**	A11356
System Condition:	Good	**Date of Test:**	6th - 10th November 2017
Test Engineer & Report Preparation:	Daniel Kane	**Signature:**	[redacted]
H&V Approval:	Ian Stewart	**Signature:**	[redacted]
Client Reviewed by:	David Brattey	**Signature:**	

KILKNOWE OFFICE
16 BARRMILL ROAD
GALSTON
AYRSHIRE
KA4 8HH

QUEEN ELIZABETH UNIVERSITY HOSPITAL

Table of Contents

QUEEN ELIZABETH UNIVERSITY HOSPITAL

Section 1 – Scope of Works

Adults Ward 4B is located on the 4th floor in Queen Elizabeth University Hospital. Adults Ward 4B is supplied by 3 Air Handling Units located on level 3 plant room, just below one level from the department.

Main traverse readings will be taken from both the supply and extract ducts and the invertor readings recorded.

To ensure compliance with SHTM03-01, the following tests will be carried out;

1 - Supply volume flow rates from each terminal grille and air change rates calculated.
2 – Record room pressures and compare with the Digital Pressure Panel
3 – DOP integrity test all supply HEPA filters
4 – Provide an electronic validation report

.

Section 2 – Executive Summary

Recorded the supply volumes and calculated the air change rates, all achieve or are acceptable to the required specification.

The room pressures are above the minimum required limits.

The change of HEPA filters in each individual Isolation Room was carried out and old filters boxed ready for disposal.

The DOP Filter integrity test all HEPA Filters was carried out. All filters achieved an integrity of 99.99% MPPS.

Section 3 – Air Volumes & Air Change Rates

Air Volume Methodology

Objective:

To provide documented evidence to verify the supply air volume rates through individual filter terminals are in accordance with their design volumes.

Prerequisites – Supply and Extract Air Handling Unit maintenance complete.

Test Method

- Micromanometer – calibrated and used in conjunction with Pitot tube to measure air velocity in appropriate ducting, to calculate air volume for Balometer factor.
- The HVAC System(s) is operational and stable.

Methodology:

- Hold the balometer hood over the diffuser/grille face and ensure balometer is set in the correct direction and read off the measured air volume flow rate.

Acceptance Criteria

- Calibration certificates for all test equipment are appended to the report.

Room Air Change Rate Calculation Methodology

Objective

To provide documented evidence to verify the room air change rate to each room within the Area based on measurement of the total supply air volume to the room in accordance with the design specification.

Pre-Requisites

- The tests described in the air volume methodology have been completed.

Methodology

- Insert all supply air volumes into the results table.
- Calculate the total supply air volume to each room by the addition of all supply HEPA filter flow rates within the room.
- Calculate the air change rate per hour for each room using the following equation:

$$\frac{\text{Total volume of all supply terminal HEPA filter flowrates } (m^3/h)}{\text{Volume of the room } (m^3)}$$

Acceptance Criteria

- All rooms must achieve the minimum number of air change rates specified in the design data.

QUEEN ELIZABETH UNIVERSITY HOSPITAL

Section 3 – Air Volumes & Air Change Rates

AHU Invertor Readings & Filter Pressure Drops

AHU 31-63		Primary Filter PD	55Pa
Supply Invertor	44Hz (A)	Secondary Filter PD	120Pa
Extract Invertor	30Hz (B)	Extract Filter PD	15Pa

Supply Duct Traverse

Test Point / Location	Design Volume m³/s	Duct Size mm	Duct Area m²	Design Velocity m/s
TP2 / 4th Floor Riser	0.899	700 x 350	0.245	3.67
	A	B	C	D
1	6.10	4.70	5.00	7.00
2	5.80	3.90	5.30	6.30
3	5.60	3.60	5.10	4.30
4	5.60	3.50	5.10	4.40
Total	23.10	15.70	20.50	22.00
Overall Total		81.30		
Average Velocity m/s	Test Volume m³/s	% Design	Static Pressure Pa	
5.08	1.245	139	380	

Test Point / Location	Design Volume m³/s	Duct Size mm	Duct Area m²	Design Velocity m/s
TP1 / 4th Floor Riser	1.04	500 x 500	0.25	4.16
	A	B	C	
1	5.96	5.70	5.00	
2	5.48	5.90	5.30	
3	5.31	5.20	5.10	
4	5.15	5.60	5.10	
Total	21.90	22.40	20.50	
Overall Total		64.80		
Average Velocity m/s	Test Volume m³/s	% Design	Static Pressure Pa	
5.40	1.35	130	369	

QUEEN ELIZABETH UNIVERSITY HOSPITAL

Section 3 – Air Volumes & Air Change Rates

Extract Duct Traverse

Test Point / Location	Design Volume m³/s	Duct Size mm	Duct Area m²	Design Velocity m/s
Main TH	1.392	700 x 450	0.315	4.42
	A	B	C	D
1	3.80	3.20	3.30	3.90
2	3.30	3.40	3.50	3.10
3	3.60	2.50	2.50	2.80
4	3.60	2.50	2.10	2.00
Total	14.30	11.60	11.40	11.80
Overall Total		49.10		
Average Velocity m/s	Test Volume m³/s	% Design	Static Pressure Pa	
3.069	0.967	69	120	

AHU Invertor Readings & Filter Pressure Drops

AHU 31-63EF01			
Extract Invertor	70Hz (B)	Extract Filter PD	15Pa

Extract Main Test Point

Test Point / Location	Design Volume m³/s	Duct Size mm	Duct Area m²	Design Velocity m/s
Main TH	0.698	500 x 350	0.175	3.99
	A	B	C	
1	6.00	5.80	5.80	
2	5.70	6.00	5.80	
3	5.80	5.70	5.90	
4	5.70	5.90	5.80	
Total	23.20	23.40	23.30	
Overall Total		69.90		
Average Velocity m/s	Test Volume m³/s	% Design	Static Pressure Pa	
5.825	1.019	146	204	

Extract Test Point

Test Point / Location	Design Volume m³/s	Duct Size mm	Duct Area m²	Design Velocity m/s
TH1	0.0898	250 ϕ	0.0491	1.83
	A	B		
1	1.90	1.80		
2	2.00	1.90		
3	1.90	2.20		
4	1.90	1.70		
Total	7.70	7.60		
Overall Total		15.30		
Average Velocity m/s	Test Volume m³/s	% Design	Static Pressure Pa	
1.9125	0.0939	105	9	

QUEEN ELIZABETH UNIVERSITY HOSPITAL

Section 3 – Air Volumes & Air Change Rates

Supply Grille Volume Flow Rates

Room	Room ID	Test Volume		Design Volume l/s	% of Design
		m³/hr	l/s		
76	A4-HOW-190	324	90	80	113
77	A4-HOW-193	392	109	80	136
78	A4-HOW-195	324	90	80	113
79	A4-HOW-198	364	101	80	126
80	A4-HOW-202	385	107	80	134
81	A4-HOW-050	324	90	80	113
82	A4-HOW-053	302	84	80	105
83	A4-HOW-055	338	94	80	118
84	A4-HOW-058	328	91	80	114
85	A4-HOW-059	306	85	80	106
86	A4-HOW-062	385	107	80	134
87	A4-HOW-064	342	95	80	119
88	A4-HOW-067	335	93	80	116
89	A4-HOW-031	403	112	100	112
90	A4-HOW-029	407	113	80	141
91	A4-HOW-026	371	103	80	129
92	A4-HOW-024	382	106	80	133
93	A4-HOW-021	317	88	80	110
94	A4-HOW-020	310	86	80	108
95	A4-HOW-017	317	88	80	110
96	A4-HOW-015	396	110	80	138
97	A4-HOW-012	356	99	80	124
98	A4-HOW-011	392	109	80	136
99	A4-HOW-009	378	105	80	131

QUEEN ELIZABETH UNIVERSITY HOSPITAL

Section 3 – Air Volumes & Air Change Rates

Extract Grille Volume Flow Rates

Room	Room ID	Test Volume		Design Volume l/s	% of Design
		m³/hr	l/s		
76	A4-HOW-190	104	29	30	97
77	A4-HOW-193	104	29	30	97
78	A4-HOW-195	115	32	30	107
79	A4-HOW-198	108	30	30	100
80	A4-HOW-202	104	29	30	97
81	A4-HOW-050	94	26	30	87
82	A4-HOW-053	104	29	30	97
83	A4-HOW-055	126	35	30	116
84	A4-HOW-058	90	25	30	83
85	A4-HOW-059	95	26	30	87
86	A4-HOW-062	126	35	30	116
87	A4-HOW-064	94	26	30	87
88	A4-HOW-067	86	24	30	80
89	A4-HOW-031	94	26	30	87
90	A4-HOW-029	86	24	30	80
91	A4-HOW-026	108	30	30	100
92	A4-HOW-024	108	30	30	100
93	A4-HOW-021	108	30	30	100
94	A4-HOW-020	108	30	30	100
95	A4-HOW-017	94	26	30	87
96	A4-HOW-015	94	26	30	87
97	A4-HOW-012	112	31	30	103
98	A4-HOW-011	108	30	30	100
99	A4-HOW-009	97	27	30	90

Section 3 – Air Volumes & Air Change Rates

31-63/EF01 Extract Volume Flow Rates

Room	Grill Reference	Test Volume		Design Volume l/s	% of Design
		m³/hr	l/s		
Corridor Area	512-EG002	346	96	90	107
Corridor Area	514-EG008	274	76	75	101
Corridor Area	513-EG006	281	78	75	104
Corridor Area	513-EG008	284	79	75	105
Corridor Area	514-EG009	360	100	75	133
Corridor Area	513-EG007	310	86	77	112
Corridor Area	513-EG004	342	95	63	151
Corridor Area	513-EG003	328	91	55	165
Corridor Area	513-EG002	328	91	54	169
Corridor Area	513-EG001	389	108	60	180

125AHU05 Clean Utility Volume Flow Rates

Room	Grill Reference	Test Volume		Design Volume l/s	% of Design
		m³/hr	l/s		
Clean Utility	Supply Grille	131	36	tbc	107
Clean Utility	Extract Grille	130	36	Tbc	101

Pentamidine Treatment Room Volume Flow Rates

Room	Grill Reference	Test Volume		Design Volume l/s	% of Design
		m³/hr	l/s		
HOW-003	Supply Grille	284	79	tbc	107
HOW-003	Extract Grille	395	110	Tbc	101

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Section 3 – Air Volumes & Air Change Rates Continued……

Air Change Rates

Room Reference	Recorded Air Volume m³/hr	Room Volume m³	Recorded ac/hr	Design Air Change Rates ac/hr
Room 76	324	45.9	7.1	6
Room 77	392	45.9	8.5	6
Room 78	324	45.9	7.1	6
Room 79	364	45.9	7.9	6
Room 80	385	54.0	7.1	6
Room 81	324	48.6	6.7	6
Room 82	302	45.9	6.6	6
Room 83	338	45.9	7.4	6
Room 84	328	48.6	6.7	6
Room 85	306	48.6	6.3	6
Room 86	385	45.9	8.4	6
Room 87	342	45.9	7.5	6
Room 88	335	45.9	7.3	6
Room 89	403	45.9	8.8	6
Room 90	407	45.9	8.9	6
Room 91	371	48.6	7.6	6
Room 92	382	48.6	7.3	6
Room 93	317	48.6	6.5	6
Room 94	310	48.6	6.4	6
Room 95	317	45.9	6.9	6
Room 96	396	45.9	8.6	6
Room 97	356	48.6	7.3	6
Room 98	392	48.6	8.1	6
Room 99	378	64.80	5.8	6
Clean Utility	131	36.4	3.6	6
Pentamidine	395	45.3	8.7	6
A balometer factor of 1.0 was used.				

Equipment Used

Test Instruments Used	Serial No.	Calibration Due
Balometer	90526046	September 2018

Section 4 – Filter Integrity Test

Objective

To provide documented evidence to verify that each HEPA filter installation within the HVAC System(s), comprising the filter, seal and housing, does not permit the passage of particulate material in sufficient quantities to compromise the design intent of the filter. This will be achieved by smoke integrity testing.

Prerequisites

- **Aerosol generator** – calibrated to be capable of generating a poly-dispersed aerosol having the size distribution given in PD6609:2000 Annex B, Clause C.2.1.
- **Photometer** – calibrated and suitable for the measurement of mass concentration of airborne particles having the size distribution given in PD6609:2000 Annex B, Clause C.2.1 and having an accuracy of better than ±5% over the range of a five expandable, six decade resolution and a minimum threshold sensitivity 0.0001µg/l and capable of measuring aerosol concentration in the range of 10 to 100mg/m³. The photometer shall have a sample flow rate 0.4 ± 0.05 l/s
- **Sampling probe** - a suitable sampling probe is required which is designed for maximum coverage of isokinetic flow rates.
- **Calibration certificates** – are required for the above and must be appended to the test report.

Methodology

The test will be performed by introducing an aerosol challenge upstream of each HEPA filter and scanning immediately downstream of the filters and support frame.

A test report will be prepared which will include confirmation of the methodology used, results of testing for each filter, whether each test is a **pass** or **fail**, the location of any detected leaks and indication of the position and extent of any repairs and calibration certificates for all test equipment used.

Acceptance Criteria

- Aerosol concentration readings must be $\leq$ 0.01 % of the upstream concentration within all grade of rooms.
- A test report is prepared which includes confirmation of the methodology used, results of testing for each filter, whether each test is a **pass** or **fail.** If a fail is recorded replace the filter and retest.
- Attach copy of calibration certificates for all test equipment.
-

QUEEN ELIZABETH UNIVERSITY HOSPITAL

Section 4 – Filter Integrity Test

Filter Integrity Results

Room	Room Reference ID	Filter Pressure Drop Pa	Set Upstream Concentration mg/m³	Downstream % penetration	% Upstream Aerosol Concentration Post Scan	Pass/Fail
76	A4-HOW-190	New Filter	47	0.0001	100	Pass
77	A4-HOW-193	New Filter	52	0.0004	97	Pass
78	A4-HOW-195	New Filter	28	0.0001	98	Pass
79	A4-HOW-198	New Filter	67	0.0003	102	Pass
80	A4-HOW-202	New Filter	63	0.0009	100	Pass
81	A4-HOW-050	New Filter	34	0.0001	97	Pass
82	A4-HOW-053	New Filter	40	0.0002	100	Pass
83	A4-HOW-055	New Filter	46	0.0008	103	Pass
84	A4-HOW-058	New Filter	78	0.0005	101	Pass
85	A4-HOW-059	New Filter	65	0.0007	100	Pass
86	A4-HOW-062	New Filter	80	0.0009	100	Pass
87	A4-HOW-064	New Filter	88	0.0003	102	Pass
88	A4-HOW-067	New Filter	82	0.001	100	Pass
89	A4-HOW-031	New Filter	77	0.0002	103	Pass
90	A4-HOW-029	New Filter	74	0.0004	104	Pass
91	A4-HOW-026	New Filter	80	0.0009	100	Pass
92	A4-HOW-024	New Filter	64	0.0003	99	Pass
93	A4-HOW-021	New Filter	80	0.001	102	Pass
94	A4-HOW-020	New Filter	63	0.0008	102	Pass
95	A4-HOW-017	New Filter	21	0.0001	100	Pass
96	A4-HOW-015	New Filter	28	0.002	101	Pass
97	A4-HOW-012	New Filter	39	0.003	100	Pass
98	A4-HOW-011	New Filter	31	0.004	98	Pass
99	A4-HOW-009	New Filter	23	0.001	103	Pass
Clean Utility	HOW-039	New Filter	80	0.007	100	Pass

Test Instruments Used	Serial No.	Calibration Due
Photometer	11200	March 2018
Aerosol Generator	12198	June 2018

Section 5 - Room Pressure Differentials

Room Pressure Differential Methodology

Objective

To provide documented evidence to verify the room pressure regime throughout the Cleanroom suite is in accordance with their design values.

Pre-Requisites

All supply and extract volumes are set to client specification

- All LAF unit(s) are operational, where applicable.
- The HVAC System(s) must have been operating normally and continuously for at least 24 hours prior to commencement of the test.
- The tests are to be carried out “unmanned at rest”. Ensure that area supervision have been informed to keep personnel out of the area.
- The test operator has been trained to use the test equipment and is wearing appropriate clean area clothing.
- Room pressure alarms/information;
    - High room pressure set at 15Pa
    - Low room pressure alarm set at 5Pa
    - Door open or out of specification alarm is set for a 2 minute period before alarming.
    - Room pressure alarms can be silenced from the button on the digital display set at each room door entry (on the stainless steel plate).

Methodology

- With the Micromanometer properly zeroed, attach the tubing to the positive connection on the instrument, then place the other end of the tubing underneath the room door, with the tubing going into the higher pressured room.
- Record the reading into the appropriate position on the table below.

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Section 5 - Room Pressure Differentials

Room Pressure Differentials, Temperature, Humidity & Noise Levels

Room	Room	Recorded Pressure Pa	Target Pa	Recorded Temp Target 18-28ºC	Recorded Noise Target 35dba
Room 76	Corridor	7.6	5 – 10	23.5	28.2
Room 77	Corridor	7.0	5 – 10	23.2	29.5
Room 78	Corridor	6.8	5 – 10	25.0	30.0
Room 79	Corridor	9.2	5 – 10	23.9	31.0
Room 80	Corridor	7.4	5 – 10	23.5	29.8
Room 81	Corridor	7.0	5 – 10	22.4	29.2
Room 82	Corridor	8.1	5 – 10	21.0	29.0
Room 83	Corridor	9.4	5 – 10	20.0	29.7
Room 84	Corridor	8.7	5 – 10	23.4	32.0
Room 85	Corridor	7.2	5 – 10	22.9	31.1
Room 86	Corridor	8.6	5 – 10	23.1	28.0
Room 87	Corridor	8.4	5 – 10	23.5	29.5
Room 88	Corridor	8.4	5 – 10	19.8	30.2
Room 89	Corridor	8.5	5 – 10	19.3	28.4
Room 90	Corridor	8.4	5 – 10	23.6	29.7
Room 91	Corridor	10.0	5 – 10	18.9	29.3
Room 92	Corridor	11.2	5 – 10	19.2	28.5
Room 93	Corridor	8.3	5 – 10	27.7	29.6
Room 94	Corridor	7.4	5 – 10	19.8	29.8
Room 95	Corridor	13.0	5 – 10	22.9	27.4
Room 96	Corridor	10.6	5 – 10	23.2	28.2
Room 97	Corridor	7.2	5 – 10	19.3	28.1
Room 98	Corridor	7.5	5 – 10	19.8	29.6
Room 99	Corridor	6.5	5 – 10	22.2	27.9
Clean Utility	Corridor	0.5	+	-	-
Ward 4B	Link Corridor	6	+	-	-
Ward 4B	Ward 4C	6	+	-	-
Ward 4B	Stairwell	4	+	-	-

Equipment Used

Test Instrument Used	Serial Number	Calibration Due Date
Micromanometer	7827	November 2017
Environmental Meter	160506299	September 2018

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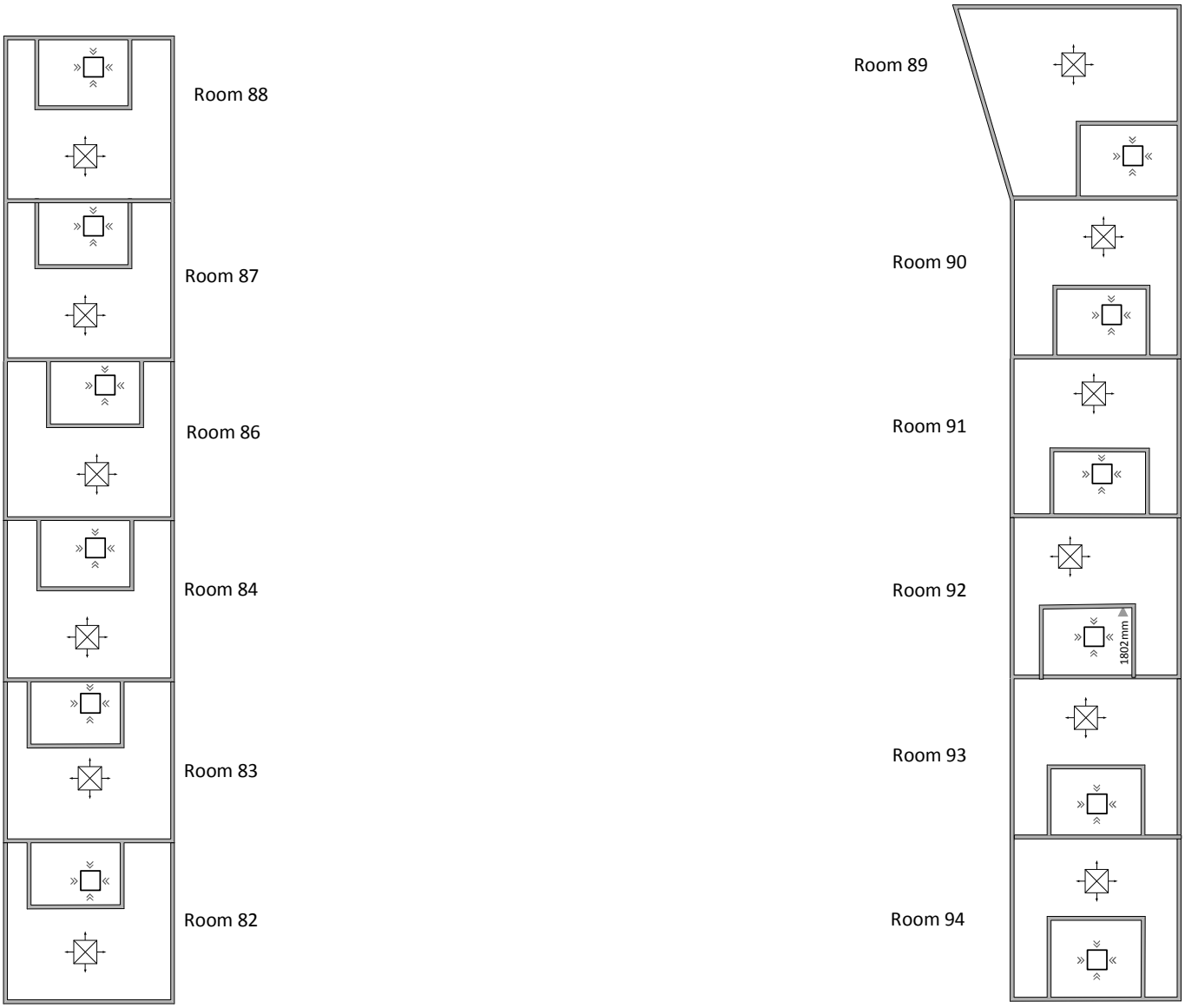
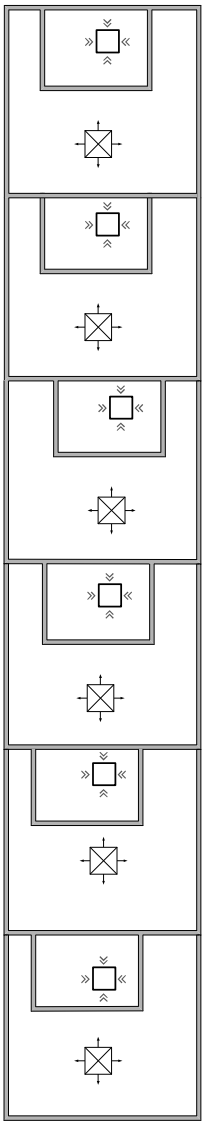
Section 6 – Ward 4B Schematic



QUEEN ELIZABETH UNIVERSITY HOSPITAL



Room 81

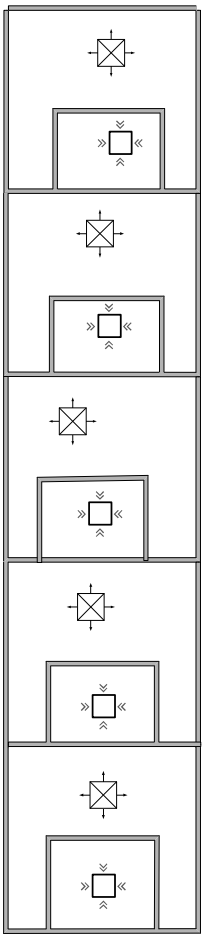
Room 80

Room 79

Room 78

Room 77

Room 76



Room 95

Room 96

Room 97

Room 98

Room 99

CERTIFICATE OF CALIBRATION

Issued By IRC Ltd

Date of Issue 19 September 2017

Certificate Number
224854

Page 1 of 2 Pages

Instrument Repairs & Calibration
7 Howard Court Industrial Estate
East Kilbride, G74 4QZ
Tel: 01355 264120 Fax: 01355 264150
www.instrument-repairs.com

Approved Signatory
[redacted]
Digitally signed by Keith Low
DN: cn=Keith Low, o=IRC Ltd, ou=IRC Ltd, email=[redacted] c=GB
Date: 2017.09.19 11:21:41 +01'00'

☐ N.Anderson ☐ K.Low ☐ C.Moore ☐ A.Rae

Customer : H&V Commissioning Services Ltd
Kilknowe Offices, 16 Barrmill Road
Galston KA4 8HY

Date Received : 07 September 2017

Instrument -

System ID :	IRC02204	Job Number :	R87915
Description :	Balometer	Ref. Number :	AC-C-06
Manufacturer :	Alnor	Site :	
Model Number :	EBT-721	Location :	
Serial Number :	90526046	Last Certificate Number :	
Procedure Version :	2592	Last Calibration Date :	

Environmental Conditions

Temperature :	23°C +/- 2°C	Mains Voltage :	230V +/- 10V
Relative Humidity :	50% +/- 20%	Mains Frequency :	50Hz +/- 1Hz

Comments

A. All prime parameters found to be within specification.
Results at the time of test carry no long term stability of the instrument.
This certificate records the ON RECEIPT calibration status.
Recalibration period 52 weeks by customer request.

Traceability Information

Instrument description	*Serial number*	*Certificate number*	*Cal. Date*	*Cal. Period*
Mensor CP6000	610020	13027/8/9/30/33	09/11/2015	104

Calibrated By : K Low **Date of Calibration :** 19 September 2017

CERTIFICATE OF CALIBRATION

Certificate Number
224854

Test Title	Tolerance	Applied Value	Reading	Pass/Fail
Pressure				
Pascals	2.8pa	249.0pa	250.0pa	Pass
	22.9pa	1 992.0pa	1 995pa	Pass
	40.4pa	3 736.0pa	3 737pa	Pass

End of Results

Uncertainties

Pressure TE69	0- 1000mBar +/- 0.01% of reading

TRACEABLE CERTIFICATION & CALIBRATION REPORT

Digital Aerosol Photometer

Customer : H & V Commissioning Services, Kilknowe Office, 16 Barrmill Road, Galston, Ayshire

P.O#

Envirtonmental Conditions		
Temperature	22.4	°C
Ambient Pressure	100	kPa

Model	ATI-2G
Serial No.	11200
ID#	2248

Calibration Equipment			
	Multimeter	Electronic Balance	Flowmeter
Model	U3402A	HP220DC	Flow Meter
Serial Number	MY50060007	D455800028	F165086/01
Cal Due Date	Apr-17	May-17	Oct-18

Calibration Data

Volumetric Flow: L/min ± 5% of reading

Test Point	Measurement	2G Output	ABS ERROR	Allowed ERROR	Cal status
As Found	28.30	27.60	0.70	1.4	Pass
As Left	28.30	28.20	0.10	1.4	Pass

Stray Light: Volts

	As Found	As Left
Stray Light	0.0027	0.0076

P1 = ONDINA Concentration: 100 µg/L +/- 10% of Reading*

Test Point	Generator	2G Output	ABS ERROR	ALLOWED ERROR	CAL Status
As Found	100.00	81.30	18.70	10	Fail
As Left	100.00	100.60	-0.60	10	Pass

P2 = Emery Concentration: 100 µg/L +/- 10% of Reading*

Test Point	Generator	2G Output	ABS ERROR	ALLOWED ERROR	CAL Status
As Found	100.00	80.80	19.20	10	Fail
As Left	100.00	99.04	0.96	10	Pass

P3 = HIGH Concentration: 100 µg/L +/- 30µg/L

Test Point	Generator	2G Output	ABS ERROR	ALLOWED ERROR	CAL Status
As Found	100.00	85.00	15.00	30	Pass
As Left	100.00	103.00	-3.00	30	Pass

Notes:

Cleaned internal filters, tubing & rewired optical chamber lamp due to intermittent fault.

TUR 1:1

Condition of Unit

AS FOUND				AS LEFT			
☐	In tolerance	☐	Inoperable	☑	Calibrated as left	☐	New instrument
☑	Out of tolerance			☐	No calibration performed		

Maintenance Performed

☐	Rework scattering chamber	☑	Test scanning probe	☑	Leak Check	
☑	Clean Sampling System	☐	Test Absolute Filter	☐	Printer	
☐	Replace Cell Lamp	☐	Replace Gaskets	☑	Voltage Checks	
☑	Align Optics	☑	Tighten Loose Hardware	☑	Final Test	

Calibration Statement

The instrument listed on this certificate has been calibrated against standards traceable to NIST or other recognized national metrology institutes, derived from ratio type measurements, or compared to nationally recognized consensus standards. A test uncertainty ratio of 4:1 [k-2, approx. 95% confidence level] was maintained unless otherwise stated. All results contained within this certificate relate only to the item(s) calibrated. Any number of factors may cause the calibrated item to drift out of calibration before the instruments calibration interval has expired. This certificate shall not be reproduced except in full and with written consent of ATI. This unit has been calibrated to the most recent revision of PCL-030-WI .

Calibrated by	L . HANTEA	Signed	[redacted]
Cal Date	02 March 2017	Cal Due	[illegible]ch 2018

ATI UK Ltd
Unit 10
Protea way
Pixmore Avenue
Letchworth
Hertfordshire
SG6 1JT
United Kingdom

Telephone:
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Email: saleuk@atitest.com

Web:
www.atitest.co.uk

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SG6 1JT

Registered in England
No. GB 3889548

VAT Number
GB 770 8627 05000

OptiCal Sciences

CERTIFICATE OF COMPLIANCE AEROSOL GENERATOR

No G/29466

The Standards used have been calibrated by internal and external procedures traceable to National Standards.
This Aerosol Generator has been tested with Finavestan A80 B

		Model	Serial No
Date of Calibration: 15-Jun-17			
Customer	H & V Commisioning Services	CF Taylor	12198
Address	Kilknowe Office		
	16 Barrmill Road		
	Galston		
	KA4 8HH		
Service Report No 29466			

STANDARDS USED

INSTRUMENT DESCRIPTION	MANUFACTURER	SERIAL No	LAST RECAL	CERT NO
Photometer	Air Techniques	12076	19-Apr-17	29181
Airflow Meter	Airflow Developments	115135	19-May-17	12574
Airflow HLF Bench	Gelman Sciences	9436-89	25-Nov-16	28644
Electrical Safety Tester	Martindale MPAT+	78491386	27-Apr-17	386428
Aerosol Diluter	Air Techniques	13940	27-Jul-16	28001

AEROSOL OUTPUT CONCENTRATION RESULTS

Inlet Bottle Pressure (PSI)	Oil Flow Valve	Heater Block Temperature (°C)	HLF Bench Airflow (L/min)	Upstream Concentration (µg/L)
5	N/A	355	13,336.2	165
10	N/A	355	13,336.2	500
15	N/A	355	13,336.2	775
20	N/A	355	13,336.2	920
25	N/A	355	13,336.2	1,100
30	N/A	355	13,336.2	1,200

ELECTRICAL SAFETY TEST RESULTS

Test No: 0452	
Test Mode: Class one	
Visual: Pass	
Earth Test: 0.09Ω	
Insulation Test: ^19.9MΩ	
Load Test: 0.91KVA	
Leakage Test: 00.1mA	
FLOW RATE	
ATI TDA-5B	N/A LPM

CALCULATED RESULTS

Generator Output (g/min) = Upstream Concentration (µg/L) x HLF Bench Airflow (L/min) / 1,000,000

Pressure	Output (g/min)	Pressure	Output (g/min)
5psi	2.20	25psi	14.67
10psi	6.67	30psi	16.00
15psi	10.34		
20psi	12.27		

Out Of Limit Errors As Found. Comments: None.

[redacted]

Next Calibration Due 15-Jun-18 | Engineer A.Laurance

OptiCal Sciences Limited
Envirotest House
Anglia Way, Moulton Park Industrial Estate, Northampton NN3 6JA
Telephone: 0844 334 0100 Fax: 0844 334 0101 Email: info@optical-sciences.co.uk
Visit our Website at www.optical-sciences.co.uk

CERTIFICATE OF CALIBRATION

Issued By **Cuthbertson Laird Group**
Date of Issue **28 November 2016**
Date Received **22 November 2016**

Certificate Number
HAM13016

Cuthbertson Laird Group
Parkburn Court
Glasgow Road
Hamilton
ML3 0QQ

[redacted]

Approved Signatory
D. Semple

Electronically Signed

Customer : H & V Commisioning
16 Barmill Road
Ayrshire
Galston
KA4 8HH

Instrument -

System ID :	ID216
Description :	AutoZeroing Micromanometer
Manufacturer :	DPM
Model Number :	TT470S
Serial Number :	7827
Customer Ref:	
Procedure Version	2227

Environmental Conditions

Temperature :	20°C ± 1°C	Mains Voltage :	240V ± 10V
Relative Humidity :	50%RH ± 15%RH	Mains Frequency	50Hz ± 1Hz

Comments
This Certificate Records The On Receipt Calibration Status Of The Instrument.

Traceability Information

Instrument Description	*Serial Number*	*Certificate Number*	*Cal. Date*	*Cal. Period Weeks*
Air Neotronics MP6KS	0141232	20637	20/07/2015	104
Druck DPI142	2562944	24756	29/10/2016	52

Calibrated By : **D Semple**
Date of Calibration : **28 November 2016**

This is to certify the above instrument was fully tested and calibrated. Work carried out was in accordance with procedures laid down in BS EN ISO/IEC 17025:2005. The accuracies of the standards used are traceable to National Standards, via UKAS approved laboratories.

CERTIFICATE OF CALIBRATION

Certificate
HAM13016

Test Title	Applied Value	Reading	Uncertainties
Pressure			
7kPa	1.000kPa	1.01kPa	10Pa
7kPa	2.000kPa	2.01kPa	10Pa
7kPa	3.000kPa	3.01kPa	10Pa
7kPa	4.000kPa	4.02kPa	10Pa
7kPa	5.000kPa	5.03kPa	10Pa
7kPa	6.000kPa	6.03kPa	10Pa
1999Pa	400Pa	399Pa	1Pa
1999Pa	800Pa	798Pa	1Pa
1999Pa	1600Pa	1595Pa	1Pa
199.9Pa	40.0Pa	39.9Pa	0.1Pa
199.9Pa	80.0Pa	79.9Pa	0.1Pa
199.9Pa	160.0Pa	159.7Pa	0.1Pa
Velocity			
100m/s	5.0m/s	5.0m/s	1Pa
100m/s	10.0m/s	10.0m/s	1Pa
100m/s	25.0m/s	25.0m/s	1Pa
100m/s	50.0m/s	50.0m/s	1Pa

End Of Results

A50002331

CERTIFICATE OF CALIBRATION

Issued By **Cuthbertson Laird Group**
Date of Issue **04 September 2017**
Date Received **31 August 2017**

Certificate Number
HAM18771

Cuthbertson Laird Group
Parkburn Court
Glasgow Road
Hamilton
ML3 0QQ

[redacted]

Approved Signatory
D. Semple

Electronically Signed

Customer : H & V Commisioning
16 Barmill Road
Ayrshire

Galston
KA4 8HH

Instrument -

System ID :	ID23629
Description :	Environment Meter
Manufacturer :	Precision Gold
Model Number :	N09AQ
Serial Number :	160506299
Customer Ref:	
Procedure Version	2491

Environmental Conditions

Temperature :	20°C ± 1°C	Mains Voltage :	240V ± 10V
Relative Humidity :	50%RH ± 15%RH	Mains Frequency	50Hz ± 1Hz

Comments
This Certificate Records The On Receipt Calibration Status Of The Instrument.

Traceability Information

Instrument Description	*Serial Number*	*Certificate Number*	*Cal. Date*	*Cal. Period Weeks*
Pulsar P100B	035219	G002819	14/09/2016	52
Vaisala HMI41 Indicator	S1330009	A22418029-1	29/08/2017	52
Vaisala HMP41/45 Probe	J3215002	A22418029-1.	29/08/2017	52

Calibrated By : **D Semple**

Date of Calibration : **04 September 2017**

This is to certify the above instrument was fully tested and calibrated. Work carried out was in accordance with procedures laid down in BS EN ISO/IEC 17025:2005. The accuracies of the standards used are traceable to National Standards, via UKAS approved laboratories.

CERTIFICATE OF CALIBRATION

Certificate
HAM18771

Test Title	Applied Value	Reading	Uncertainties
Sound Level Meter			
Lo C	94dB	92.8dB	0.6dB
Hi C	94dB	93.5dB	0.6dB
Hi C	104dB	103.3dB	0.6dB
Humidity Meter			
%Rh	47.2%Rh	44.8%Rh	1.6%Rh
Temperature Meter			
°C	21.1°C	21.3°C	0.33°C

End Of Results

Queen Elisabeth University Hospital\Royal Hospital for Children

Potable Water System Outline Sanitisation Discussion Paper

24\4\2018

The purpose of this paper is to set out the principles required for the systemic sanitisation of the potable water system supplying the Queen Elisabeth University Hospital & Royal Hospital for Children following identification of a systemic microbial and sustaining biofilm contamination of the distribution systems and final outlets. This paper does not examine the reasons for this systemic contamination which is currently under review by Health Facilities Scotland (HFS).

During the lead time required to develop a suitable sanitisation plan and implementation programme, Sterilising grade Point of Use (POU) filters have been deployed as an interim control measure to maintain the safety of patient groups identified as high risk by the Incident Management Team (IMT).

Data from collated from the water sampling programme carried out over the past 4-5 weeks has confirmed the need for systemic sanitisation of the system, where previous attempts to decontaminate specific areas using Silver Hydrogen Peroxide and local outlet heat sanitisation have proven to be unsuccessful due to the suspected retention of systemic biofilm which harbours and supports microbial activity.

In order to effectively sanitise the distribution system, biofilm must be scoured & dislodged from all surfaces, discharged from the system and sanitised. This requires ether thorough physical cleaning and chemical disinfection of tanks\storage vessels etc or scouring of the distribution system pipes by high volume flushing to agitate, disturb and dislodge biofilm followed by sanitisation.

The following proposal for effective sanitisation to bring the potable water system back under control requires further investigation and designer input to assess the existing design and required modifications to the distribution pipe work to support both thermal and chemical disinfection efficacy across such a large scale and complex distribution system.

Proposed Methodology:

The following stages are configured sequentially to minimise\eliminate the risk of recontamination from source.

Stage 1: *Restore bulk filtrate tank water quality by draining, mechanically clean and chemically sanitising both raw water (2 off) and filtrate water (2 off) storage tanks using Silver Hydrogen Peroxide (Sanosil), each tank will require to be cleaned independently one at a time, due to the size of these tanks this will take approximately one week per tank.*

Stage 2: *Modify pipework to install injection points on the main cold water line and each cold water riser,*

a) *Isolate all branches of the selected riser flush in sequence at high volume to disturb and purge biofilm from the each riser plus the supply line.*
b) *Dose to a suitable strength of chemical Silver Hydrogen Peroxide (Sanosil), for a period of one hour, this will require to be carried out in sections (over 10 risers) during this process the area supplied from these line will have no hot or cold water, this would be carried out over night at periods of low demand .*

Queen Elisabeth University Hospital\Royal Hospital for Children

Potable Water System Outline Sanitisation Discussion Paper

24\4\2018

Stage 3: *Install a suitable continuous dosing system to bring the large and complex distribution system under a longer term controlled and stable condition after shock sanitisation of the full system, options are:*

Option 1; Chlorine Dioxide (ClO^2) plant:

Provides continual dosing proportional to supply volume at <0.5ppm (in line with EU Drinking Water Directive & World Health Organisation Guidance) for distribution throughout the Domestic Cold Water (DCW) & Domestic Hot Water (DHW) systems. Residual ClO^2 may not be detectable in the DHWS due to evaporation of the gas, with a lower efficacy however empirical data indicates that there is a positive effect on DHWS dosed with ClO^2. It should also be noted that it may take 3 – 9 months for continual dosing systems to take effect at the furthest points on the distribution system dependant on biofilm removal and due to system size. Implementation of ClO^2 should be combined with a programme of high volume flushing at all risers and outlets to promote agitation and scouring effect at on the internal pipe work and tap surfaces.

It may also be difficult to establish the desired chlorine dioxide residual throughout all areas of this large and complex water distribution system from a single dosing point, particularly if it is colonised by an established biofilm. Installing satellite-dosing systems may be needed to boost the residual at key areas, such as cold water risers & upstream of calorifiers.

Therefore detailed design and sizing of the proposed installation will be required by experienced specialist designers.

ClO^2 is a proven technology covered in national NHS guidance as well as HSE guidance on HSG 274 on Legionnaires' disease Part 2: "The control of Legionella bacteria in hot and cold water systems" with well established experience within NHS GG&C sites.

This will require the following safe guards:

I. *H&S Risk assessment and management control requirements relating to risk chemical\toxic exposure*
II. *Confirmation from the manufacturers of the Taps and showers and pipework fittings, that these components can with stand the exposure to this level of continual dosing without detriment to their function and safe operation?*
III. *Implementation of ClO^2 gas monitoring and safety plant shutdown*
IV. *Install ventilation in chemical storage\production areas*
V. *Installation of automatic sentinel ClO^2 & Chlorite residual monitoring and trend monitoring points.*
VI. *Chemical fill point installation for remote decant to the basement storage area.*
VII. *Can form THMs at lower levels than chlorine,*
VIII. *Introduction requires routine water quality sampling for microbial activity.*

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Option 2; Silver Cooper Ionisation:

Copper-silver ionization disperses positively charged copper and silver ions into the water system. The ions bond electrostatically with negative sites on bacterial cell walls and denature proteins. Over the long term, the presence of copper and silver ions destroy and slimes that can harbor Legionella, 30 to 45 days for the copper and silver ions to penetrate a biofilm.

Works in all temperatures, High doses will remove biofilm. Silver has curative properties against disease. Disinfects drinking water for long periods of time. Will not corrode pipes. Easy to install and maintain.

Point of concern operational concern:

I. *Monitoring the silver levels is difficult and expensive.*
II. *Can stain porcelain.*
III. *May need to be neutralised before discharge to the environment.*
IV. *Any chemical discharge to a drain needs to be sanctioned by the Water Authority, who may then impose conditions on the discharge.*
V. *High pH may affect efficacy.*
VI. *Blocidal efficacy of silver may be compromised by high concentrations of chloride.*
VII. *Level of silver required for effectiveness is eight times greater than for silver catalysed hydrogen peroxide.*
VIII. *Not equally effective for all pathogens.*
IX. *Must not be used in water systems supplying dialysis machine*
X. *Introduction requires routine water quality sampling for microbial activity.*

Option appraisal is required by IMT to assessment which of these options would provide the most effective protection. It should also be noted that it can take 12 – 24 months to bring large distribution systems under control with continual chemical dosing; however there are not other viable options to chemical control.

Stage 4: Biofilm control.

a) *Implement a system by system (10 off) high volume flushing programme on all risers, ward\department branches and tap outlets to scrub pipe and tap internal surfaces of Bio-film; Completed over a 5-7 day period.*
b) *Follow rapidly by system by system shock dose chemical (Silver Hydrogen Peroxide) sanitisation at the appropriate strength, before the system can reseed with microbial activity.*
c) *Commence continual chemical dosing control regime, (see stage 2).*
d) *sanitisation each system should be completed over a 5-7 day period and followed up by rapid chemical shock dosing, delivered over night during periods of low demand.*
e) *All drinking water dispensers should be removed and returned for the supplier for full service and disinfection with ClO^2 and testing before reconnection to the cold water service.*

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Note during this process the areas affected by these works will have no water supply.

Stage 5: *Drain, clean and pasteurise all Domestic Hot Water Heat Stations sequentially at 75°C for one hour as per SHTM 04-01 Part A. (Note there are 10 sets of heat stations requiring to be pasteurised)*

Stage 6: Remove *all Horne Thermostatic Mixing Taps (TMT) within designated high risk patient areas as flow control devices are deemed a contamination risk and cannot be removed from the Horne TMT. Replace with an alternative open flow control device (preferred option is the Armitage Shanks, Marwick 21 with copper lined Bio-Guard flow control), which is demountable and suitable for whole body autoclaving process.*

All en-suites are fitted with Armitage Shanks contour 21 monobloc tap with a mesh flow straightener this flow straightener will be replaced by the copper lined bio-guard flow control device.

On completion of this programme a water sampling programme is required to prove the efficacy of these measures before the Lead Infection Control Doctor (ICD) & IMT can consider the option to instruct the removal of the POU filters.

it should be noted that the measures proposed while documented as viable and proven options, there is no current experience of implementation on a system of this scale and complexity and these measures will require substantial system redesign and modification to accommodate the control measures it is recommended that a suitably experience designer be commissioned to support the design requiremnents.

Queen Elizabeth University Hospital

Chlorine Dioxide (ClO^2)
Proposed; Water Treatment Protocol.

Executive Summary

This paper details the current proposal for consideration of the Board Incident Water Technical Group, supported by Health Protection Scotland (HPS) and Health Facilities Scotland (HFS) representatives, for the introduction of a chemical treatment regime in to the domestic cold and hot water distribution systems within the Adult and Children's Hospitals to restore water quality within acceptable microbiological limits. Where the initial phased introduction is based on continual water treatment over 3 month period at varying concentrations

Commencing with; 1 PPM for a period of 24-48 hours for 48 hours to establish a minimum residual Chlorine Dioxide (ClO^2) of 0.1 PPM, if this is not established after 48hrs the treatment rate will be increase to 1.5 PPM and re-sampled each day for 7 days. At day 7 if the residual ClO^2 has not achieved 0.1 PPM the treatment plant dosing rate will be increase to 2.0 PPM and monitored daily until a residual ClO^2 level of 0.1mg\l (PPM) is registered. A minimum 3 month period will be allowed from this point for the ClO^2 to penetrate and overcome the biofilm (Bio-Burden). Once the residual has reached 0.1mg\l (PPM) at each part of the system the agreed microbiological monitoring programme will be implemented.

Once the residual has reached 0.2mg\l (PPM) at each part of the system the associated plant output will be reduced in stages until the residual achieves 0.4mg\l (PPM) and the plant output is between 0.5 – 0.7 mg\l (PPM) as a final continual water treatment base line value.

If after 3 months there is no appreciable increase in residual ClO^2, then the option for shock dosing will be reviewed further to potential implementation.

It should be noted that dependant on bio-burden level within the system it may take as long as 18 -24 months to establish an effective control regime.

Introduction:

The Initial proposal for chemical water treatment with Chlorine Dioxide (ClO_2) to establish effective control of the Adult & Children's hospitals water distribution system, was to commence continual treatment (dosing) of the system via the bulk storage filtrate tanks proportional to supply volume at 0.5 mg\l (ppm), (in line with EU Drinking Water Directive & World Health Organisation Guidance for potable quality water) for distribution throughout the Domestic Cold Water (DCW) & Domestic Hot Water (DHW) systems, To establish a maximum residual ClO_2 level of 0.5mg\l (0.5 PPM) at the point of use (user outlets). The system to be treated at this level for a period of at least 4 weeks before moving to a shock treatment of each discrete distribution system.

After the initial 4 week continual baseline treatment, each desecrate system would be programmed for shock treatment at 5-10 mg\l (PPM) for duration of 12- 24hrs to provide a more aggressive disruption\destruction of established biofilm.

These combines treatment processes are expected to establish the baseline residual ClO^2 levels required to achieve effective and sustainable control of the water system.

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Proposed; Water Treatment Protocol.

More in-depth system analysis and assessment has lead to further development and improvement of the proposed dispersal method across the distribution network to augment the treatment from the bulk filtrate storage tanks by implementing a multiple point treatment regime at the following locations:

a. *Stage 1: Micro filtration Plant back washes cycle.*
b. *Stage 2: Filtrate Bulk Storage Tanks.*
c. *Stage 3: Boosted cold water feed pump out put (4 off)*
d. *Stages 4 – 11: Domestic Hot Water (DHW)Heat station associated Hot and cold distribution system (8 off)*

This augmented treatment plan allows for more rapid and effective dispersal of ClO^2, compensating for biofilm (bio-burden) chemical absorption rates at each stage of the distribution system. Combined with the implementation of a robust monitoring procedure at nominated indicator locations (sentinel points) and supplemented by automatic monitoring stations at designated control points located at each stage of the process. Individual treatment plant can be fine tuned to compensate for the bio-burden absorption rate.

Following an initial meeting of the Campus Water Technical Group (WTG) and RHC Clinical management regarding the proposed shock water treatment and the associated implications of a 12 – 24hr period with no access to the plumbed in potable water services, affecting the following clinical functions and services :

a. *Renal Dialysis,*
b. *Endoscopy reprocessing,*
c. *Baby feed production unit,*
d. *Aseptic Suite,*
e. *Ward\department basic services:*
    a. *Drinking,*
    b. *Showering,*
    c. *Washing,*
    d. *WC and Sluice flushing.*

It was clear from the clinical feedback received on the impact and disruption as well as the HAI implications of this proposed option that clinical sub-group was required to review and develop a potential action plan and risk assessment of this proposal as well as the operational requirements and logistics of implementing this process within an occupied hospital facility.

However in recognition of the adverse impact shock water treatment will have on clinical services over a prolonged period of time and that decant on this scale is not a viable option, an alternative proposal has been developed in an attempt to avoid the need for shock treatment and put this on hold as a last resort option in the event that the following proposal fails to achieve the required restoration of water quality within acceptable parameters.

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Chlorine Dioxide (ClO^2)
Proposed; Water Treatment Protocol.

Revised Water Treatment proposal:

On completion of each stage of the installation chemical treatment for the Domestic Cold Water System (DCWS) will commence at a level of 1.0mg\l (PPM) for a period of 24-48 hours, with manual monitoring of nominated sentinel points commencing after 24 hrs and automatic monitoring and trending logging of designated key locations commencing after a 48 hour sensor bedding-in period and final re-calibration.

The Bulk storage tank and boosted pump distribution treatment levels will be capped at 1.0mg\l (PPM) to ensure that primary distribution chemical residual levels are maintained at below threshold for removal by Renal Dialysis Granulated Activated Carbon (GAC) filters.

- *If after 48 hours the residual ClO^2 has not achieved 0.1mg\l (PPM) the treatment plant dosing rate will be increase to 1.5mg\l (PPM) and re-sampled each day for 7 days.*
- *At day 7 if the residual ClO^2 has not achieved 0.1mg\l (PPM) the treatment plant dosing rate will be increase to 2.0mg\l (PPM) and monitored daily until a residual ClO^2 level of 0.1mg\l (PPM) is registered.*
- *A minimum 3 month period should be allowed from this point for the ClO^2 to penetrate and overcome the biofilm (Bio-Burden).*
- *Once the residual has reached 0.1mg\l (PPM) at each part of the system the agreed microbiological monitoring programme will be implemented.*
- *Once the residual has reached 0.2mg\l (PPM) at each part of the system the associated plant output will be reduced in stages until the residual achieves 0.4mg\l (PPM) and the plant output is between 0.5 – 0.7 mg\l (PPM) as a final continual water treatment base line value.*

The Domestic Hot Water System (DHWS) presents additional challenges as ClO^2 is a dissolved gas solution when exposed to high temperatures gases off, this gassing off is of benefit as it provide a more aggressive impact on biofilm. However it results in a difficulty in achieving the required residual levels to verify efficacy, therefore it is proposed that ClO^2 treatment of DHW will be set at 2 – 4 mg\l (PPM) to achieve a residual of 0.5 – 1.0 mg\l (PPM). DHW does not require to be maintained within the regulated 0.5mg\l (PPM) as it is not classified as Potable (drinking quality water).

Once the minimal ClO^2 residual level has been achieved a physical service\cleaning\sanitisation programme for Thermostatic Mixing Taps (TMT's) will commence to ensure that any disrupted\released biofilm caught in the TMT's are effectively neutralised to minimise the risk of reseeding of the system.

If after 3 months there is no appreciable increase in residual ClO^2, then the option for shock dosing will be reviewed further to potential implementation.

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Chlorine Dioxide (ClO^2)
Proposed; Water Treatment Protocol.

It should be noted that dependant on bio-burden level within the system it may take as long as 18 -24 months to establish an effective control regime.

De-escilation Plan

Once residual ClO^2 levels are achieved, the Domestic hot and cold water treatment levels will be reduce as detailed in tables 1, 2 and 3 below.

Table 1: *Bulk storage and boosted primary systems:*

Residual (PPM)	Treatment concentration (PPM)
0.1 - 0.3	*1.00*
0.4	*0.7*
0.5	*0.6*
0.4 (target level)	*0.5*

Table 2: *Local Cold water distribution*

Residual (PPM)	Treatment concentration (PPM)
0.1 – 0.2	*2.00*
0.3	*1.00*
0.4	*0.7*
0.5	*0.6*

Table 3: *Local Domestic Hot Water (DHW) distribution*

Residual (PPM)	Treatment concentration (PPM)
0.1 – 0.2	*4.00*
0.3	*3.00*
0.4 - 0.5	*2.00*
> 0.5	*1.5*

Installation plan:

Installation of the water treatment plant will be carried out in stages to prioritise the treatment and establish control, based on the following criteria:

i. *Earliest system wide dispersal*
ii. *Highest patient risk groups*
iii. *Areas with renal plant\Endoscopy Reprocessing Unit (ERU,)*

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See proposed programme in table 4 below.

Table 4: Sequence of Installations.

Stage	*Plant ref*	*Area Served*	*Proposed Go live date*
1	*Micro filtration Plant back washes cycle.*	*Adult & RHC*	*TBC following tender award.*
2	*Filtrate Bulk Storage Tanks: 1A & 1 B, 2A & 2B.*	*Adult & RHC*	*TBC following tender award.*
3	*Boosted cold water feed pump out put (4 off)*	*Adult & RHC*	*TBC following tender award.*
4	*41CAL01/02/03 & Associated CWS*	*RHC*	*TBC following tender award.*
5	*32Cal01/02/03 & Associated CWS*	*Adult Ward stack "A"*	*TBC following tender award.*
6	*31Cal04/05/06 & Associated CWS*	*Adult Ward stack "B"*	*TBC following tender award.*
7	*33Cal01/02/03 & Associated CWS*	*Adult Ward stack "D"*	*TBC following tender award.*
8	*31Cal07/08/09 & Associated CWS*	*Adult Ward stack "C"*	*TBC following tender award.*
9	*21Cal01/02/03 & Associated CWS*	*Adult: Critical care CCU, AAU, ED & RHC-ED,*	*TBC following tender award.*
10	*31Cal01/02/03 & Associated CWS*	*Adult: Theatres, AAU, MDU & Stroke ward*	*TBC following tender award.*
11	*22Cal01/02/03 & Associated CWS*	*Adult: Theatres, OPD, Nuclear-Med, Rad, FM Kitchen & RHC Interventional Rad.*	*TBC following tender award.*

Stages 1, 2 & 3 *will be carried out simultaneously with stage 4, the Heat station in plant rooms 41 (RHC), this will effectively introduce chemical treatment to both the Adult & Children's network as well as augmented dosing to the Domestic Hot & Cold water system to RHC wards simultaneously to effect rapid dispersal to the highest priority patient groups.*

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Chlorine Dioxide (ClO^2)
Proposed; Water Treatment Protocol.

Water Bylaws:

Introduction of ClO^2 into the Scottish Water "Wholesome cold water supply" (Fluid Category 1) and the Domestic Hot water systems (Fluid category 2) changes these defined fluids to Fluid Category 3, which is defined as any:

"Fluid which represents a slight health hazard because of the concentration of substances of low toxicity, including any fluid which contains-

> **b- Sodium Hypochlorite, other chloride-based disinfectants or other common disinfectants,"**

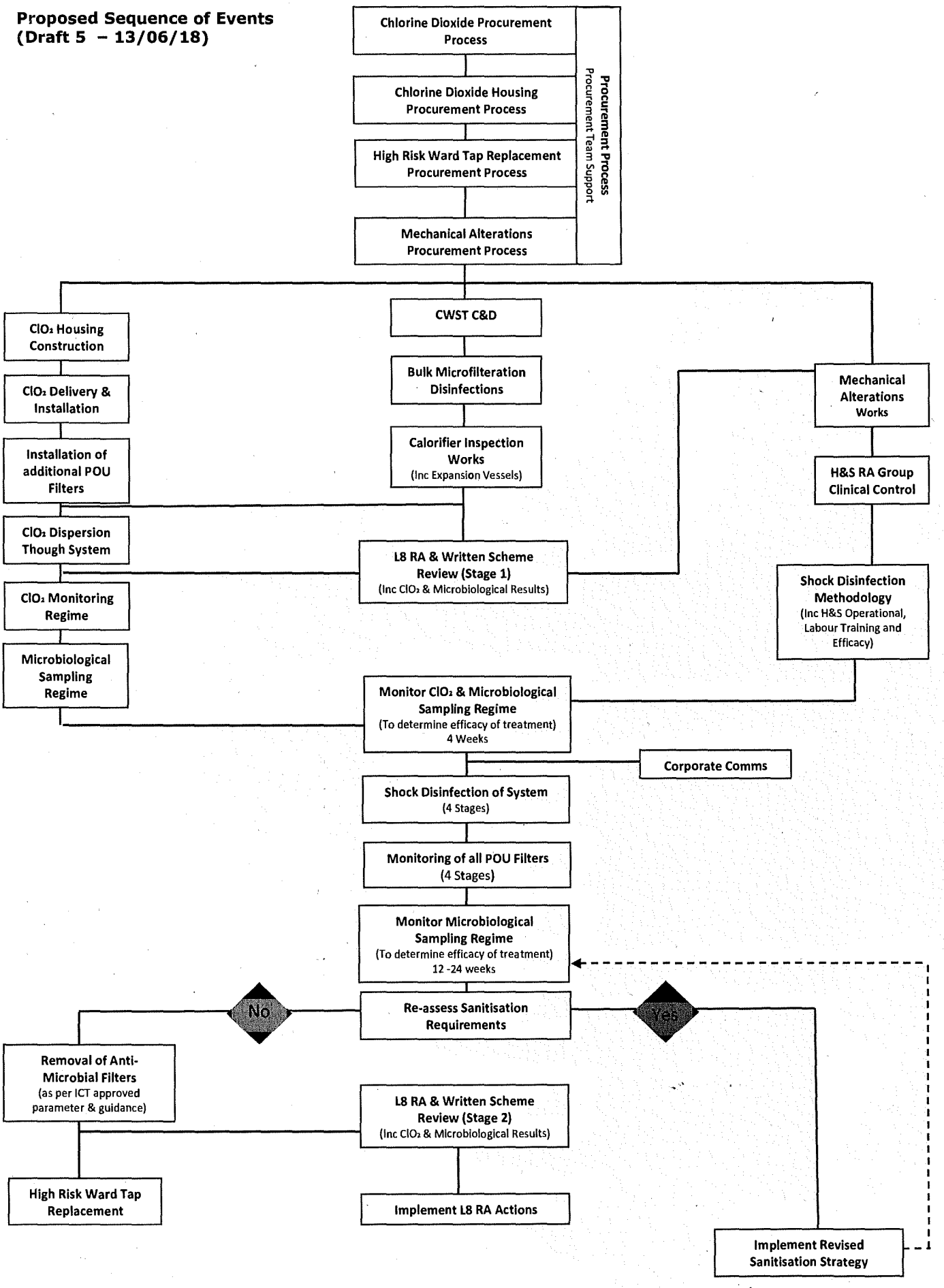
Scottish water has been notified of the proposed water treatment programme via our licensed water supplier WAVE (Previously: Anglian Water Business) and a form "H" modification (Review) request was submitted early May 2018 for the on-going chlorine dioxide dosing in order that this waste stream is added to our Trade Effluent Consent.

This is at least a 4 month legal process (which cannot be shortened) however this change will be covered by the Temp Consent until the Review comes into force.

Ian Powrie

Deputy General Manager (Estates)

Proposed Sequence of Events (Draft 5 – 13/06/18)



Task No.	Chlorine Dioxide Background Dosing Installation Project	Concurrent Activities to be Carried out
	All steps should have suitable safety, water system and feasibility assessments carried out prior to any works being undertaken. Regular meetings (e.g. weekly) of the Incident Management Team (and other relevant parties) should be held to review all documentation and progress should be scheduled throughout project.	All relevant parties (e.g. Estates, Infection Control, Microbiology, Clinical Staff, Health & Safety, Compliance, Installers/Contractors, Authorising Engineer, External Consultants, Chemical Manufacturers External Regulating Bodies etc.) should be included in this process. On-going throughout process (e.g. Weekly)
	Ongoing Monitoring of L8/SHTM 04-01, (ClO_2 when installed) and Microbiological Results	On-going throughout process
1	**ClO_2 Procurement Process & Installation** *(and confirming companies selected for tender process)*	**NHS/Estates Considerations** • Confirm specification (Tim Wafer of The Water Solutions Group appointed) for ongoing ClO_2 monitoring and sampling requirements to ensure compliance with SHTM 04-01. • Confirming suitability for chemical delivery routes and any restrictions and times for deliveries. • Ventilation requirements for basement plantroom (if plant installed in basement) • Clarify requirements for Sensitive patients or equipment (e.g. renal, neo-natal, endoscopy, RO water plant, satellite labs) to be excluded or water services filtering to remove ClO_2. **Note:** Consent for water discharge submitted to Water Authority in May 2018 in 2 separate applications. • Application A is for Shock treatment to be added to the existing Trade Effluent Agreement. • Application B for continual treatment of water system. This requires to go through legal consultation process for a fixed period of 4 months before a permanent consent can be issued. In the meantime a Temporary consent can be granted for 4 months under trade effluent agreement whilst a permanent amendment to discharge consents is obtained.
2	**ClO_2 External Housing Procurement Process & Construction Works** *(and confirming companies selected for tender process)*	**NHS/Estates Considerations** Confirming location to west side of RHC for ClO_2 external housing, including extraction etc.
	Engineering Modifications Procurement Process *(and confirming companies selected for tender process)* Including; • Alter water services to "Baby Milk Production Unit" in corridor from Children's to Neo-Natal to be fed from Neo-Natal services (i.e. non-chemically treated water) • CWST modifications and remedial actions • ClO_2 Installation Requirements • Booster Set/Riser Modifications to allow Shock Disinfections (including back flow protection on each riser) • Removal of Identified & redundant connection points (from construction phase) • Reconfiguring connections to "other" systems to connect them to Trades Water System (If to be incorporated into this project) • Flow through expansion vessels • Alternative Supply to Renal/Endoscopy Wash & Other "Medical" systems (If to be incorporated into this project)	**NHS/Estates Considerations** • Compiling register of deadlegs within the system which could be removed as part of engineering works (primarily redundant connections used as filling/flushing points in construction phase) • Compiling register of all connections to "other" systems fed from the domestic (Bulk) water systems and investigate the practicalities of removing these connections from the domestic water system and connecting them onto the Trades Water System (e.g. Pressurisation Units, and other "Non Category 1 Water" systems connected to the domestic water system during construction. • Investigate option of supplying the Renal Systems, Endoscopy, RO water plant, Satellite labs, (and other "Medical" systems) from alternate supply (e.g. from post-filtration/pre-treated (ClO_2) supply,
	High Risk Ward Tap Replacement Procurement Process	
3	**CWST Cleaning and Disinfection (Inc. Methodology)**	**NHS/Estates Considerations**

Task No.	Chlorine Dioxide Background Dosing Installation Project	Concurrent Activities to be Carried out
	(inc H&S, Operational, Labour Requirements, Training and Efficacy Data)	• Confirm sequence of CWSTs to be disinfected and methodology of tank cleaning and disinfection (including disinfectant, levels and contact times) • Disinfectant proposed to be Sodium Hypochlorite (Chlorine) (As guided by L8/HSG 274 and SHTM 04-01) with a 25mg/L solution with a contact period of 2 hours (lower concentration utilised due to stainless steel components) • Confirm what (if any) remedial works are to be carried out on CWSTs at time of disinfectant (e.g. fitting of rodent screens, repositioning of drain valves, sealing any current leaks in CWSTs) • Confirm operational contingency plans for any unforeseen circumstances occurring during the disinfection process (e.g. tanks leaking) • Confirm H&S requirements for accessing tanks and rescue protocols (e.g. gas monitors, harnesses, emergency access procedures etc.) • Investigate and fit (if practical) additional access hatches into roof of CWSTs to provide additional ventilation and access/egress routes.
4	**Bulk Water Microfiltration Disinfection (inc. Methodology)** (inc H&S, Operational, Labour Requirements, Training and Efficacy Data)	**NHS/Estates Considerations** Veolia Quotation and RAMS received by Estates
5	**Calorifier Inspection, Cleaning and Disinfection (inc. Methodology)** H&S, Operational, Labour Requirements, Training and Efficacy Data)	**NHS/Estates Considerations** • Confirm sequence of Calorifiers to be disinfected and methodology of calorifier cleaning and disinfection/descale (including disinfectant, levels and contact times). • Confirm what (if any) remedial works are to be carried out on Calorifiers at time of inspection/cleaning (e.g. fitting of flushing valves on hot return line, fitting of flow through expansion vessels on each calorifier, etc.) • Confirm Calorifiers and all other associated fittings and materials are compatible with proposed disinfectant at levels and contact times anticipated (any impact on warranties or other adverse effects should be clarified at this time and any decision to proceed should be ratified by appropriate personnel). • Confirm ventilation requirements (dependant on disinfectant utilised for disinfection). • Confirm operational contingency plans for any unforeseen circumstances occurring during the infection/disinfection process (e.g. calorifiers or pipework leaking)
6	**Calorifier and Booster Pump Expansion Vessel Servicing (inc. Methodology)** (inc H&S, Operational, Labour Requirements, Training and Efficacy Data)	
7	**Booster Pump Servicing (inc. Methodology)** (inc H&S, Operational, Labour Requirements, Training and Efficacy Data)	
8	**Installation of Additional POU Filters to all "currently unfiltered" outlets?**	
9	**ClO_2 Dosing initial dispersion through system**	
10	**ICD – Set Microbiological Monitoring criteria post continual disinfection installation**	**NHS/Estates Considerations** • Confirm Parameters which shall be used to determine that the system is deemed to be operating in a safe and acceptable condition, and or contingency plans and additional works requirements in the event the works are deemed to not have achieved the required outcome. • Confirm scope of sampling and the designated sampling points for testing. • Sampling protocols should be ratified by all relevant departments prior to sampling commencing (with due cognisance to appropriate guidance, standards and industry experts). • Specific bacteria being tested for should be confirmed prior to sampling commencing. • Acceptable/out-of-specification parameters should be clarified prior to works commencing along with frequency of sampling • Frequency and ongoing period sampling to continue for (both in the event of "clear" samples and out-of-specification samples being returned.
11	**Implement ClO_2 monitoring regime to confirm distribution through all services**	**NHS/Estates Considerations** • Ongoing after ClO_2 installation complete

Task No.	Chlorine Dioxide Background Dosing Installation Project	Concurrent Activities to be Carried out
12	**Microbiological sampling regime implementation to determine efficacy of ClO2 treatment programme**	**NHS/Estates Considerations** • Ongoing after ClO_2 installation complete with input from all relevant parties included in the process (e.g. Estates, Infection Control, Microbiology, Clinical Staff, Compliance, Authorising Engineer, External Consultants, External Regulating Bodies etc.).
13	**Review Efficacy of control measures implemented**	**NHS/Estates Considerations** • Review of microbiological and other control measure results to determine efficacy of implemented control measures • o be determined once sufficient monitoring data received to allow for informed consensus to be achieved as to the efficacy of the additional control measures implemented, with input from all relevant parties included in the process (e.g. Estates, Infection Control, Microbiology, Clinical Staff, Health & Safety, Compliance, Installers/Contractors, Authorising Engineer, External Consultants, Chemical Manufacturers, External Regulating Bodies etc.).
14	**L8 RA and Written Scheme (Review 1)** and all system monitoring and servicing requirements in accordance with L8, SHTMs and manufacturer's instructions (and any other relevant guidance legislation) in light of amendments being proposed and recent additional PPMs implemented. (E.g. Anti-microbial filter management).	**NHS/Estates Considerations** • Assess requirements for ClO_2 monitoring requirements • Assess requirements for Hot F&R sub-ordinate loop temperature monitoring as per HSG 274 & SHTM 04-01 • Review L8 regime and Written Scheme in light of system amendments being proposed, additional control measures already in place (anti-microbial filters) and additional control regime (ClO_2) being installed with additional PPMs required (E.g. Anti-microbial filter management, ClO_2 monitoring, additional flushing requirements to ensure ClO_2 being drawn through to all areas of the system) • On-going/updated throughout process (as guided by Estates, Infection Control, Microbiology, Clinical Staff, Health & Safety, Compliance, Installers/Contractors, Authorising Engineer, External Consultants, External Regulating Bodies etc.).
15	**Pipework Engineering Modifications to Support Shock Dosing**	
16	**ICD – Set Microbiological Monitoring criteria post shock disinfection**	**NHS/Estates Considerations** • Confirm Parameters which shall be used to determine that the system is deemed to be operating in a safe and acceptable condition, and or contingency plans and additional works requirements in the event the works are deemed to not have achieved the required outcome. • Confirm scope of sampling and the designated sampling points for testing. • Sampling protocols should be ratified by all relevant departments prior to sampling commencing (with due cognisance to appropriate guidance, standards and industry experts). • Specific bacteria being tested for should be confirmed prior to sampling commencing. • Acceptable/out-of-specification parameters should be clarified prior to works commencing along with frequency of sampling Frequency and ongoing period sampling to continue for (both in the event of "clear" samples and out-of-specification samples being returned.
17	**Clinical and Operational Risk Assessment & Shock Dosing Methodology and Preperations** (inc H&S, Operational, Labour Requirements, Training and Efficacy Data)	**NHS/Estates Considerations** • Logistics of no water to specific "Zones" during the shock disinfection stages. • Comms Notifications • Disconnect all water coolers, dish washers, vending machines, coffee machines (shops) on the day prior to shock disinfection proceeding (and reconnecting after disinfection completed.

Task No.	Chlorine Dioxide Background Dosing Installation Project	Concurrent Activities to be Carried out

	Contingency for Shock Dosing Loss of H&C Water Services
	
	• Bottled Water Requirements
	• Catering Services
	  o Staff Dining
	  o Aroma
	  o Retail Units (Coffee Shops)
	• Hygiene
	  o Hand Hygiene (Clinical & Theatres)
	  o Portable Handwash Stations
	  o Sluice Services
	  o Patient Hand Wash
	  o Patient, Staff & Public Toilet (WC Flushing)
	• Loss of Renal Services (Carbon Filtration efficacy)
	• Loss of Endoscopy Services (Carbon Filtration efficacy)
	• Loss of Satellite Labs (ICU, Theatres etc.)
	• Baby Feed Unit (Transfer away from chemically treated supply)
	• Ice Machines (Theatres)
	
	- Patable water etc
		• Rooms to be removed from use to allow "end of line flushing" in each ward area (full bore) and at DSR or other direct hot/cold outlets (Clinical impact)
		• Confirm Parameters which shall be used to determine that the system is deemed to be operating in a safe and acceptable condition, and or contingency plans and additional works requirements in the event the works are deemed to not have achieved the required outcome.
		• Arrangements for no water being available within specific zones during the disinfection process (e.g. patient/public toilets etc.)
		• Confirm chosen disinfectant and contact times (inc. efficacy data) to be utilised during the shock disinfection and methodology of dosing CWST (reservoir) to correct levels.
		• Confirm validation and testing protocols for disinfectant. levels to be achieved at end of lines (and other) outlets at initial disinfectant phase, during and final flush of system (inc. flushing times required to remove "disturbed" biofilm.
		• Confirm post disinfection requirements (e.g. daily flushing of all outlets for X minutes) and assign responsibilities for this.
		• Confirm pipework, taps, showers, valves, pumps and all other associated fittings and materials are compatible with proposed disinfectant at levels and contact times anticipated (any impact on warranties or other adverse effects should be clarified at this time and any decision to proceed should be ratified by appropriate personnel).
		• Confirm shock disinfection sequence of events, methodology, and CWSTs etc. to be utilised as the ClO_2 "reservoir" are clearly identified and labelled to all relevant personnel.
		• Confirm labour and management requirements for carrying out the disinfection within the anticipated timescales.
		• Confirm H&S arrangements for NHS Estates Staff and Contractors carrying out the disinfection. (See workplace exposure limit information) including appropriate extraction in basement plantroom.
		• Confirm H&S arrangements for NHS staff, patients, visitors and any other personnel within building during the disinfection process.
		• Confirm operational and clinical contingency plans for any unforeseen circumstances occurring during the disinfection process.
		• NHS Estates staff and contractors (along with any other personnel who are involved) are appropriately trained/inducted in the methodology and importance of the tasks allocated to them and the necessary paperwork completion protocols.
		• Stock of Anti-Microbial filters and other components which could potentially fail should be on standby.
		• Monitoring of all anti-microbial filters after disinfection being completed and changing where necessary.
		• Confirm paperwork and record keeping requirements necessary for the disinfection procedures, and allocation of responsibility of collating and maintaining records.
		• Confirm steps to be taken to minimise potential exposure to ClO_2 at both CWST (reservoir) and at outlets throughout building.

18	**Communication Strategy (Corporate Comms)**	
19	**Establish competent person support team**	Combination of Estate Staff, Domestics, Contractors and Clinical staff
20	**Support Team Induction process**	
21	**Shock Disinfection Implementation** • **RHC (PR 41) & Adult OPD (PR 22)**	**NHS/Estates Considerations** • Estimated labour requirement of 40 operators • Additional administration and Management Staff required. • Combination of NHS Estates and Sub-contractors. • ENDOSCOPY (PR 22)
22	**Shock Disinfection Implementation Adult & RHC ED, Adult ARU, ICU & CCU (PR 21)**	**NHS/Estates Considerations** • Estimated labour requirement of 25 operators • Additional administration and Management Staff required. • Combination of NHS Estates and Sub-contractors. • Labour requirements proposed above should be reviewed after initial disinfection completed • RENAL PLANT (PR 21)
23	**Shock Disinfection Implementation**	**NHS/Estates Considerations**

Task No.	Chlorine Dioxide Background Dosing Installation Project	Concurrent Activities to be Carried out
	• **Adult Podium:-AAU, MDU & Stroke wards, Theatres (PR 31 Cal 01/02/03)** • **Ward Tower "B" wing (PR 31 Cal 07/08/09)** • **Ward Tower "C" wing (PR 31 Cal 04/05/06)**	• Estimated labour requirement of 80 operators • Additional administration and Management Staff required. • Combination of NHS Estates and Sub-contractors. • Labour requirements proposed above should be reviewed after initial disinfection completed • DECON RO WATER PLANT (PR 31)
24	**Shock Disinfection Implementation** • **Ward Tower "A" wing (PR 32)** • **Ward Tower "D" wing (PR 33)**	**NHS/Estates Considerations** • Estimated labour requirement of 40 operators • Additional administration and Management Staff required. • Combination of NHS Estates and Sub-contractors. • Labour requirements proposed above should be reviewed after initial disinfection completed • RENAL PLANT (PR 32)
25	**POU Filters Monitoring (and replacement as required) from each "Zone" after shock disinfection**	**NHS/Estates Considerations** • This will require to be implemented after each of the shock disinfections are completed
26	**Microbiological Sampling Regime (Post Shock Disinfection)**	**NHS/Estates Considerations** • Ongoing after ClO_2 shock disinfection complete with input from all relevant parties included in the process (e.g. Estates, Infection Control, Microbiology, Clinical Staff, Compliance, Authorising Engineer, External Consultants, External Regulating Bodies etc.).
27	**Re-assess Sanitisation Requirements**	Dependant on microbiological and other control regime results
28	**Implement Revised Sanitisation Strategy (if required)**	
29	**High Risk ward Tap Replacement & Drain Valve Installation (run concurrently) & Maintain POU Filters** • Ward 2A (Schiehallion) • Ward 4B (BMT) • Ward 4A (BMT 2 off isolation Rooms) • Ward 1D (Paediatric Critical Care) • Ward 1E (Cardiology) • Maternity (NICU) • Adult Critical Care Unit • Coronary Care Unit • Institute Of Neuroscience (ICU) • Ward 7A Cystic Fibrosis • Ward 7D Cystic Fibrosis • Ward 2C • Ward 3A • Ward 3B • Ward 3C • Ward 2B	**NHS/Estates Considerations** • Works to be carried out concurrently • POU Filters to be maintained in these areas • Drain valves installation t be fitted to WHBs also at time of tap replacement. • Does not currently include for WHB replacement • Does not include for HPV of rooms (average £30k per ward)
30	**L8 RA and Written Scheme (Review 2)** and all system monitoring and servicing requirements in accordance with L8, SHTMs and manufacturer's instructions (and any other relevant guidance legislation) in light of amendments being proposed and recent additional PPMs implemented. (E.g. Anti-microbial filter management).	**NHS/Estates Considerations** • Review L8 regime and Written Scheme in light of system amendments being proposed, additional control measures already in place (anti-microbial filters) and additional control regime (ClO_2) being installed with additional PPMs required (E.g. Anti-microbial filter management, ClO_2 monitoring, additional flushing requirements to ensure ClO_2 being drawn through to all areas of the system) • On-going/updated throughout process (as guided by Estates, Infection Control, Microbiology, Clinical Staff, Health & Safety, Compliance, Installers/Contractors, Authorising Engineer, External Consultants, External Regulating Bodies etc.).
31	**Removal of POU Filters from Non-Critical Areas** as per ICT approved parameters & guidance & replacing with Flow Regulators	**NHS/Estates Considerations** To be determined once sufficient monitoring data received to allow for informed consensus to be achieved as to the efficacy of the additional control measures implemented, with input from all relevant parties included in the process (e.g. Estates, Infection Control, Microbiology, Clinical Staff, Health & Safety, Compliance, Installers/Contractors, Authorising Engineer, External Consultants, External Regulating Bodies etc.).

Task No.	Chlorine Dioxide Background Dosing Installation Project	Concurrent Activities to be Carried out
32	Risk Associated Slippage	

Water Review Meeting (Technical)

Friday 22nd June 2018 at 11.30am in Meeting Room 5, Laboratory Building - QEUH

Present:

Alan Gallacher (AG)	General Manager – Estates
Teresa Inkster (TI)	Consultant Microbiologist
John Hood (JH)	Consultant Microbiologist
Ian Powrie (IP)	Deputy General Manager – Estates
Colin Purdon (CP)	Senior Estates Manager
Annette Rankin (AR)	Nurse Consultant Infection Control – HPS
Ian Storrar (IS)	Principal Engineer – HFS
Andrew Wilson AW)	Senior Estates Manager

Apologies:

Mary Anne Kane (MAK)	Interim Director of PPFM
Susie Dodd (SD)	Lead Infection Prevention & Control Nurse
Iain Kennedy (IK)	Consultant in Public Health Medicine

In Attendance:

Allyson Hirst (AH)	Admin to the Interim Director of PPFM

Item	Discussion	Action
1.	**Minutes from Previous Meeting (15th June 2018)/Matters Arising**	
	Previous notes were agreed as an accurate record but with a few minor changes which will be included and the updated notes forwarded to the members. Agreed to commence monitoring bacterial counts after dosing and establishing returns of 0.01ppm as this will be after the Chlorine Dioxide is no longer working to clear the system. The monitoring regimen is detailed within the TVC monitoring paper. Agreed to set up the ½ day session to review the action plan, areas affected and how this will progress and will be set up in a few weeks time. All members will be invited along with John Hood, Jamie Redfern and Mel MacMillan.	IP
2.	**Sanitisation Procurement**	
	IP noted that the spec will be prepared and brought to the meeting. IP reported he was meeting with Tim Wafer and Euan Forsyth on 4th July to pull together the information for the tender. A statement for general notice will be prepared for the minor works frameworks contractors for expressions of interest and rolled out to tender. IP noted that this framework covers up to £1M of contract works. The confidence in this completing – it will be taken through the tender process and will require a waiver. All the details will be worked out at a meeting with procurement and feedback to the group as necessary.	
3.	**Tap Replacement**	
	IP noted that the chosen tap was Markwik 21 as the preferred option. Guidance states that sensor taps were not suitable for clinical use and there is documented evidence to back this up including the risks and issues. IP noted that a procurement process is required to the purchase these taps and it was noted that this programme could commence in March 2019 starting with Wards 2A and 2B moving onto the other high risk areas thereafter. AR noted that Scottish Government were aware of the possible time taken to begin this process. IP noted that he was working on a option to adopt the bio-guard flow straightener made by the Ideal Standard to replace the Horne flow regulator device on all non high risk ward Optitherm taps this would require installation of in-line isolation valves complete with integral flow control device on the hot and cold water supplies to each tap ensure appropriate flow rate control to facilitate the adoption of the bio-guard device. If this modification is possible It is not yet clear when this work will be	

	programmed but possibly within the same period that the taps are replaced in the high risk wards. Horne is not involved in the discussions and possible options at this stage. IS noted that an in-line flow control device could introduce a risk into the system. IP advised a flow control device was required to control flow rate if removal of the Horne flow regulation device is to be considered as viable option along with Continual chlorine dioxide dosing of the system should manage the risk of bio film. By undertaking the continual dosing of the system whilst the taps remaining in place should be kept clear and with no bio film. Cost is not the only consideration but the disruption to the users and services in the areas outweigh the high risk areas as the high risk clinical areas will be fitted with the Markwik 21 taps. It was agreed that we should let this process for a new flow straightner continue before we make any decision on placing these within the water system. It was agreed to review the benefits and issues that this may cause – IP agreed to prepare a short paper on this proposal. It was agreed that if the regulator was not WRAS approved then it could not be installed. Markwik maintenance – visual check of the tap and replace the regulator on a regular maintenance schedule. It was noted that as well as the Chlorine Dioxide the cleaning regimen needs to be maintained for each and every tap. AG asked that when the taps are replaced on 2A, 2B and 4B – will these require to continue to have POUF – yes until we are satisfied that the water is sanitised to requirements. Flow Rate – Constant pressure – water pooling in the shower areas – it was noted that the POUF could be pushing the water further away from the drain hole thereby causing this issue? But AR noted that the flow rate was good on one day and not so good another – was there a reason for this. AG/IP noted that this should not be the case as it should be consistent – it was thought that possibly booster pressure pump had not engaged at the appropriate time. POUF blew off during use – CP agreed to investigate and a review of the pressure also.	**IP** **CP**
4.	**Water Tank Sanitisation**	
	AW noted that the filtration unit has been sanitised along with the raw water tank – this work commenced this week but this is taking longer than anticipated to complete. Based on the times so far it was anticipated that this will take approximately three weeks to conclude but noted that all raw water tanks will be completed this week. At this time there was no programme for this work as it was a simple process but AG asked for a programme to be created to show dates of start and completion of this work and all the steps taken within and should be included within the action plan once completed for a record of the works.	**AW**
5.	**Water Coolers**	
	Removal of water coolers from the high risk areas of 2A and 2B and the removal of the dead legs. AW noted that this has been completed but are there other areas to be removed? – TI noted PICU, NICU, CF?, SCBU, 4B and 4B2 this action had to be carried out. Once removed the pipework will also need to be removed back as far as possible and until then it will need to be flushed. Users will be notified of the removal of these water coolers via Core Brief and this was for Kevin Hill to action. Estates will wait until the following week before starting to remove these coolers in the other high risk areas. Replacement for the areas to be considered via vending machines and this will be taken to the Executive Group to ensure that users are made aware. It was noted that this was being undertaken due to the water issues but consideration was to be given to any refurbishments considered to host high risk patients then no water coolers to be installed. It was agreed that no coolers are removed until staff can be informed. POUF to be delayed until it is clear what has to be done with these – either removed or remain in situ over the entire hospital site. It was agreed that domestics will be asked to carry out a	

	wipe down/clean within their cleaning regimen. This to be written up for domestic staff and supervisors – AG will speak to KC about putting this in place.	**AG**
6.	**Drain Cleaning**	
	Programme was emailed to members. AW reviewed the completed areas and those still to be completed. Access is preventing some areas being cleaned at this time but CP is scheduled to meet with LPritchard to show the process to ascertain if this be carried out in the limited areas.	**CP/LP**
	Regular Drain Cleaning – TM and OP discussed and the Chlorus 2 Report will include simple drain cleaning agents – this is not concluded yet and will take approximately 1 week after previously stated completion date. In the meantime Anticlor cleaning will progress until we know of a different way forward. Domestics will be required to dose the sinks on a weekly basis in all high risk areas. The Estates Team can dispense the sanitiser into litre bottles for the domestics to use and will use the Chloramine until used and then revert back to Anticlor.	
	AR noted that after checking the drains to look at splash back which had been reported it was noticed that the spigot was creating splashback and it was thought that this could be causing the next user to spray the water and causing the environmental bugs being found and the filters exacerbating the finds in the room.	
	IP has submitted a report to HFS on the materials found within the drain as this could be a national issue as it has been found within other hospitals with the same drains, drain parts and flow straightners have been sent away for analysis. Awaiting feedback from HFS on way forward.	**HFS**
	Drain cleaning has been completed as per previous advice on high risk areas but not yet known if this is required in other areas.	
	Dishwasher Programme – POUF filters fitted to a number of areas and these should be completed by early next week. Locations of dishwashers in specific areas to be added to the programme for the filters to be fitted by next week also. It was noted that plumbers are required to make modifications to the pipework in some areas AW will update TI when this is completed to allow further checks on the areas showing contamination for further checks on these.	
7.	**POUF**	
	IP gave an overview of the filters we have available to use within QEUH noting the benefits and issues with each one – IP has completed a chart showing the details including costs and change times. IP noted that if a change to the filters was required then this would be required to go through the tender process. Some options included a longer in situ filter of up to 90s days. It was noted that during the shock dosing phase every tap in the building will have a filter fitted so would be wasteful to have the longer lasting filters attached at this time. Clinical colleagues would need to be given opportunity to voice their opinion and Susanne Lees will be asked her opinion. It may be feasible to change to longer lasting for the non high risk areas and remain on frequent changes in those areas deems to be of high risk.	
	IP also had an example of a drain unit that can be easily removed and check if issues are reported in an area.	
	It was noted that proper consideration needs to be given to what is used for a replacement within the BMT unit specifically – changing of the sinks and taps in the high risk areas only. This would require to be input to the report to the Capital Planning Group as there will be funding requirements for this to be taken forward.	

8.	**AOCB**	
	An action plan had been produced and all members were asked to review the document to note what actions have been placed on each of the members and this will be updated and review at the next meeting of the group. TVC Monitoring – how do we progress after the POUF are removed and what levels are appropriate within the hospital – details of this is noted within the TVC rotocol produced by TI and members are asked to note their opinions on this document and the information contained within it. It was agreed to carry out testing during the CD dosing and this will determine when the POUF can be removed within the area. It was agreed that a sampling regimen needs to be established and sampling points determined – suggested that DSRs are used as this would lessen any clinical impact but it was noted that there were other options – agreed to look at floor plans and determine best points and then get assurance from experts that this was the best way forward. Agreed that several points of the wards checked during flushing – shower, DSR, taps as the CD is being flushed through the system on a daily basis. This would be looked at during the half day awareness session on the remedial action plan.	**All**
9.	**Date & Time of Next Meeting**	
	The next meeting is scheduled for Friday 29th June 2018 at 11.30am in Meeting Room 5, Ground Floor, Labs Building, QEUH. *Post meeting note – the meeting will now be held via teleconference on Wednesday 27th June at 10.00*	

NHS Greater Glasgow & Clyde, Royal Hospital for Children Water Incident: Note of Teleconference, 15 June 2018, 16:00 – 17:00

Dialled in:

Scottish Government:

- Dr Gregor Smith, Deputy Chief Medical Officer (chair)
- Diane Murray, Associate Chief Nursing Officer and Professional Lead for HAI within CNO
- Christine McLaughlin, Director Health Finance
- Rachael Dunk, Head of Chief Nursing Officer Directorate
- Margaret Syme, HCAI Policy Unit, Chief Nursing Officer Directorate (notes)

Health Protection Scotland:

- Annette Rankin, Nurse Consultant Infection Control
- Laura Imrie, Nurse Consultant Infection Control

NHS Greater Glasgow & Clyde:

- Jennifer Armstrong, Board Medical Director
- Dr Teresa Inkster, Lead Infection Control Doctor and Training Programme Director Medical Microbiology
- Mary-Anne Kane, Interim Director Facilities
- Kevin Hill, Director of Women & Children's Services
- Alan Mathers, Chief of Medicine Women and Children's Service

1. Welcome/Introductions

After introductions, GS welcomed everyone to the call, and set out the purpose as below.

2. Purpose of the meeting

To discuss the current position regarding the water incident, including the number of patients, any emergent issues, and any on-going risks.

3. Update position from NHS GGC

Patient and ward safety

The number of patients affected since January 2018 is 17, none are giving cause for concern, and the majority of these cases were likely to have been affected before control measures were put in place.

Patient safety and ensuring wards remain safe continues to be the priority for NHSGGC. Current IMT advice is, the ward is safe to admit patients. No ongoing risks have been identified across the wider QEUH/RHC site. The NHSGGC Chief Executive is being updated daily.

Clinical decisions regarding patient treatment are being taken on a case by case basis by the medical staff in charge of each individuals care. Where appropriate and practicable, other options/hospitals for treatment have been considered, for example, one child received their chemotherapy in the Beatson. Where treatments have been delayed for clinical reasons, NHSGGC have put plans in place for treatment to resume once patients are well.

There are no new issues emerging, and NHSGGC anticipate that the wards (and treatment) will resume to a normal service on Monday (18 June) following work to replace spiggots (from aluminium

to Plastic) cleaning of the drains and treatment of the ward with hydrogen peroxide vapour over the coming weekend.

Infection control measures

Infection control measures have been in place since the first case was identified in January 2018. These remain in place, and include:

- Point of use filters have been installed in all showerheads and taps in wards 2A and 2B, and are regularly checked/replaced (as per manufacturers instructions).
- All drains in ward 2A and 2B have been chemically treated, and a longer term decontamination plan is to be established as this impacts on national guidance .
- Due to the role they may have played in the biofilm formation, all aluminium spigots in wards 2A and 2B have been replaced with Plastic alternatives.
- Clutter has been removed from wards 2A and 2B, and patients/visitors are limited to what they can take into the ward.
- The number of people attending the ward has been limited.
- Notices and signs are up for staff, patients, parents and visitors to the ward.
- The frequency of ward cleaning has been increased and all staff (clinical, nursing and domestic) have been reminded of the infection control measures and processes.
- Daily walk around by senior clinical managers and IC staff.
- Taking advice from HPS and other UK experts.

Communication with parents

NHSGGC have been proactive in keeping patients and their families updated about what is happening in the ward. Consultants have had discussions with the parents of their individual patients, and TI has also been available to speak to them on a one to one basis.

Other areas of the QEUH/RHC site

There are good infection control measures in place throughout the site, with the longer term aim to clean drains throughout the QUEH/RHC high risk areas, although the drain issues are restricted to wards 2A and 2B at present.

There is increased surveillance in place, and all gram negative sepsis cases across the sites are being reported and monitored.

Programme of work

Initially there was a systematic process to identify the source of the water contamination. This resulted in filters in the showerheads and taps being introduced, however, this is a temporary measure and the filters require changing every 30 days. Following further investigations, biofilm was identified in the drains, and a programme of work established to clean the drains using Actichlor and Chlorine dioxide.

A water management group was established in April. The group has been meeting weekly, and is made up of representatives from a range of specialists, including Clinical, HPS, HFS, Estates, Engineers, Service and Management and UK experts have been engaged to provide NHSGGC with advice as this is an unprecedented incident.

The group has concluded that the regular cleaning of the drains should continue, along with shock and continual dosing of the water system with chlorine dioxide to control this issue in the short . In the long term bespoke water dosing units are required. These may take up to 12 weeks to procure equipment (dosing units) if OJEU processes can be by passed by Procurement colleagues due to the seriousness of the situation and they will be installed in both the QEUH and the RHC.

Once the programme of work to dose the drains, and the water dosing units are fitted, the group will consider replacement of the taps and showerheads in the high risk areas in the first instance. The filters are a costly short term measure but are effective in preventing bacteria from entering the water system.

At the time this hospital was under construction, there was an issue with taps in a neo-natal unit in Belfast. This resulted in a discussion about the type of taps being installed at the QEUH/RHC, a risk assessment was undertaken, and a decision was taken at the time by Contractors, Estates, HPS/HFS to continue to fit the taps.

Since the incident has been live NHSGGC have maintained a decision log for all clinical, management, service, cost implications, and technical issues.

The programme of work to shock dose the water system will be done at weekends to minimise disruption to patients, with the entire RHC being completed over a weekend.

Decisions will be taken at a later date regarding replacing the taps and showerheads in the QEUH/RHC in low risk areas-.

Costs for this programme of work have not yet been estimated, but is likely to be significant. The Board are considering this.

The Board has a range of short and medium term control measures in place and planning for longer term solutions is underway.

4. Update position from HPS

HPS have been providing support to NHSGGC since 16 March 2018, via the IMT and more recently the water management group.

HPS felt that patient safety has been the paramount consideration by the Board and this remains so, and that all appropriate control measures have been put in place to minimise risks to patients. .

As well as the investigation being undertaken as requested by the Cabinet Secretary for Health and Sport, HPS will begin a full review alongside the investigation to try to understand better how this may have happened and NHSGGC Medical director requested that any information/ advice should be given in real time as this was an active investigation and any advice to resolve this would be helpful. In addition NHSGGC were keen to look at data from other centres to establish a baseline and asked for any support in this regard. The HPS review will, amongst other things look at data and comparisons with the old 'Yorkhill' Childrens Hospital, as well as hospitals in England and any data can be shared with GGC.

The Terms of Reference for HPS Review will be shared with this group.

5. Any other business, or questions to raise

It was agreed that lessons must be learned in real time for not only NHSGGC, but across NHSScotland. To do this it needs to be clear as to how this incident happened so DM asked for copies of the paperwork regarding the decisions taken at the time of the construction of the hospital and the Construction Design and Management (CDM) file to be made available to Scottish Government and HPS and HFS as it may shed light on the process for decontamination of pipes and drains at handover of the building. The file is available to HFS and HPS , but not all information

is available either electronically or in paper copy. NHSGGC advised they would strive to identify all relevant documentation and this may involve external contractors.

A number of the individuals involved in the decision making process when the hospital was under construction have moved on but NHSGGC will be approaching them to ask about the decisions taken at the time.

NHSGGC were asked if they required any additional external support or expetise; at this time they do not as they already have UK experts advising them. However NHS GGC would accept any suggestion/offer of expertise to resolve the situation. NHSGGC are looking at other hospitals, within the UK and abroad to establish what they are doing, this will include what is viewed as a reasonable rate of infections in this patient group so that the NHSGGC unit can benchmark it against these. GS offered assistance from CMOs office when engaging with other hospitals if the Board were finding it difficult to obtain this information. HPS are also looking at infection rates from other centres and it was agreed that they would share any details with NHSGGC

It was noted that there are new technologies developing all the time for water systems, however it was noted that they have not been used/tested in healthcare settings, but NHSGGC are monitoring availability of new technologies should they offer an alternative solution, and meantime will progress procuring dosing units for the site.

SG colleagues commented that they were reassured by the current management of the issue and the efforts made to obtain expertise to resolve this complex situation. They did not identify further actions which NHSGGC should take at this time.

6. Summary of actions and next steps

It was agreed this meeting has been helpful for all parties, and further meetings would be an effective method of keeping everyone updated on progress.

Action no	Action	Who	Cleared
Action 1	Terms of Reference for water review to be shared with this group	HPS	
Action 2	Paperwork regarding the decisions taken at the time of the construction of the hospital and the Construction Design and Management (CDM) file to be made available to Scottish Government and HPS/HFS.	NHSGGC	
Action 3	Further teleconferences to be arranged (monthly unless situation changes significantly).	Scottish Government (DM/Policy Unit)	WIP
Action 4	Meeting about the water system and the consequential financial impact of the actions undertaken to date and future requirements to be arranged at a later date.	NHSGGC/ Scottish Government (CMcL)	

HS Greater Glasgow &Clyde, Royal Hospital for Children Water Incident:
Action note of Teleconference, 4 October 2018, 13:00 – 14:00

Dialled in:

Scottish Government:

- Dr Emma Watson, HAI/AMR Professional Advisor (Chair)
- Rachael Dunk, Head of Chief Nursing Officer Directorate
- Margaret Syme, HAI/AMR Policy Unit
- Melanie Goodfellow, HAI/AMR Policy Unit
- Jason Birch, Unit Head, Chief Nursing Officer Directorate
- Alan Morrison, Capital Accounting and Policy Manager, Health Finance

Health Protection Scotland:

- Annette Rankin, Nurse Consultant Infection Control
- Laura Imrie, Nurse Consultant Infection Control

NHS Greater Glasgow & Clyde:

- Dr Jennifer Armstrong, Board Medical Director, HAI Executive Lead
- Dr Teresa Inkster, Lead Infection Control Doctor and Training Programme Director Medical Microbiology
- Tom Steele, Director Estates and Facilities
- Kevin Hill, Director of Women and Children's Services
- Jennifer Rodgers, Chief Nurse for Paediatric and Neonatal Services
- Pauline Hamilton, PA IPC, NHSGGC

1. **Welcome, introductions**
   After introductions, EW welcomed everyone to the call, and set out the purpose as below.

   EW acknowledged and thanked NHSGGC and HPS/HFS for the significant work undertaken to date to try to resolve this issue.

2. **Aim of weekly calls**
   Patient safety remains paramount, and the aim of calls are for Scottish Government to understand where they can support incident management.

3. **Update on incident**
   The last confirmed case was [redacted] September; no new cases since the decant.

   Infection control staff are visiting the wards (4B and 6A) regularly and have no concerns over clinical practice or ward cleanliness – also confirmed by HPS.

   The water safety group continue to meet and are involved in the extensive work programme being undertaken.

4. **Update from estates / facilities (management of incident, work plan / timescales)**
   A wide range of experts (internal and external) are involved in the extensive programme of work, with a Project Manager being appointed to coordinate the work. Timescales change daily, dependant on findings.

With ward areas (2A/2B) being empty, Estates/Facilities are undertaking a more detailed testing and an extensive programme of work to review all water sources (taps, sinks, showers, toilets), including:

- Dosing units have been procured for the entire site - with a separate system for RHC - and dosing will commence 19 October for RHC and 19 November for the entire site
- Water system will be isolated and the point of use filters removed to allow cleaning with a standalone chlorine dioxide system.
- Modifications of pipework at the sinks to prevent backflow / build-up of biofilm.
- Toilet cisterns will be removed/replaced so there will be no water stored in the system.
- A drainage contractor undertook a drain survey to a 10 meter depth; some evidence of biofilm, but not deep beyond the traps; no evidence of backflow; no evidence that the drain stack in the system cannot cope with the volume of water.
- Sinks across the adult and RCH are being surveyed, there has been no similar evidence of biofilm out with RHC being prevalent across this site.
- Third party advice is being sought about the design of the ventilation system – swabs are being taken and decontamination of the ducts underway.

Armitage Shanks the sink manufacturer are involved in ongoing dialogue with NHSGGC regarding the biofilm at the out flow of the sink.

The water group has shortlisted two types of tap that may be a suitable alternative to the current tap if a decision is made to replace the taps. The decision regarding the most suitable tap will be made by Friday (5 October), and all parties and experts will be involved in that decision (AR, TI, three independent water experts, estates, clinicians, etc). TS will need to be assured that the right taps have been chosen by the right people. TS noted that all due diligence was likely to be carried out before the current taps were procured – at this time it is unknown whether these taps are not fit for purpose, but they no longer allow a build-up in the system.

The intention is to put ward 2A/2B back to as near as new condition as possible by installing the most up to date, and best available taps, sinks, toilets, shower hoses, etc.

Despite these efforts, there is no guarantee that this will prevent this issue reoccurring in the future, despite NHSGGC undertaking extensive remedial action to resolve this.

5. Implications of the incident on the rest of QEUH

Patients were decanted from wards 2A and 2B on 26 September in to adult wards 4B (1 patient) and 6A (14 patients) respectively. Adult patients from ward 6A (where appropriate) have been decanted off site to Gartnavel hospital; this ward would normally be used as additional capacity for winter pressures.

On 27 September, ward 6A was opened to children requiring day care chemotherapy.

All staff (clinical and non-clinical) were consulted and involved in this decant / move; safeguarding standard operating practices were reviewed to ensure this transition was successful for the children who are being treated by the same clinical staff.

Business as usual patient care and new admissions to wards 4B and 6A will be reviewed on a case by case basis.

The immuno-comprised patient group in ward 2A/2B is likely to have been a significant contributing factor for susceptibility to infection and the presence of biofilm. Biofilm has been

identified in other areas, but hasn't affected patients. Biofilm is prevalent in ward 1B (outpatients), but was felt to be a low risk area.

6. What additional support, if any, to the Board or IMT needed from SG / elsewhere

NHSGGC have three asks of SG:

i. Future PQs, NHSGGC have asked SG to provide a draft answer rather than forwarding on the questions with no indication of how it might be answered, and for PQs to go directly to NHSGGC. They also asked that where similar information has already been asked/provided, that this is included in any follow up questions, which means NHSGGC will be updating rather than drafting a new answer. NHSGGC will provide contacts.

ii. Both NHSGGC and HPS are finding it difficult to obtain benchmark data from other hospitals across the UK, and from Public Health England. NHSGGC have obtained data from a hospital in Cincinnati in the USA. Dr Gregor Smith, DCMO, had previously offered to facilitate collecting benchmark data on the call in June – SG will follow up once NHSGGC provides a short note of what they want.

iii. NHSGGC have invited EW to spend half a day on site.

7. Communications

Communication – following the decant of patients the families are more settled; patients and families have been kept informed throughout the decant.

SG and NHSGGC comms already have good communication lines – all to ensure this continues.

It was agreed that when appropriate, EW will liaise directly with TI, and free up ARs time; HPS will be kept informed of any discussion either directly or on weekly combined calls.

8. Discussion of read out from incident to wider NHS Scotland in particular Boards undergoing new build

Carried forward to the next call (on Wednesday 10 October).

9. AOCB

SG to look over previous questions regarding costs, before NHSGGC provide further information.

10. Future calls

- Wednesday 10 October, 13:00 – 14:00
- Thursday 18 October, 13:00 – 14:00
- Wednesday 24 October 2018, 13:00 – 14:00

Action no	Action	Who	Cleared
Action 1	SG to draft answers (based on existing information) to any PQs, and follow up questions before sending direct to NHSGGC.	HAI/AMR PU	
Action 2	NHSGGC to provide HAI/AMR PU with contacts for future PQs.	NHSGGC	
Action 3	NHSGGC to provide SG with an outline of what they want DCMO to facilitate for them regarding benchmarking data from other hospitals.	NHSGGC - JR	

Action 4	HAI/AMR PU to approach DCMO re benchmarking information.	HAI/AMR PU
Action 5	EW to join TI on site for half a day – date to be arranged.	EW / TI
Action 6	Item 8 to be carried forward to next meeting.	HAI/AMR PU
Action 7	SG to review information from NHSGGC regarding costs – NHSGGC to provide more information if required.	HAI/AMR PU & AM NHSGGC

HCAI/AMR Policy Unit
Chief Nursing Officers Directorate
5 October 2018

NHS Greater Glasgow & Clyde, Royal Hospital for Children Water Incident: Action note of Teleconference, 10 October 2018, 13:00 – 14:00

Dialled in:

Scottish Government:
- Dr Emma Watson, HAI/AMR Professional Advisor (Chair)
- Rachael Dunk, Head of Chief Nursing Officer Directorate
- Melanie Goodfellow, HAI/AMR Policy Unit
- Louise Aitken, Communications Team

Health Protection Scotland:
- Annette Rankin, Nurse Consultant Infection Control
- Laura Imrie, Nurse Consultant Infection Control

Health Facilities Scotland:
- Ian Storrar, Assistant Director (Engineering, Environment and Decontamination)

NHS Greater Glasgow & Clyde:
- Dr Jennifer Armstrong, Board Medical Director, HAI Executive Lead
- Dr Teresa Inkster, Lead Infection Control Doctor and Training Programme Director Medical Microbiology
- Tom Steele, Director Estates and Facilities
- Kevin Hill, Director of Women and Children's Services
- Pauline Hamilton, PA IPC, NHSGGC

Apologies:
- Eddie McLaughlin, Principal Engineer, Health Facilities Scotland
- Jennifer Rodgers, Chief Nurse for Paediatric and Neonatal Services, NHSGGC
- Margaret Syme, HAI/AMR Policy Unit
- Jason Birch, Unit Head, Chief Nursing Officer Directorate
- Alan Morrison, Capital Accounting and Policy Manager, Health Finance

1. **Welcome, introductions and apologies**
   After introductions and apologies, EW welcomed everyone to the call.

2. **Minutes and actions**
   The minutes and actions from the previous meeting were reviewed and two changes were agreed. These will be sent to the HAI/AMR Policy Unit from NHSGGC colleagues and the document will be updated and the final version circulated.

3. **Facilitating national learning (carried forward from 4 October meeting)**
   It was agreed during the previous call to bring this item forward to allow time for discussion. EW asked NHSGGC representatives about sharing their learning with other Boards.

   Tom Steele (in previous role at HFS) had informally discussed learning around the design of a new hospital and said that learning had been shared informally with colleagues in NHS Lothian. This had focussed on the water system, commissioning and handover aspects and he had sought support from SG capital and facilities team with regard to this.

It was suggested that it would be most helpful for the national agencies (HPS/HFS) to lead on sharing learning and updating where required existing guidance or developing new guidance. Annette Rankin advised that the incident report that is anticipated in early November. Part of the recommendations would provide learning that could be applicable across NHSScotland.

Jennifer Armstrong raised that this would need to be considered carefully and with a degree of proportionality, and be robustly risk assessed. . It was also suggested that a debrief of this incident would be useful to help with learning. All to consider how best to take this forward.

Jennifer asked for clarity around the timing of the report for Parliament and it was agreed that a timeline would be put together by the HAI/AMR Policy Unit. Annette clarified that the report would be sent to Teresa Inkster so this could be shared with the relevant people within the Board and comments can be fed back to HPS prior to the final version being circulated.

4. Update from NHSGGC – clinical and IPC perspective

There are currently two inpatients in ward 4B (BMT) and 16 inpatients in ward 6A. There have been no new cases since [redacted] September 2018. Patients and their parents have fed back that they are content with the current situation. The Infection Control Team is happy with the environment and continue to make daily visits.

Teresa provided an update following the drain survey, noting that plastic toys, syringes etc. were found in the drains and this could be adding to the wider problem. Consideration is being given to how sinks can be adapted to prevent objects from falling in to the drains. A Board wide educational programme is also being developed to make staff aware of the risks this can cause.

Teresa also discussed they were looking at areas in the Netherlands, that are waterless environments – to see what learning can be used from there, e.g. reducing the number of sinks/water outlets).

5. Update from NHSGGC – estates/facilities perspective

The team are currently procuring materials required for the tap replacement programme. A more accurate timescale can be provided by the next meeting. The replacement tap that has been selected has a copper lining that should help to reduce biofilm formation and improves flow and minimises splashing. It is easier to maintain and has been used successfully across many healthcare settings within the UK for the last three years.

Annette advised that she supported the decision and that a rigorous process had been undertaken underpinning the decision and that all relevant parties were involved throughout the process.

6. Update from HPS/HFS perspective

HPS are currently working on the report and had no further detail to add. Nothing further to add from HFS perspective. Both organisations are content to support national learning post incident and reporting.

7. Communications update

It was agreed that the SG comms would work with NHSGGC comms team regarding any media enquiries. It was noted that a paper was being presented to the Board next week which will include an update on the water incident. The updates from HPS following the IMT would continue as normal to allow the HAI/AMR PU too update the Cabinet Secretary.

Jennifer Armstrong advised that Pauline Hamilton would also take notes and these could be combined with the SG note of the meeting to support accuracy, particularly around the technical aspects.

Louise from SG comms advised she would update Mark Taylor (SG comms) and suggested it would be useful to meet with the HAI/AMR Policy Unit to agree a strategy going forward prior to the the report going to Parliament. Handling to be agreed with Cabinet Secretary.

8. AOCB

As noted earlier Jennifer Armstrong advised that there was a Board meeting on 16 October 2018 and an update on the incident was included. An update can be provided at the next meeting.

The next meeting will go ahead as planned and it would be decided if future meetings could be moved to every two weeks.

9. Future calls

- Thursday 18 October, 13:00 – 14:00 – to be chaired by Diane Murray (TBC)
- Wednesday 24 October 2018, 13:00 – 14:00 – will confirm if this call is required on during meeting on 18 October 2018.

Action no	Action	Who	Cleared
Action 1	SG to draft answers (based on existing information) to any PQs, and follow up questions before sending direct to NHSGGC.	HAI/AMR PU	Agreed
Action 2	NHSGGC to provide HAI/AMR PU with contacts for future PQs. This should be sent to the public affairs mailbox. HPS would be included in email exchanges.	NHSGGC	Jennifer will send agreed email address
Action 3	NHSGGC to provide SG with an outline of what they want DCMO to facilitate for them regarding benchmarking data from other hospitals.	NHSGGC - JR	Awaiting further information from NHSGGC
Action 4	HAI/AMR PU to approach DCMO re benchmarking information. EW has already noted to DCMO request will be forthcoming.	HAI/AMR PU	Will progress once information received from the Board
Action 5	EW to join TI on site for half a day – date to be arranged.	EW / TI	Date agreed for 7 November 2018.
Action 6	Item 8 to be carried forward to next meeting.	HAI/AMR PU	Completed

Action 7	SG to review information from NHSGGC regarding costs – NHSGGC to provide more information if required.	HAI/AMR PU & AM NHSGGC	On-going
Action 8	NHSGGC colleagues to send updates for minutes on 4 October to HAI/AMR Policy Unit.	NHSGGC	Agreed, updates pending
Action 9	SG to draft a timeline for the report and circulate for agreement	HAI/AMR PU	Draft completed

HCAI/AMR Policy Unit
Chief Nursing Officers Directorate
15 October 2018

NHS Greater Glasgow & Clyde, Royal Hospital for Children Water Incident: Action note of Teleconference, 18 October 2018, 13:00 – 14:00

Dialled in:

Scottish Government:

- Rachael Dunk, Head of Chief Nursing Officer Directorate (Chair)
- Diane Murray, Associate Chief Nursing Officer
- Margaret Syme, HAI/AMR Policy Unit
- Melanie Goodfellow, HAI/AMR Policy Unit
- Mark Taylor, Communications Team

Health Protection Scotland:

- Annette Rankin, Nurse Consultant Infection Control

Health Facilities Scotland:

- Ian Storrar, Principal Engineer (Health Facilities Scotland)

NHS Greater Glasgow & Clyde:

- Dr Teresa Inkster, Lead Infection Control Doctor and Training Programme Director Medical Microbiology
- Tom Steele, Director Estates and Facilities
- Kevin Hill, Director of Women and Children's Services

Apologies:

- Eddie McLaughlin, Assistant Director, Health Facilities Scotland, Engineering, Environment and Decontamination)
- Laura Imrie, Nurse Consultant Infection Control
- Dr Jennifer Armstrong, Board Medical Director, HAI Executive Lead
- Jennifer Rodgers, Chief Nurse for Paediatric and Neonatal Services, NHSGGC
- Pauline Hamilton, PA IPC, NHSGGC
- Jason Birch, Unit Head, Chief Nursing Officer Directorate
- Alan Morrison, Capital Accounting and Policy Manager, Health Finance
- Dr Emma Watson, HAI/AMR Professional Advisor

1. **Welcome, introductions and apologies**
   After introductions and apologies, RD welcomed everyone to the call.

2. **Minutes and actions**
   The minutes and actions from the previous meeting were reviewed and a change from Jennifer Armstrong was highlighted. This will be sent to the HAI/AMR Policy Unit from Tom Steele and the document will be updated. Final versions of the notes from 4 and 10 October calls will also be circulated by HAI/AMR Policy Unit. Ian Storrar asked to be added to distribution list and it was agreed that he would be sent the notes from the previous two calls.

   Dial in details will be added to future agendas.

3. **Update from NHSGGC – clinical and IPC perspective**
   Kevin Hill provided an update on patient numbers. There are currently 10 patients in ward 6A and two in ward 4B (BMT). The decant has worked well and there are no further cases.

Dr Teresa Inkster advised that a patient had been admitted over the weekend (13/14 October) with Gram-negative sepsis, but this was unlikely to be related to the water incident. A further update will be provided following the IMT.

4. Update from NHSGGC – estates/facilities perspective

Tom Steele advised that work is progressing well with regards to procurement and also to replace the taps and basins in RHC. He noted the panels that the basins are mounted on may also need replaced/altered and this could cause a delay to the work as there are over 100 panels. However, he is liaising with the suppliers/contractors to ensure any timescales are expedited given the scale of work required. An assessment will take place on 19 October and firmer timescales can be provided. An environmental deep clean and HPV would take place prior to any patients being moved back to RHC, so this would also be factored in to timescales.

Diane Murray asked what assurances NHSGGC had that the replacement taps and basins were suitable. Tom advised that the taps had a copper lining, which is more resistant to biofilm and the new basins allowed a more efficient water discharge in to the drain. Ian Storrar advised that the spout on the new tap could also be disconnected and cleaned.

The policy unit also asked about the blocked drain issue reported in the media this week, Tom explained this was not related to this incident and was a blockage caused due to paper towels.

5. Update from HPS/HFS perspective

Nothing further to add to what has already been discussed.

6. Communications update

Tom advised that during the NHSGGC Board meeting on Tuesday 16 October Jennifer covered the water issues and Tom provided an update on the technical aspects. There had been no media/other enquiries following this.

Mark Taylor advised that there had been no enquiries within the last 7 days, but once the PQs are published this may result in more activity.

7. Future meeting dates

It was agreed that the HAI/AMR Policy Unit would confirm if the meeting next week was going ahead by midday on Tuesday. If the call was cancelled the next call would be arranged for a suitable time after Emma Watson has visited RHC.

Annette advised that she would provide the draft report on Monday 22 October. Comments would need to be provided by 29 October, so that it can be finalised and sent to the policy unit by early Nov

8. AOCB

Tom asked if work was needed on guidance around the number and location of sinks/water outlets in new hospital builds, noting the learning from this incident would be an important factor in the future. He noted as part of the work some of the sinks that are not used often across the QEUH will be removed to reduce the risk of infection. He also asked if changes to hand hygiene guidance would be useful as hand gel is used more often.

Diane Murray advised that hand washing should always be the first course of action and that hand gel should be used in conjunction with this.

Annette advised that this could be included in the report and be outlined in the recommendations which would facilitate national work thereafter.

Tom Steele gave apologies in advance of the call on 24 October if it goes ahead.

9. Future calls

- Thursday 15 November 2018 – 13:00 – 14:00

Action no	Action	Who	Cleared
Action 1	NHSGGC to provide HAI/AMR PU with contacts for future PQs. This should be sent to the public affairs mailbox. HPS would be included in email exchanges.	NHSGGC	Jennifer to send agreed email address
Action 2	NHSGGC to provide SG with an outline of what they want DCMO to facilitate for them regarding benchmarking data from other hospitals.	NHSGGC - JR	Complete
Action 3	HAI/AMR PU to approach DCMO re benchmarking information. EW has already noted to DCMO request will be forthcoming.	HAI/AMR PU	In progress
Action 4	SG to review information from NHSGGC regarding costs – NHSGGC to provide more information if required.	HAI/AMR PU & AM NHSGGC	On-going

HCAI/AMR Policy Unit
Chief Nursing Officers Directorate
19 October 2018

NHS Greater Glasgow & Clyde, Royal Hospital for Children Water Incident: Action note of Teleconference, 28 November 2018, 12:00 – 13:00

Dialled in:

Scottish Government:

- Dr Emma Watson, HAI/AMR Professional Advisor (Chair)
- Jason Birch, Unit Head, Chief Nursing Officer Directorate
- Melanie Goodfellow, HAI/AMR Policy Unit
- Mark Taylor, Communications Team

Health Protection Scotland:

- Annette Rankin, Nurse Consultant Infection Control
- Laura Imrie, Nurse Consultant Infection Control

Health Facilities Scotland:

- Eddie McLaughlin, Assistant Director, Health Facilities Scotland, Engineering, Environment and Decontamination)
- Ian Storrar, Principal Engineer (Health Facilities Scotland)

NHS Greater Glasgow & Clyde:

- Dr Jennifer Armstrong, Board Medical Director, HAI Executive Lead
- Tom Steele, Director Estates and Facilities
- Kevin Hill, Director of Women and Children's Services
- Pauline Hamilton, PA IPC, NHSGGC
- Tom Walsh, NHSGGC Infection Prevention Control Manager
- Sandra Devine, Associate Nurse Director Infection Prevention Control

Apologies:

- Dr Teresa Inkster, Lead Infection Control Doctor and Training Programme Director Medical Microbiology
- Jennifer Rodgers, Chief Nurse for Paediatric and Neonatal Services, NHSGGC
- Alan Morrison, Capital Accounting and Policy Manager, Health Finance
- Rachael Dunk, Head of Chief Nursing Officer Directorate
- Diane Murray, Associate Chief Nursing Officer
- Margaret Syme, HAI/AMR Policy Unit

1. **Welcome, introductions and apologies**
   After introductions and apologies, EW welcomed everyone to the call.

2. **Minutes and actions**
   The minutes and actions from the previous meeting were reviewed and accepted as an accurate record. It was raised that PH also takes notes and it may be easier to combine these to ensure everything is covered.

3. **Update from NHSGGC – clinical and IPC perspective**
   KH asked for agenda item 5 to be brought forward as he would have to leave the call early to attend another meeting. He provided an update on patient numbers. There are currently 20 patients in ward 6A and 3 in ward 4B (BMT). Although the site has moved and there are

obvious challenges around that, all patients treatments are continuing as planned and there are no clinical concerns.

He raised that there had been a new Gram-negative bacteraemia identified in the last 2 weeks but after all the appropriate investigations were undertaken the case was not considered to be linked.

JB asked for clarity around this case and suggested it would be useful to be advised of this information as quickly as possible. JA provided reassurance that in this patient population it is normal to see Gram-negative bacteraemia from time to time and that the incident management team review these on a case by case basis. The agreed triggers remain in place and it was agreed at the IMT that the paediatrician and IPC doctor are clinically satisfied that the case is not linked. LI also provided reassurance about this case and advised it's not uncommon in this patient population.

Given this is a single case and in order to protect the patients privacy, TI would share this information with EW directly.

4. Final report and national learning

HPS and HFS had held a meeting with directors of estates earlier in the day and provided some feedback from this. This regular strategic meeting used the morning session to review lessons learned from across NHSScotland in relation to the design, build and commissioning if new builds systemic issues were identified and an action plan is being developed.

It was noted by AR that the ICM network had also started to share lessons learned on an informal basis, including discussions around key messages for Boards and concerns around knowledge, influence and resources. It was pointed out that to ensure consistency across the whole of NHSScotland, sharing these on a formal level would be more practical.

AR noted that the HAI/AMR policy team has asked HPS and HFS to undertake a review of new hospital builds in the last 5 years. The initial scoping exercise to determine resources and the scale of the project is underway.

5. Ventilation review

No update was available at this time due to other work priorities but this work is progressing. HPS and HFS continue to support the Board with this work.

6. Update from NHSGGC – estates/facilities perspective

TS advised that the planned remedial works on the water system in wards 2A/2B were due to be complete by 7 December 2018, including removing sinks and dosing the water supply. An issue with the ventilation system means further work is necessary. Once this is complete A thorough deep clean and HPV treatment would then begin and once complete water testing would be undertaken to ensure the wards are safe. Patients will not return to the wards until this is complete and the Board are satisfied it is appropriate for patients to be cared for in these areas. Work is likely to continue through to the end of January 2019.

TS noted that sharing information on the planned work and any media releases would be part of the action plan to ensure everyone is kept up to date with progress.

7. Update from HPS/HFS

AR advised that HPS continue to support the Board and work is being done on the format of the report ahead of this being shared with Parliament. HFS had nothing further to add.

8. Update from SG comms

Mark agreed that it is useful for the Board to share their action plan and any media releases with SG comms. It was also agreed that SG colleagues would share plans on the final report going to Parliament ahead of this taking place.

9. Future calls

- It was agreed that another meeting would be scheduled for mid-December 2018. Dates to be circulated by the HAI/AMR Policy Unit.

10. AOB

Nil.

Action no	Action	Who	Cleared
Action 1	NHSGGC to provide HAI/AMR PU with contacts for future PQs. This should be sent to the public affairs mailbox. HPS would be included in email exchanges.	NHSGGC	JA to send agreed email address
Action 2	HAI/AMR PU to approach DCMO re benchmarking information. EW has already noted to DCMO request will be forthcoming.	HAI/AMR PU	Complete
Action 3	SG to review information from NHSGGC regarding costs – NHSGGC to provide more information if required.	HAI/AMR PU & AM NHSGGC	On-going as part of wider work
Action 4	SG to combine call notes and circulate next meeting date.	HAI/AMR PU	In progress

HCAI/AMR Policy Unit
Chief Nursing Officers Directorate
21 December 2018

NHS Greater Glasgow & Clyde, Royal Hospital for Children Water Incident:
Action note of Teleconference, 20 December 2018, 12:00 – 13:00

Dialled in:

Scottish Government:

- Dr Emma Watson, HAI/AMR Professional Advisor (Chair)
- Jason Birch, Unit Head, Chief Nursing Officer Directorate
- Rachael Dunk, Deputy Director, Chief Nursing Officer Directorate
- Alan Morrison, Capital Accounting and Policy Manager, Health Finance
- Elizabeth Burgess, Chief Nursing Officer Directorate

Health Protection Scotland:

- Annette Rankin, Nurse Consultant Infection Control

NHS Greater Glasgow & Clyde:

- Dr Jennifer Armstrong, Board Medical Director, HAI Executive Lead
- Tom Steele, Director Estates and Facilities
- Kevin Hill, Director of Women and Children's Services
- Pauline Hamilton, PA IPC, NHSGGC
- Jennifer Rodgers, Chief Nurse for Paediatric and Neonatal Services, NHSGGC
- Tom Walsh, NHSGGC Infection Prevention Control Manager

Apologies:

- Dr Teresa Inkster, Lead Infection Control Doctor
- Diane Murray, Associate Chief Nursing Officer
- Margaret Syme, HAI/AMR Policy Unit
- Sandra Devine, Associate Nurse Director Infection Prevention Control
- Laura Imrie, Nurse Consultant Infection Control
- Melanie Goodfellow, CNOD
- Ian Storrar, Principal Engineer, Health Facilities Scotland
- Eddie McLaughlin, Assistant Director, Health Facilities Scotland (Engineering, Environment and Decontamination)

1. Welcome, introductions and apologies

After introductions and apologies, EW welcomed everyone to the call.

2. Minutes and actions

JB reported that the minutes of the last meeting have not yet been circulated, as they need to be cross referenced to the notes made by NHSGGC (received by CNOD on 20 December).

JB confirmed that SG would circulate a combined single official record of the last meeting, and today's one, to the wider group.

JB confirmed that SG would communicate with NHSGGC in advance of the report on this incident going before Parliament in the New Year. This advance warning will be helpful in terms of NHSGGC preparing for media interest. JB also agreed that the report would be shared with NHSGGC, before going to Parliament, once it has been finalised by the Cabinet Secretary for Health and Sport.

3. Update from NHSGGC – clinical and IPC perspective

KH reported that ward 6A and ward 4B (BMT) in the Queen Elizabeth Hospital are still being used as a decant facility. There have been no further infections relating to this incident since the move or since the last meeting. There are no patient concerns at the moment. The intention is to maintain the patients in question in ward 6A and ward 4B for the next 12 months (whilst all remedial work is undertaken).

4. Final report and national learning

JB reported that a national-level event to disseminate learning from this incident would be held in 2019. Officials would meet the Cabinet Secretary in the New Year to discuss plans. There was some discussion of the audience for this event (e.g. whether or not to include representatives of academia). EW concluded that a consensus view would need to be formed and that there might be scope for more than one event, in the format that adds most value.

5, 6. Ventilation review & Update from NHSGGC – estates/facilities perspective

Tom Steele reported that work had been completed to replace taps, basins and outlets. A chlorine dioxide system is now working across the whole campus (children's and adult's hospital) and initial feedback (including lab results) on this system are encouraging.

A high level study has been completed to assess how the ventilation system can be improved. Initial indications are that much of the existing system will need to be replaced, with a time estimate for this work of 18 months and no cost estimate as yet.

7. Future calls

This is the final teleconference on this issue.

KH asked for agreement that – since there have been no new cases of infection related to this incident since the ward decant, the fortnightly IMT meeting could be discontinued. Work to progress technical and estates issues would obviously continue for many months to come. All agreed with this approach, though with the understanding by all present that if the situation changed, SG would be informed by NHSGGC immediately.

EW as chair thanked all present for their efforts to respond to this incident.

AOB

Nil.

Actions

Action #	Action	Who	Cleared
1.	Circulate a combined single record of the last meeting, and today's one, to the wider group.	CNOD	
2.	Communicate with NHSGGC in advance of the report on this incident going before Parliament in the New Year.	CNOD	
3.	Plan national level learning event(s).	SG with input from all present	
4.	Continue and complete work to progress technical and estates issues, and keep all present informed.	NHSGGC	

HCAI/AMR Policy Unit
Chief Nursing Officer Directorate
21 December 2018

NHS Greater Glasgow and Clyde

AECOM

NHS GREATER GLASGOW AND CLYDE

Ward 2A/2B Progress Meeting 01

Date: 17 October 2018 **Time:** 11:00 **Location:** QEUH Campus, Facilities Meeting Rm 5

Present:	Ian Powrie (IP)	-	NHSGG&C
	Colin Purdon (CP)		NHS GG&C (Part)
	Teresa Inkster (TI)	-	NHSGG&C
	Andy Wilson (AW)	-	NHSGG&C
	Emma Heggarty (EH)	-	AECOM
Apologies:	Karen Connolly (KC)	-	NHSGG&C
Distribution:	Tom Steele (TS)	-	NHSGG&C
	Mary Anne Kane (MAK)	-	NHSGG&C
	Alan Gallacher (AG)	-	NHSGG&C
	Melville MacMilan (MM)	-	NHSGG&C

		Action
1.0	**Introductions & Apologies**	
1.1	Advanced apologies noted from KC.	**Note**
2.0	**Ward 2A/2B scope review**	
2.1	**Chlorine Dioxide Treatment Works**	
2.1.1	**Continual Dosing Works –** IP confirmed that the works were approved on Friday 12 October at the value of [redacted]. M&S has been instructed to progress dosing. It is anticipated that the system will be fully up and running in accordance with previously reported date of 26 October 2018. IP to monitor progress. CP queried if the dosing of the isolated system would impact on the cold water supply used for the baby feed prep in the Children's Hospital. It was agreed that CP would review to ensure supply remains separate – if not temporary bottled water supply to be considered in this area.	**IP** **CP**
2.1.2	**Removal and reinstatement of Point of Use Filters –** IP confirmed that the removal and reinstatement works will be carried out by the term contractor, DMA.	**Note**
2.1.3	**High level dosing works –** IP noted that a 3-4 week monitoring period, following continual dosing commencing will be required, prior to a decision being made if a one off high level dosing (10ppm) is required. This will mean a decision is required by 23 November 2018 if dosing is required. Decision as to whether dosing is required to be infomed through weekly water sampling to monitor tvc levels, carried out by NHSGGC microbiology. It was agreed that the sampling should be carried out at 3 locations on each ward (TCT, BMT and Ward 2B). TI to coordinate sampling activities.	**Note** **TI**
2.1.4	**Maintenance contract –** IP noted that it will be necessary to put in place a maintenance contract with M&S for the first year's maintenance of the system following installation. IP noted that this is subject to sign off from the revenue budgets by finance. The deadline for instruction of the maintenance contract is 12 November 2018 (1 week prior to the full children's ward going live). IP to clarify costs to enable maintenance agreement to be put in place.	**IP**

2.2	**Tap replacement & pipework alterations**	
2.2.1	**Tap replacement –** IP advised that the quick quote that was put out for the procurement of the Contour 21 taps and ensuite basins, only resulted in one return being obtained. IP noted that this was due to the details for a number of suppliers being out of date on the system. This issue has been rectified and the quick quote request has been re-issued. It is expected that revised quotes will be received 22 October 2018, thereafter an order to be placed. The Markwik 21 taps for the CWHB quick quote has been issued following confirmation at Friday's WTG that this is the preferred option. Quotes expected back on 22 October 2018, thereafter an order will be placed for delivery. M&S has provided a quote for the installation of the taps/sinks, which will be factored into the dispensation request from the Finance Director.	**IP** **IP** **Note**
2.2.2	**Supply and install of pipework outlets –** IP confirmed he now has a quote from M&S for these works, which will be factored into the dispensation request from the Finance Director.	**Note**
2.2.3	**In line filter to cold water supply –** IP confirmed this has been removed from scope following feasibility assessment.	**Note**
2.2.4	**Bottle traps to ensuite sinks -** IP confirmed he now has a quote from M&S for these works, which will be factored into the dispensation request from the Finance Director.	**Note**
2.3	**Clinical Wash Hand Basins (CWHB)**	
2.3.1	**Replacement of CWHB and Contour 21 taps –** Refer to item 2.2.1.	**Note**
2.3.2	**Anti-syphon traps to CWHB and pipework** - IP confirmed he now has a quote from M&S for these works, which will be factored into the dispensation request from the Finance Director.	**Note**
2.3.3	**IPS panel replacements –** IP advised that now has a revised quote from Crawfords, which is significantly reduced from [redacted] to [redacted]. The reduction is due to the omission of the supply and install of the taps and sinks which were previously included in the quote. It was noted that the revised quote was in line with the recommendations made by AECOM Cost Advisor. IP noted that M&S has provided a quote for the installation of all taps and sinks, which is now excluded from Crawfords scope, with all materials being procured direct.	**Note**
2.3.4	**Removal of trough sink from BMT room –** IP confirmed that the removal of the trough sink from the BMT room has been included in the M&S quote. TI noted that dialogue is still ongoing with the Ward Consultant, regarding the removal of the trough sinks from the Clean Utility rooms on the ward. TI noted that the Ward Consultant is reluctant to have these removed, however from a microbiological stand point, the recommendation is that they are. TI noted that she anticipates a final decision will be made by the end of the week. It was noted that a decision requires to be made timeously regarding the removal of these sinks as there will be a potential requirement to order new IPS panels for these areas. IP suggested that in lieu of replacing the IPS panels, it may be a quicker and more cost effective option to just create a plaster board wall once the pipework behind has been isolated.	**TI** **Note**
2.4	**Toilets**	
2.4.1	**Toilet seats –** IP noted that he had received correspondence from Iain Storrer (HFS) in relation to findings from a Consultant Microbiologist following tests carried out with toilet seats at another hospital, leading to the recommendation that toilet seats are not fitted. TI noted that there is conflicting evidence from other studies that suggest otherwise. TI advised that she would review all the evidence available and provide a recommendation in due course. She noted that it is likely that the recommendation is that these are to be installed. IP to hold placing an order for the toilet seats until further direction received from TI.	**Note** **TI** **Note**
2.4.2	**Removal of cisterns –** IP noted that the M&S quote has been received for the removal of	**Note**

	the cistern and replacement with the plunge valve system. Material costs also obtained via quick quote, both of which will be factored into the commercial assessment issued to the Finance Director for approval.	
2.4.3	**Removal of slop hoppers –** IP noted that M&S has included the removal of the slop hoppers in the DSRs in their quote. This will be factored into the costs issued to the Finance Director for approval.	**Note**
2.5	**Drainage**	
2.5.1	**Remedial works –** AW advised that he is in the process of instructing the remedial works identified in the drainage report. Further update to follow. It was noted that these do not directly impact on the Ward 2A/2B remediation works.	**AW**
2.6	**Ventilation**	
2.6.1	**Ventilation strategy –** IP advised that the interim ventilation strategy will be ready for review at the WTG meeting on Friday. The full report will follow 29 October as previously reported.	**IP**
2.6.2	**Ventilation Maintenance –** AW confirmed these works are on track to be completed on Friday 19 October 2018.	**Note**
2.6.3	**Ventilation re-validation –** AW advised that these works will be pushed back to the end of the works programme in Ward 2A/2B, once the air permeability works are completed.	**Note**
2.6.4	**Positive pressure provision –** IP advised that the feasibility of creating a positive pressure environment within 2 no. TCT rooms and 4 no. other bedrooms, has been included in the ventilation strategy scope. It is anticipated that clarification of whether or not this will be achievable will be obtained at the end of the month.	**IP**
2.7	**Opportunity works**	
2.7.1	**Flooring replacement -** Works in progress. Completion planned 31 October 2018.	**Note**
2.7.2	**Décor works –** Scope under review in parallel with the SCN requests for Ward 2A/2B. Clarity still required in relation to the removal of the transfers on the ward. Further discussion required at the WTG meeting on Friday 19 October.	**Note**
2.7.3	**SCN requested works –** It was noted that further requests have been made by the ward SCN's in relation to décor and lighting on the ward, leading to an expanding scope that may not be achievable in the timescales available. To be discussed at the WTG on Friday 19 October.	**Note**
3.0	**Early Procurement/Contractor appointment**	
	EH noted that costs need to be issued to TS by Thursday 18 October, to enable approvals to be sought from the Finance Director on Friday 19 October, as agreed at the WTG meeting the previous week. IP noted that costs have been obtained for most materials/labour now to enable an informed build up to be developed as follows; 1. Direct material Orders: [redacted] (Based on quotes received) 2. IPS Panels: [redacted] (Quote) 3. Morris & Spottiswood labour costs: [redacted] (Quote) 4. Air Permeability testing: [redacted] (estimate) 5. HPV: [redacted] (estimate) 6. Shelving & Storage: [redacted] (estimate) 7. Additional chlorination works: [redacted] (Quote – already instructed) 8. Decoration costs: TBC (Clarification if revenue of capital funded) TOTAL: [redacted] (excl VAT and decoration works) EH noted that she would circulate a note of these costs for IP to validate to enable TS to progress obtaining the necessary approvals. IP noted that he would commence drafting the waiver paperwork to enable orders to be placed as soon as approval is obtained.	**EH/IP** **IP**

4.0	**Programme**	**Note**
	AW advised that he had spoken with TS prior to the meeting, who had advised that clarity on the M&S programme is required and that there works require to be completed by the end of November 2018. IP noted that he was meeting with M&S on 17 October to discuss the programme for the main chlorination works and would raise this with them also. It was noted that the lead times for materials, specifically the IPS, will need to be factored into their programme.	**IP**
5.0	**Water sampling**	
5.1	**Cistern and plate sampling** – TI proposed that the sampling exercise take place on Monday 22 October. Testing to take place in two parts; 1. Baseline sampling (4 hr period) – 9am – 1pm, when bathroom not in use. 2. Test sampling (4hr period) – 1.30pm – 5.30pm, when bathroom routinely in use. AW noted that he will liaise with KC to coordinate access and bathroom use during the period.	**AW/TI**
5.2	**Cold Water sampling –** Refer to Item 2.1.3.	**Note**
6.0	**Morris & Spottiswood Meeting Attendance**	
	EH noted that it is intended that M&S will join this weekly meeting forum on appointment, to enable regular updates on progress to be obtained. IP undertook to discuss with M&S who would attend from their team and circulate contact details to EH to include in meeting invite.	**IP/EH**
7.0	**HAI-scribe**	
	EH queried if/what has taken place in terms of HAI-scribe prior to works commencement. It was noted that a HAI-scribe had taken place in relation to the works to the water system, however there will be a requirement to update this to include the intrusive works to the ward and the actions require to put the ward back in to service. CP to progress coordinating. M&S attendee to be included in scribe meeting.	**CP**
8.0	**Any Other Business**	
8.1	AW noted that the flooring works are ongoing in the wards. It has been identified that a large proportion of the damage to the flooring has been caused by the bins on the ward. Options for protective feet on bins to be considered in future to prevent further marking. AW noted that only areas where the marks on the floor are bad are being replaced. Minor marks will be left in situ.	**Note**
9.0	**DATE OF NEXT MEETING**	
	The next meeting will be held on **Wednesday 24 October 2018** at 11.30 within **QUEH Campus, Facilities Meeting Room 5, Labs Building**	**Note**

NHS Greater Glasgow and Clyde

AECOM

NHS GREATER GLASGOW AND CLYDE

Ward 2A/2B Progress Meeting 02

Date: 24 October 2018 **Time:** 12:30 **Location:** QEUH Campus, Facilities Meeting Rm 5

Present:	Ian Powrie (IP)	-	NHSGG&C
	Teresa Inkster (TI)		NHSGG&C (Part)
	Andy Wilson (AW)	-	NHSGG&C
	Karen Connolly (KC)	-	NHSGGC
	David Carmichael (DC)	-	Morris & Spottiswood
	Jim Cumming (JC)	-	AECOM
	Emma Heggarty (EH)	-	AECOM
Apologies:	Colin Purdon (CP)	-	NHSGGC
	Tom Steele (TS)	-	NHSGG&C
Distribution:	Mary Anne Kane (MAK)	-	NHSGG&C
	Alan Gallacher (AG)	-	NHSGG&C
	Melville MacMilan (MM)	-	NHSGG&C

		Action
1.0	**Introductions & Apologies**	
1.1	Advanced apologies noted from CP. EH noted that she would be stepping down from the project from w/c 29/10/2018. Her colleague Jim Cumming who was in attendance at the meeting will be taking on the Project Manager role. Introductions were made.	**Note**
2.0	**Review of previous minute**	
2.1 (2.1)	**Continual dosing works** - AW confirmed that the continual dosing works were progressing and are on track for completion on 26/10/2018, in accordance with programme.	**Note**
2.2 (2.1)	**Baby feed pipework** – AW advised that CP had reviewed the implications of the chlorination works to the baby feed water supply. He noted that CP will provide a more detailed update of his findings, however noted that only the cold water feed is used for baby feed, which will not be impacted. AW also noted that there are pipework modifications due to start shortly in this area, which CP is at the Pre-start Meeting for.	**Note**
2.3 (2.1.3)	**High level dosing works** – Further to the previous progress meeting, it was agreed at the Water Technical Group on 19/10/2018, that a one off high level dosing of the system will be required prior to the wards being reoccupied. This is due to the limited time available, once the continual dosing becomes live, to establish a sufficient drop in the TVC counts in the wards that will enable safe reoccupation of the area. NHSGCC to formalise M&S instruction to include this in their current scope. It was noted that even though the high level dosing will now be included in scope, that the weekly sampling regime agreed at the previous meeting would still be carried out. TI advised that the initial water samples obtained from the wards, earlier that week, are not presenting any TVC counts above 100. It may be necessary to take further samples to validate this. If TVC counts are below 100, further microbiological analysis will be required. (Post Meeting note: Following re-assessment of the samples taken, it has been established that some samples are presenting counts over 100 TVC. Further analysis is being undertaken).	**NHSGGC** **Note** **Note**

2.4 (2.1.4)	**Maintenance contract** – IP advised that he has followed this up internally to establish the revenue funding required to enable sign off of the maintenance contract required following the dosing regime has been established. IP to continue to pursue.	**IP**
2.5 (2.2.1)	**Tap replacement** – IP confirmed that both the Markwik 21 (CWHB taps) and the Contour 21 (Ensuite taps) are now on order. Markwik 21 taps are on a 2-3 week lead time. Delivery date tbc. Contour 21 taps (and sinks) are due to be delivered on 29/10/2018. DC noted that any deliveries taken by NHSGGC, for equipment to be installed on site, should be marked as 'unchecked' on delivery. This is to enable NHSGGC to have recourse that the goods were damaged on arrival, when it has not been possible to check all items on delivery prior to accepting. It was agreed that M&S would coordinate uplift of the equipment from the delivery bay to the wards once on site. M&S to liaise with NHSGGC Estates to arrange.	**Note** **Note**
2.6 (2.3.4)	**Trough sink replacement** – TI advised that dialogue is ongoing with regard to the removal of the trough sinks on the wards. The sinks were discussed at the IMT meeting on 19/10/2018, at which clinical colleagues including the Transplant Consultant, Hand Wash Consultant and Ward Consultant have noted that they are not happy with the proposal to remove the sinks. TI noted that this has now been escalated to the Hospital General Manager, Jamie Refern, to enable a final decision to be made. It was noted that a decision on the sink removal is time critical and is required by the end of the week. KC advised that she would follow up with TI following the meeting in an effort to escalate a final decision being made.	**TI** **KC**
2.7 (2.4.1)	**Toilet lids** – It was noted that TI had circulated a paper in relation to the proposed toilet lid installation, following review of various literature on the subject. TI's recommendation is that the toilet lids are installed, with an appropriate cleaning regime in place, and an assessment of their effectiveness is made post-installation. If necessary these can be removed at a later date. IP confirmed that the toilet seats are on order and due for delivery to site on 29/10/2018. IP requested that TI liaise with the ward staff in relation to signage for the new toilet seat lids, in addition to replacement of signage for re handwashing following replacement of the IPS panels.	**Note** **Note** **TI**
2.8 (2.5.1)	**Remedial works** – AW noted that M&S has been instructed to progress the remedial works identified through the drainage survey; - Replacement of damaged cowls - Replacement of section of pipework at level 4 - Removal of pebbles from Stack 13 and re-inspection. It was noted that the completion of these remedial works are not critical to the re-opening of Wards 2A/2B. DC to review and confirm status of remedial works.	**DC**
2.9 (2.6.1)	**Ventilation strategy** – IP noted that the final report is on track for issue on 29/10/2018. It was noted that the initial feedback obtained from the interim report is that that the 125% capacity that should have been built into the system at construction stage is not there.	**Note**
2.10 (2.6.4)	**Positive pressure provision** – IP noted that the feasibility of providing positive pressure to 2 no. rooms in TCT and 4 no. rooms elsewhere on the wards is being considered as part of the final ventilation report (refer to 2.9). IP noted that if the findings validate the initial assessment that the additional capacity in the system that should have been built in is not there, then this will likely impact the ability to enhance the provision in these rooms, which could cause Infection Control concerns regarding re-occupation of the ward. It was agreed that a meeting should be scheduled on Wednesday 31 October, once the report has been issued and reviewed, to enable further assessment to be made. (Post meeting note: Ventilation meeting scheduled 11.30am, 31 October 2018).	**IP**

2.11 (5.1)	**Cistern/Plate sampling** – It was noted that it was not possible to carry out the sampling on 22/10/2018 as previously planned. IP advised that the ward has now been largely stripped out, which would prevent the assessment from taking place without further contamination issues. It was agreed that as these tests are not critical to resolving the issues on the ward, that the samples would be carried out post-occupation instead.	**Note**
2.12 (6.0)	**Morris & Spottiswood meeting attendance** – IP introduced David Carmichael to the meeting group, noting that he would be attending future meetings to provide progress updates on the works.	**Note**
2.13 (7.0)	**HAI-scribe** – On review, it was confirmed that no further HAI-scribe will be required for the works taking place on the wards.	**Note**
3.0	**Tracker Update** – Refer to appended tracker (Updates in red font).	
4.0	**Morris & Spottiswood Appointment** – Refer to Item 2.12.	**Note**
5.0	**Morris & Spottiswood Programme** – DC advised that M&S are aware of the timescales and the requirement to conclude their scope by 5/12/2018. This is the timescale that is currently being worked to. A detailed programme to follow early w/c 29/10/2018, which will detail the interdependencies of the equipment deliveries and the sequencing of the works to make this date achievable. EH requested that a copy of the programme is circulated prior to the next progress meeting to enable review/discussion.	**DC**
6.0	**Any Other Business**	
6.1	EH queried the status of the order for the HPV clean, noting the requirement for them to be mobilised following completion of the M&S scope of work on 5/1/18. KC noted that they have been advised of the intention to carry out these works and can be mobilised very quickly.	**Note**
6.2	IP advised that the possibility of making modifications to the parent beds in Ward 2A/2B is under review. It was noted that there are issues with keeping the current fold down beds clean from an infection control perspective. There would be a preference from Soft FM Staff to install Z-beds in the rooms, with modified storage space. KC advised that he proposed change is subject to ratification from the Clinical Group and also will be dependent on lead time for the beds and the storage for these. It was noted that if these works are instructed to proceed it will be a change to the current scope.	**KC/IP**
9.0	**DATE OF NEXT MEETING**	
	The next meeting will be held on **Wednesday 31 October 2018** at 09.00 within **QUEH Campus, CMB Meeting Room, CMB Building.**	**Note**

NHS Greater Glasgow and Clyde

AECOM

NHS GREATER GLASGOW AND CLYDE

Ward 2A/2B Progress Meeting 03

Date: 31 October 2018 **Time:** 12:30 **Location:** CMB, QEUH

Present:	Ian Powrie (IP)	-	NHSGG&C
	Teresa Inkster (TI)		NHSGG&C
	Andy Wilson (AW)	-	NHSGG&C
	Karen Connolly (KC)	-	NHSGGC
	Colin Purdon (CP)	-	NHSGGC
	John O'Rourke (JO)	-	NHSGGC
	David Carmichael (DC)	-	Morris & Spottiswood(Part)
	Jim Cumming (JC)		AECOM
Apologies:		-	
	Emma Heggarty (EH)	-	AECOM
Distribution:		-	
	Tom Steele (TS)	-	NHSGG&C
	Mary Anne Kane (MAK)	-	NHSGG&C
	Alan Gallacher (AG)		NHSGG&C
	Melville MacMilan (MM)		NHSGG&C

		Action
1.0	**Introductions & Apologies**	
1.1	Advanced apologies noted from EH as JC attending. Introductions were made.	**Note**
2.0	**Review of previous minute**	
2.1 (2.1)	**Continual dosing works -** AW confirmed that the continual dosing works are postponed till all works. On completion of the refurbishment works will take 24hrs to fully implement.	**Note**
2.2 (2.1)	**Baby feed pipework** – Pre-start meeting held with contractor – City Building – works to commence on 5 November – target to complete before the dosing works. CP to advise progress.	**CP**
2.3 (2.1.3)	**High level dosing works** – Further to the previous progress meeting, it was agreed at the Water Technical Group on 19/10/2018, that a one off high level dosing of the system will be required prior to the wards being reoccupied. This is due to the limited time available, once the continual dosing becomes live, to establish a sufficient drop in the TVC counts in the wards that will enable safe reoccupation of the area. NHSGCC to formalise M&S instruction to include this in their current scope. When the refurbishment works are complete and water supply reinstated and flushed through it will be sanitized at 10ppm level. Further analysis is being undertaken on completion	**NHSGGC** **Note** **Note**
2.4 (2.1.4)	**Maintenance contract** – IP advised that the issue of the purchase order is going through the procurement process. IP to advise when issued.	**IP**
2.5 (2.2.1)	**Tap replacement** – IP confirmed that both the Markwik 21 (CWHB taps) and the Contour 21 (Ensuite taps) are now on order. Markwik 21 taps are on a 2-3 week lead time. Delivery date anticipated 1 Novemeber.	**Note**

	Contour 21 taps (and sinks) are delivered – JO reported the install is 50% complete in Ward 2A.	**Note**
2.6 (2.3.4)	**Trough sink replacement** – TI advised that dialogue is ongoing as a meeting with relevant parties did not agree a solution with regard to the removal of the trough sinks on the wards. A potential option of creating a spate space with an automated door has been suggested by the Ward Consultant – IP advised this could cost in excess of [redacted] per room with a lead in time of at least 10 weeks. TI to report back if solution to issue is agreed.	**TI** **TI** **KC**
2.7 (2.4.1)	**Toilet lids** –IP confirmed that the toilet seats are to be installed – agreed that old seats are to be disposed of. IP requested that TI liaise with the ward staff in relation to signage for the new toilet seat lids, in addition to replacement of signage for re handwashing following replacement of the IPS panels.	**Note** **TI**
2.8 (2.5.1)	**Remedial works** – AW noted that M&S has been instructed to progress the remedial works identified through the drainage survey; - Replacement of damaged cowls - Replacement of section of pipework at level 4 - Removal of pebbles from Stack 13 and re-inspection. AW advised works progressing to completion.	
2.9 (2.6.1)	**Ventilation strategy** – IP had issued the Feasibility Study reports regarding air change rates provided by Innovated Design Solutions – discussion deferred to subsequent meeting following on from Task Group Meeting.	**Note**
2.10 (2.6.4)	**Positive pressure provision** – as per item 2.9. Ventilation meeting scheduled 11.30am, 31 October 2018).	**IP**
2.11 (5.1)	**Cistern/Plate sampling** – It was noted that it was not possible to carry out the sampling on 22/10/2018 as previously planned. IP advised that the ward has now been largely stripped out, which would prevent the assessment from taking place without further contamination issues. It was agreed that as these tests are not critical to resolving the issues on the ward, that the samples would be carried out post-occupation instead.	**Note**
2.12 (6.0)	**Morris & Spottiswood meeting attendance** – DC provided update on the progress to date. IP requested for subsequent meetings that a report against programme and forthcoming works is provided.	**Note**
2.13 (7.0)	**HAI-scribe** – On review, it was confirmed that no further HAI-scribe will be required for the works taking place on the wards.	**Note**
3.0	**Tracker Update** – Refer to appended tracker (Updates in red font).	
4.0	**Morris & Spottiswood Appointment** – Refer to Item 2.12.	**Note**
5.0	**Morris & Spottiswood Programme** – DC advised that M&S are aware of the timescales and the requirement to conclude their scope by 5/12/2018. This is the timescale that is currently being worked to. A detailed programme to be reported against in the meeting 7/11/18..	**DC**
6.0	**Any Other Business**	
6.1	EH queried the status of the order for the HPV clean, noting the requirement for them to be mobilised following completion of the M&S scope of work on 5/12/18. KC noted that they have been advised of the intention to carry out these works and can be mobilised very quickly. Nothing further to add from previous note.	**Note**
6.2	IP advised that the possibility of making modifications to the parent beds in Ward 2A/2B is under review. It was noted that there are issues with keeping the current fold down beds clean from an infection control perspective. There would be a preference from Soft FM Staff to install Z-beds in the rooms, with modified storage space. KC advised that she will seek	**KC/IP**

	advice from the provider as to cleaning operations before any further decision are taken regards the.	
9.0	**DATE OF NEXT MEETING**	
	The next meeting will be held on **Wednesday 7 November 2018** at 10.00 within **QUEH Campus, CMB Meeting Room**	**Note**

NHS Greater Glasgow and Clyde

AECOM

NHS GREATER GLASGOW AND CLYDE
Ward 2A/2B Progress Meeting 04

Date: 7th November 2018 **Time:** 10:00 **Location:** QEUH Campus, Facilities Meeting Rm 5

Present:	Ian Powrie (IP)	-	NHSGG&C
	Teresa Inkster (TI)	-	NHSGG&C (PART)
	Emma Watson	-	Scottish Government (PART)
	Tom Steele (TS)	-	NHSGG&C
	Mary Anne Kane (MAK)	-	NHSGG&C
	Andy Wilson (AW)	-	NHSGG&C
	Karen Connolly (KC)	-	NHSGG&C
	Colin Purdon (CP)	-	NHSGG&C
	John O'Rourke (JO)	-	NHSGG&C
	Ross Miller (RM)	-	Morris & Spottiswood
	Emma Heggarty (EH)	-	AECOM
Apologies:	Jim Cumming (JC)	-	AECOM
	Alan Gallacher (AG)	-	NHSGG&C
Distribution:	Melville MacMilan (MM)	-	NHSGG&C

		Action
1.0	**Introductions & Apologies**	
1.1	Advanced apologies noted from JC. EH noted that he would chair the meeting in his absence.	**Note**
2.0	**Review of previous minute**	
2.1 (2.2)	**Baby feed pipework** – CP advised that the baby feed pipework modifications are now underway and are programmed to be completed at the end of the week (09/11/2018).	**Note**
2.2 (2.3)	**High level dosing works** – IP noted that this has been included in M&S scope and will be carried out at the back end of the programme.	**M&S**
2.3 (2.4)	**Maintenance contract** – IP confirmed that the order to conclude the maintenance contract is in progress by the NHSGG&C Procurement Team and will be concluded in time for the necessary maintenance works to commence.	**Note**
2.4 (2.6)	**Trough sinks** – KC advised that TI was still in discussion with clinicians regarding the proposed removal of the trough sinks. This has been escalated for a final decision at the IMT meeting scheduled on Friday 09/11/2018. It was noted that the window of opportunity to include the removal of these sinks in the current scope is closing which may require them to be left in situ.	**TI**
2.5 (2.7)	**Toilet lids** – IP confirmed that the ward staff are aware of the requirement to produce new signage detailing the use of toilet lids when flushing in the en-suite facilities.	**Note**
2.6 (2.10)	**Positive pressure provision** – Subject to discussion at the wider technical group on Friday 09/11/2018.	**Note**

2.7 (6.2)	**Parent beds** – KC advised that the options for replacing the current parent beds are under review with the manufacturer. These works will not be carried out in parallel with the project scope that is underway and will fit into a wider hospital review.	**Note**
3.0	**Action Tracker Update**	
	Refer to appended Action Tracker for update.	
4.0	**Morris & Spottiswood Programme and Progress Update**	
	RM confirmed that the works are currently progressing in accordance with programme and that M&S are over halfway through the scope identified. No concerns raised regarding the achievability of the completion of the works on 05/12/2018.	**Note**
5.0	**Any Other Business**	
5.1	**Room conversion** – IP noted that a quote has been obtained for the fabric amendments to convert the existing Treatment Room into and Prep Room and the W/C into a Treatment Room, for [redacted]. This quote is not inclusive of the amendments that will be required to the ventilation for these rooms, which will need to be adapted to suit the new room functions. A quote for these works to be obtained.	**IP**
5.2	**Lighting design** – Further to the SCN request to change the lighting in the wards, it was noted that the décor works that are currently ongoing in this space are making the spaces much brighter without the need for a change to the lighting. It was agreed that the improvements the refreshed décor is creating should be considered before any lighting orders are placed.	**Note**
9.0	**DATE OF NEXT MEETING**	
	The next meeting will be held on **Wednesday 11 November 2018** at 12.30 within **QUEH Campus, Facilities Meeting Room 5, Facilities Dept, Labs Building.**	**Note**

NHS Greater Glasgow and Clyde

AECOM

NHS GREATER GLASGOW AND CLYDE

Ward 2A/2B Progress Meeting 05

Date: 14th November 2018 **Time:** 10:00 **Location:** QEUH Campus, Facilities Meeting Rm 5

Present:	Ian Powrie (IP)	-	NHSGG&C
	Teresa Inkster (TI)	-	NHSGG&C
	Tom Steele (TS)	-	NHSGG&C
	Andy Wilson (AW)	-	NHSGG&C
	Karen Connolly (KC)	-	NHSGG&C
	John O'Rourke (JO)	-	NHSGG&C
	David Carmichael (DM)	-	Morris & Spottiswood
	Emma Heggarty (EH)	-	AECOM
Apologies:	Jim Cumming (JC)	-	AECOM
	Colin Purdon (CP)	-	NHSGG&C
Distribution:	Alan Gallacher (AG)	-	NHSGG&C
	Melville MacMilan (MM)	-	NHSGG&C
	Mary Anne Kane (MAK)	-	NHSGG&C

		Action
1.0	**Introductions & Apologies**	
1.1	Advanced apologies noted from JC and CP. EH noted that he would chair the meeting in JC's absence.	**Note**
2.0	**Review of previous minute**	
2.1 (2.2)	**High level dosing works –** IP noted that at present there is no plan to carry out the one off high level dosing, pending the outcome of the continual dosing water sampling. On the basis of the pre-dosing readings it is anticipated that the continual dosing may be enough to bring the readings back into acceptable parameters. IP advised that the system will be fully commissioned by Friday and ready to be put into operation once the system is live again.	**Note**
2.2 (2.4)	**Trough sinks –** TS advised that there was a meeting scheduled with the Chief of Medicine with the recommendation from the Water Technical Group that the trough sinks are removed. This recommendation still differs from the view of the clinical group. It was agreed that the TS would issue an email to Jamie Redfern (General Manager), noting the same recommendation in an effort to progress a decision on this matter. On the basis that the opening of the ward will likely be delayed due to other works required in the ward, it will still be possible to accommodate the removal of the trough sinks prior to re-occupation of the ward, however it is unlikely that it will be possible to include this within M&S current programme for completion on 4/12/18.	**NHSGGC**
2.3 (5.1)	**Room Conversion –** IP advised that in the period since the last meeting, NHSGG&C has obtained a quote from M&S for the required ventilation upgrades to the new prep room and treatment room, which now supplements the quote previously received for the required fabric alterations to these spaces. IP advised that M&S has been formally instructed to include these works in their scope. DC advised that it will be possible to complete the fabric works within the original programme, however due to the lead times for Hepa filters required it will not be possible to install this until early January 2019.	**M&S**

3.0	**Action Tracker Update**	
	Refer to appended Action Tracker for update.	
4.0	**Morris & Spottiswood Programme and Progress Update**	
	DC provided a progress update. A brief synopsis of this update is provided below; • Original scope progressing in line with programme. • Pipework alterations in Ward 2A complete • All IPS panels on site installed, awaiting next delivery on Friday 16/11/18. • Direction on trough sinks required.	**Note**
5.0	**Any Other Business**	
5.1	**Soap/Paper dispensers** – DC queried if the Board would be ordering new dispensers or if the existing are to be retained. IP advised these are to be retained. M&S to re-instate once IPS panels installed.	**Note**
5.2	**Spare IPS panels –** It was requested that 10 no. of the IPS panels removed from the ward, that are in good condition are retained and handed over to NHSGGC for re-use elsewhere.	**Note**
9.0	**DATE OF NEXT MEETING**	
	The next meeting will be held on **Wednesday 21 November 2018** at 12.00 within **QUEH Campus, Facilities Meeting Room 5, Facilities Dept, Labs Building.**	**Note**

NHS Greater Glasgow and Clyde

AECOM

NHS GREATER GLASGOW AND CLYDE

Ward 2A/2B Progress Meeting 06

Date: 21st November 2018 **Time:** 13:00 **Location:** QEUH Campus, Facilities Meeting Rm 5

Present:	Ian Powrie (IP)	-	NHSGG&C
	John O'Rourke (JO)	-	NHSGG&C
	David Carmichael (DM)	-	Morris & Spottiswood
	Jim Cumming (JC)	-	AECOM
		-	
		-	
Apologies:	Colin Purdon (CP)	-	NHSGG&C
	Teresa Inkster (TI)	-	NHSGG&C
	Tom Steele (TS)		NHSGG&C
	Andy Wilson (AW)	-	NHSGG&C
	Karen Connolly (KC)	-	NHSGG&C
Distribution:	Alan Gallacher (AG)	-	NHSGG&C
	Melville MacMilan (MM)	-	NHSGG&C
	Mary Anne Kane (MAK)	-	NHSGG&C

		Action
1.0	**Introductions & Apologies**	
1.1	Advanced apologies noted	**Note**
2.0	**Review of previous minute**	
2.1	**High level dosing works –** DC confirmed that the dozing commenced at 10:00am earlier in the day and had achieved target for the cold water within 2hrs – noted as yet there were no results for the hot water pipes. This will continue until target results achieved.	**Note**
2.2	**Trough sinks –** IP advised that the decision had been confirmed to remove the trough sinks – the work has been completed and the sinks have been set aside for re-use if required. Secondary pipework installed. Worktop shelves to be fitted to new IPS panels to be 300mm deep. Work anticipated to be complete by 7 December on assumption that dozing target levels achieved to allow final fix.	**NHSGGC**
2.3	**Room Conversion –** IP/DC advised that works are on target to be complete by 3 December. There may be an issue with procuring a light switch – JO to advise if a spare is available for use. Sinks are ordered and delivery expected with no delay. Hepa filters are on order, however the installation will be dependent on the wider ventilation strategy being agreed and any resultant variations.	**M&S/ JO**
3.0	**Action Tracker Update**	
	Refer to appended Action Tracker for update.	
4.0	**Morris & Spottiswood Programme and Progress Update**	
	DC provided a progress update. A brief synopsis of this update is provided below; • Original scope progressing in line with programme – subject to dozing targets	**Note**

	being achieved works to complete by 7 December. • Taps cannot be fitted until dozing targets achieved. • Completion/inspection /handover schedule to be agreed. • Direction on trough sinks if required to be re-installed.	
5.0	**Any Other Business**	
5.1	**Special Feeds Unit pipework** – AW advised by email DC – works at flushing stage, disinfection and final connection to be completed on Monday 26 December.	**Note**
5.2	**Nurse call and Biometric entry –** AW advised progress by email – incorporated into tracker – Nurse call complete, awaiting face plates, Biometric entry system – installation complete apart from software which will be installed and configured when ward re-occupied.	**Note**
9.0	**DATE OF NEXT MEETING**	
	The next meeting will be held on **Wednesday 28 November 2018** at 10.00 within **QUEH Campus, Facilities Meeting Room 5, Facilities Dept, Labs Building.**	**Note**

NHS Greater Glasgow and Clyde

AECOM

NHS GREATER GLASGOW AND CLYDE

Ward 2A/2B Progress Meeting 08

Date: 5th December 2018 **Time:** 10:00 **Location:** QEUH Campus, , Facilities Meeting Room 5, Facilities Dept, Labs Building

Present:	Ian Powrie (IP)	-	NHSGG&C
	Colin Purdon (CP)	-	NHSGG&C
	Andy Wilson (AW		NHSGG&C
	Jim Cumming (JC)	-	AECOM
	John O'Rourke (JO)	-	NHSGG&C
	David Carmichael (DM)	-	Morris & Spottiswood(part)
	Teresa Inkster (TI)	-	NHSGG&C (part)
	Tom Steele (TS)		NHSGG&C (part)
		-	
Apologies:	Karen Connolly (KC)	-	NHSGG&C
Distribution:	Alan Gallacher (AG)	-	NHSGG&C
	Melville MacMilan (MM)	-	NHSGG&C
	Mary Anne Kane (MAK)		NHSGG&C
		-	NHSGG&C
		-	
		-	

		Action
1.0	**Introductions & Apologies**	
1.1	Advanced apologies noted	**Note**
2.0	**Review of previous minute**	
2.1	**High level dosing works –** IP advised the first dozing was carried out on 3 Dec with the second being carried out 5 Dec and third planned on 10 Dec -- the full results would be anticipated approx. 10 days later ie 19 Dec – at that point if results satisfactory the taps can be fitted during that week. IP advised that a post installation performance check should be carried out after 16 weeks.	**Note**
2.2	**Trough sinks –** Trough sinks are removed and set aside for re-install if required. IPS panels being installed this week. Secondary pipework installed will require to be disinfected if sinks to be re-instaalled. Worktop shelves and brackets to be fitted to new IPS panels by 7 Dec.	**NHSGGC**
2.3	**Room Conversion –** Works are on target to be complete by 7 December. Spare light switch has been provided to allow lighting to be completed. Builders clean to be carried out by M&S when contract works complete. M&S to re-fit approx. 30 ceiling tiles which are dirty/marked.	**M&S/ JO**
3.0	**Action Tracker Update**	
	Refer to appended Action Tracker for update.	
4.0	**Morris & Spottiswood Programme and Progress Update**	
	M&S to procure drawer/shelf unit as instructed by IP. HEPA vacuum cleaners are being used to ensure all debris removed from behind IPS panels. DC to confirm if wc and shower assembly can be procured and installed this week DC to liaise with CP as to who has quickest option to procure shower assembly.2 nr wc's to be replaced due to damage. DC to confirm pipe lagging complete to Ward 2B.Works complete by 7 December.	**Note DC/CP**

5.0	**Any Other Business**	
5.1	All doors to be re-fitted prior to air permeability tests	**Note**
5.2	**Nurse call and Biometric entry –** AW advised progress by email – incorporated into tracker – Nurse call complete, awaiting face plates, Biometric entry system – installation complete apart from software which will be installed and configured when ward re-occupied and IT equipment reconnected.	**Note**
9.0	**DATE OF NEXT MEETING**	
	The next meeting will be held on **Wednesday 12 December 2018** at 10.00 within **QUEH Campus, Facilities Meeting Room 5, Facilities Dept, Labs Building.**	**Note**

HEALTH AND SPORT COMMITTEE

HEALTH HAZARDS IN THE HEALTHCARE ENVIRONMENT

SUBMISSION FROM [redacted]

What is the scale of health problems acquired from the healthcare environment in Scotland?

What and where are the main risks?

A. Water

The **water supply** can become contaminated due to biofilm formation on plumbing components including pipe work and taps; this is compounded by inadequate maintenance of outlets, drainage issues, failure to adequately commission the water supply and lack of chemical dosing and control measures from the outset.[1-4]

Water coolers in hospitals– these include both mains and stand alone coolers; coolers represent 'dead legs' in a system. They are not regularly cleaned and maintenance is poor. They can serve as a source of contamination to a water system.[5]

Little used outlets – there are too many sinks and showers unused by patients; this leads to inadequate flushing and quickly encourages contamination, chiefly with Legionella and Gram-negative organisms.[6]

Other water sources - dishwashers, need regular cleaning and maintenance and consideration given to inline filters; ice machines also present a risk.[7]

Taps

The design of taps in hospitals has become exceedingly complex and the array of different components is conducive to biofilm formation and retrograde contamination of the water supply.[8] In particular, flow straighteners inserted to direct flow and minimise splash cannot be decontaminated properly and offer a hidden reservoir for biofilm. IPCT involvement in tap selection is crucial, as is regular maintenance, replacement and a cleaning/disinfection regimen. Flow straighteners are associated with Pseudomonas and Stenotrophomonas infections in nearby ventilated patients.[9] The link between tap components and Pseudomonas was known as far back as 1966.[10]

Bathrooms

Bathrooms are a recognised source of mould.[11] Materials need to be water resistant, e.g. gyproc, paint and finishes need to be of sufficient quality to be able to repel repeated moisture, stagnation and erosion. Shower curtains or partitions require constant attention. Daily cleaning and decontamination is required for patient, staff and visitor facilities, with additional spot checks and a monitoring (and feedback) system in place.

Sinks and drains

Sinks and drains need to confirm to a design which minimises the risk of water splash for patients and surrounding environment.[12-14] There is evidence detailing transmission of Gram-negative organisms from these sources during, and after, use by staff, visitors and patients. This is especially likely with biofilm build-up in tap filters and sink traps.

Drains should contain non-corrosive materials which will discourage biofilm formation and should be cleaned regularly. It is not sufficient to irrigate with disinfectants since even the most powerful agents may fail to penetrate mature biofilm. There is also a risk that environmental organisms can develop tolerance to disinfectants on repeated exposure.

Sink hygiene is very important; staff should not decant anything down clinical hand wash basins and en-suite sinks as this similarly encourages biofilm formation. Emptying liquid waste down hand wash sinks is directly related to sluice access and inadequate education. Patient sinks should be kept free from clutter such as cosmetics and beauty products; this is specifically because these impede adequate cleaning.

Water damage/plumbing

There seems to be a general lack of understanding of the significance of water damage in the health care setting. The following have occurred at hospitals in which the authors have worked:

- Recurrent sewage leaks from plumbing in operating theatre and ward areas. This necessitated removal of water damaged mouldy material from the ceiling space above operating theatres.
- Removal and repair of a wall in the critical care unit as a result of a leaking dialysis point with extensive mould affecting the wall. This was in relation to (plumbing) connections not being adequately tightened.
- Removal of similar mould in the outpatient renal dialysis unit for the same reason.
- Poor plumbing design – there is a large drainage pipe with a horizontal bend situated above the first floor of a hospital. This was blocked by paper towels and leakage affected the staff canteen and main entrance, including various food outlets. This represents poor design strategy since high risk pipe work should always be diverted away from public and patient areas.
- A decontamination unit suffered mould on the ceiling void due to ingress of rainwater. Again, pipe work should be placed away from high-risk areas. A stoppage at this unit affected surgical services across the health board and further afield.
- Mould in a cardiac ward due to rainwater ingress from inadequately sealed windows and a flat roof design.

B. Ventilation systems

General comments

Inadequate ventilation systems have been installed in new build hospitals; these are not fit for purpose for the specialist patient groups they are intended for, e.g. bone marrow transplant and haematology wards.[15-17] The systems did not supply sufficient air changes, pressures and HEPA filtration. Staff are not trained to be able to adjust settings in facilities with different air delivery systems.

There is a lack of negative pressure room facilities to reduce the risk of airborne transmission from isolated patients with potential to spread to other patients. This does not just apply to Infectious disease units. All large acute sites should have sufficient negative pressure facilities. A&E departments cannot choose presenting patients and patients cannot choose their infections. This means that every hospital should be able to safely isolate patients with TB, meningococcal meningitis, exotic respiratory infections (e.g. SARS; MERS), etc. The lack of these facilities was immediately apparent when Scotland hosted an unexpected case of viral haemorrhagic fever three years ago.

Likewise, the adoption of positive pressure ventilation rooms (PPVL) room design throughout a number of Scottish hospitals is inadequate to protect isolated immunosuppressed and/or vulnerable patients against airborne contamination from both inside the unit and outside the hospital, e.g. other patients; building and renovation.

Thermal wheel technology

Thermal wheel technology, whilst energy efficient, may lead to mixing of clean and dirty air, undesirable in a healthcare setting, and especially at sites where immunocompromised patients are present.

Chilled beam technology

Chilled beam technology is hailed as energy efficient but the system reduces air changes in patient rooms to <3/hour. This increases the risk from aerosol generating procedures since fewer air changes impede the dilution of microbial contamination. Furthermore, chilled beams drip condensation directly onto patients and beds. They also collect significant levels of dust and are physically difficult to access, making cleaning impossible by domestic staff. Cleaning cannot be undertaken while there is a patient present in the room.[18]

Vents

Air vents, similarly, can be very difficult to clean particularly in ICU settings.[16] These gather dust rapidly and annual cleaning regimens are far from sufficient. Dust quickly builds up within 3 months. Clinical ward staff, domestics and estates need to coordinate services in order to introduce and embed a planned programme of cleaning and maintenance of all air vents, internal and external filters, and air ducts adjacent to clinical and non-clinical areas.

Building work

There is a constant stream of external building and repair work ongoing. This is rarely, if ever, discussed or signed off by infection control staff.[19] External building work and internal repairs can lead to generation of dust and release of fungal spores. This may necessitate re-routing of high-risk patients and administration of antifungal prophylaxis.

C. Cleaning

Current cleaning in one hospital conforms to a dynamic risk assessment for the first 3 days of a patient stay, i.e. if room appears visually clean, then cleaning is not carried out on that day. This is completely unacceptable. Visual monitoring cannot accurately gauge microbial dirt including pathogens.[20] Virtually all hospitals in the Western hemisphere, and further afield, clean patient rooms or bed spaces at least once per day.[21,22] Following recent clusters of environmentally associated HAIs it was decided to clean 'high risk' areas daily. However, once daily cleaning of frequently touched bedside sites should be done every day for **all** patients, not just those who are particularly vulnerable or where there have been infection incidents.

The current microfibre mop system for the same hospital appears to be ineffective since floors remain dirty; the mops lift the dust but then re-disperse it elsewhere.[23] The results from environmental sampling suggests that domestics have not been adequately trained in how to use mops or wipes, specifically, the 'one wipe; one site; one direction' system or frequency of use and/or management of cleaning fluids and disinfectants, as laid down by HPS decontamination guidelines.[24]

Hospitals require adequate domestic resources.[21] Cutting or failing to maintain the domestic work force increases the risk of HAI for patients, staff and visitors. It is also a highly contentious issue for patients and their visitors who will quickly comment on untidy and/or dirty healthcare wards.[25] High-risk units require extra cleaning hours and it is important that domestics work closely with ward staff and are included as part of the team. Moving domestic personnel around destroys ownership and erodes motivation.[20]

Plant rooms

Plant rooms at one hospital have become infested with pigeons and cockroaches. These areas accommodate the water and ventilation systems that serve the entire hospital and ultimately reach all patients, staff and visitors. They may not be deemed 'clinical' areas or 'high-risk' but they should still be kept clean and free from vermin, insects, etc. [25] No one seems to have been designated responsible for cleaning and/or monitoring these areas.

Pest control

Bird control is very important particularly where there are bone marrow transplant and other seriously immunocompromised patients. European haematology guidance recommends no birds should be nesting close to these units. The risks from pigeons and their droppings were documented over 50 years ago and there exist known strategies to protect buildings from roosting birds.[25]

Outcome of stated risks

Specific incidents associated with environmental deficiencies are listed beneath. This list is not exhaustive, and other examples can be given;

1) Occurrence of a large outbreak of *Serratia marcesens* (environmental Gram-negative bacillus) in the neonatal intensive care unit in part related to inadequate cleaning of the environment. Eventually the outbreak terminated following the use of hydrogen peroxide vapour;
2) A large and significant water incident resulting in paediatric patients developing Gram-negative bacteraemias. The contaminated water system likely relates to a combination of contaminated outlets and pipework, problems at the time of commissioning and lack of ongoing maintenance;
3) A significant incident with paediatric patients developing bacteraemias linked to drains and backflow into sinks;
4) Increased incidence of a fungus (Exophiala dermatidis) as a result of contaminated dishwashers and mould in showers;
5) Mucoraceous mould in intensive care patients, likely to be related to a leaking dialysis point;
6) Two cases of hospital acquired Cryptococcus relating to a pigeon infestation; this is undergoing investigation;
7) Colonisation of intensive care patients with the fungus Aspergillus and a source of water damage and mould traced to the ceiling void. The intensive care unit had to be closed for a number of weeks to facilitate safe removal and repair;
8) Colonisation of surgical patients with Aspergillus due to nearby construction work where there had been failure to implement HAI scribe and appropriate infection control measures;
9) Outbreak of Vancomycin resistant enterococci (VRE) in a renal unit related to unit design, patient flow and environmental contamination. Rates of VRE acquisition fell following a move to a new unit with single rooms;
10) Widespread contamination of a water system with Legionella pneumophila due to inadequate flushing of a ward that had been vacated and was unoccupied. This required installation of a chlorine dioxide system to provide control.

Are the current systems and processes in Scotland adequate for monitoring, reporting, eliminating or controlling these hazards?

Current systems and processes in Scotland are inadequate for managing environmental hazards; this is essentially because infection control personnel are either sidelined during design planning or advice is circumvented due to ignorance, time and resource implications. The basis of all healthcare environmental new builds should incorporate advice and comments from experienced infection prevention staff.

It is vital that infection control teams are involved from the outset at the time of planning with the architects and design team. A lot of these issues detailed above could have been ameliorated if appropriate staff had been involved at the very beginning.

It appears that the design brief for a new hospital is ‘innovation’. The design brief for another is ‘energy efficiency’. Quite simply, the design brief for any hospital needs to be ‘patient safety’ whether or not there is an ornamental pond or multiple restaurants.

For environmental incidents often patients are the ‘samplers’ and staff react to patient infections. There are robust infection control surveillance systems which will detect infections and alert organisms. The reporting structure is via the HIIAT process (as per the HPS national manual) to Health Protection Scotland (HPS) and the Scottish Government (SG) via submission of a HIIORT report.

This monitoring is designed for microbiologists and infection control teams, not estates personnel. Environmental incidents tend to be related to the estate/facility and control measures usually involve these aspects. Whilst there are clear reporting and governance structures for infection control teams, there is a paucity of governance for estates and facilities departments. There is a need to ensure all appropriate actions have been undertaken, in a timely fashion and that assurances and resources for continued maintenance are given for future prevention.

Infection prevention is a thankless task. It only becomes important once an outbreak or infection incident has hit the headlines. It is also difficult to cost because you cannot cost an outbreak or infection incident that does not happen.

Conclusion

Urgent action is required to ameliorate inadequate planning and design of the infrastructure of a hospital. Basic functions such as plumbing, ventilation and cleaning are fundamental for the safe and efficient working of all healthcare environments. There is plenty of evidence and guidance for appropriate installation, maintenance, decontamination and monitoring of all of these, so there is concern that recent new builds appear to have defaulted on vital systems. Indeed, it is likely that there are many hospitals in Scotland with these issues. The environment – air, water and surfaces- is a huge repository for potential pathogens, and with increasing concern over pan-resistance, this threat cannot be easily dismissed. The solutions lie with estates and domestic service managers in setting out a structural framework for checking, maintaining, monitoring, providing feedback and engaging with infection control. Close working between estates and infection control is imperative and the concept of prevention has to be embedded in routine protocol.

There is a danger that healthcare bosses introduce expensive novel cleaning technologies such as automated hydrogen peroxide and ultraviolet light robots. Such systems are seen to be particularly useful for high-risk units and resistant organisms such as carbapenemase-producing enterobacteriaceae (CPE) and other resistant Gram negatives such as *Acinetobacter* spp..These organisms, along with *Clostridium difficile* and vancomycin-resistant enterococci (VRE) are known to survive well in the environment.[21,26] However, sufficient, adequately trained and monitored domestic staff can be just as effective using detergent wipes and bleach for targeted sites at the correct frequencies. Why should costly automated devices be introduced to ‘sterilise’ surfaces at risk of immediate recontamination from underlying problems with cleaning, ventilation and water outlets? Should we not try to sort out basic systems first, and then model the cleaning to clinical areas? It is not cost–effective to paper over the cracks in basic infrastructural deficiencies by use of powerful decontamination technologies. It is like pouring expensive disinfectant down a toilet without

cleaning it first. These agents affect the environment in ways that we are only just beginning to understand.[27]

While management of water and air require urgent attention, cleaning remains the 'Cinderella' of infection control. As Florence Nightingale once said, 'Wet dirt is dangerous'; how right she was.[28]

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Notes from meeting on 9/10/19

Chair: Robert Gardiner (RG): General Manager Diagnostics
Christine Peters
Kam Khalsa
Alison Balfour
Teresa Inkster
Nitish Khanna
Pepi Valyraki
[redacted]
Bernadette Findlay
Alistair Leonard

RG: RGr unable to attend. 3 main issues from last meeting
- Cultural & historic issues: D/w Scott Davidson and these should be included in the external investigation

CP: Which investigation
RG: Not sure
AL: Not sure
CP: There is an investigation into IMTS led by HR – this one?
TI: This is a separate process
RG: I will seek clarification as to what investigation this will be included under
- Second issue is that a PPP will be circulated for comment

AL: Also discussion re HAI scribes and that ICNs will complete Level 1 + 2 (simpler ones)

RG: We need to discuss IC cover for the everyday pt
TI: Culture is big problem – still not clear what investigation is going to look at this
RG: Cant answer that
CP: Major issues also include documentation of advice and minute taken, as well as handover. How are these being tackled? This is all part of Good Md Practice
RG: How does handover currently happen
CP: Email from ICT every Friday
BF: Now no ICD, who does this?
AL: Lead ICD would normally coordinate
CP: I was on weekend and didn't get a handover from ICD re problems
AL: Easy to do
CP: Need a basic colleague-colleague handover by email. Send to all cons at south as only 8 of us

RG: What minutes are inaccurate? Need examples
AB: Clin advice given OOH misinterpreted and could impact on pt safety.
CP: Water group: No ICD/MM but JH name in minutes! Will send a list

CP: Day to day work ongoing – update by AB
AB: Current workload even outwith the Built Env stuff is huge – currently investigating increase in cranial SSIs, with IMTs. Have 3 pseudomonas from appendicectomy patients that needs looked at. Gent + Cip r E.coli in Paeds needs investigating.
CP: Dow e all feel we could deal with that?
PW: As long as documentation is accurate/straightforward and info given is accurate. Roles/Resp also need to be sorted
AB: Normal day to day stuff is ok, it is the top level issues that are problems

PW: OOH calls on PP still huge problem. 6A is really dynamic situation. Going from 1 crisis to another – everything is in flux.

TI: Problme is cant formally sign off on rooms etc as info was being withheld. Need confidence that policy is workable now

RG: Why no policy up till now?

PW: Not unwilling to help write policy/comment on policy but we have not had the correct accurate information to comment

RG: What info do you need
TI: Need full report of investigations – 2 parts of the HSE report need to be made visible
RG: This is what the PPP will tackle

KK: What do we do in meantime
AL: Give most appropriate plan given current BE

CP: Most npenic patients in hosp currently on 6A, agreed by IPCT. I cant put my name to that
AL: I have had a cons-cons conversation regarding holistic care and the treating cons has placed pt where they see fit
CP: Because there are no other options – discussion needed around nursing etc. Acting like 6A is a normal ward – it is not. Patients highly i/suppressed. I give this view regarding placement, and I will get called OOH to make a decision – what is the point?
I then email on Monday with my concerns and am told that I made the call over weekend to keep pt on ward!

AL: would you be comfortable saying I don't know when question regarding PP? What is next practical step?

CP: Deafening non response – There are PPVL rooms on 4B but they are currently prioritised for chemo pts, but they are often very i/suppressed after their chemo. There are other PPVL rooms in hosp. 6A is not even same standard as DGH isolation room.

AL: Cant you say move pt to PPVL room
CP: IC say no. That's why you need systematic change

AL: You can give advice but their may be organisation reasons which affects what happens. But you can give advice

CP: I have given advice but what is the point when it is ignored

PW: Prob is that not all PPVL rooms are same – I wouldn't know what PPVL rooms were actually PPVL rooms

TI: 3 different room modifications
- ICU: No ensuite which is wrong
- RHC non ICU: Some HEPA, some non-HEPA
- Npenic rooms and BMT rooms

We know where they are but no reliable info about ventilation

RG: If you provide advice, and its documented, surely you have then discharged your responisibility?

PW: But the problem self perpetuates
TI: there is clinical risk in splitting haem onc patients around hospital – Haem onc wont take advice due to this risk
AB: If you have a working PPP you don't need to call MM

CP: But genuine intent in giving advice is to reduce risk. What is point if I cant do that. My ultimate responsiblity is to patient. Need a way to expedite the PPP

PW: Who do we need to speak to to get this info?
CP: Not anyone here. Whoever takes this forward needs to deal with underlying problems

RG: BE issues dealt with separately
PW: CP and TI have done huge amount of work on this – you need their input

RG: We're here to talk about day to day IC work and how to provide service and timely advice for all patients

CP: PV/AB currently ICDs but have asked for urgent JP review as want to give up
Currently they are rota'd in for IC as per JP
Everyone else here has a full JP

RG: Look at TSP?

CP: When I, BJ, AL and MM looked at service provision, we looked at figures & need 11 more consultants

AL: TSP never got fair run. Premise that there are core elements to every job. So IC would be core and then you would have specialist areas. Scottish Gov edict.

CP: How does that help us
AL: Weve missed the JP cycle so need urgent 19-20 JP meeting

CP: So looking at my JP…
AL: Not getting into specifics here
CP: So Joe blogs – CMM: does IC go into his JP?

BF: How about, if your on clinical duty, then you cover IC

NK: We tried this and it was a disaster
AL: JP need sorted
RG: So routine stuff does exist?

AB: It does exist – theres lots of it, and more here vs North. Is there any aspect of ICD work that can go elsewhere? Eg: Environmental results. It is very time consuming. Can that be taken on by someone else to make routine ICD work more routine?

TI: There is no appreciation of workload. To do properly you need to be visible, out and about at meetings, on wards, in vents, not sitting in duty room. IC cant be patched up with duty CM. Good IC is about relationships.

AL: 2 elements
- BEnv and service delivery
- How do we get broad brush exposure for CM to each

TI: Some pple hate it and others love it. Need a Lead and 2 perm ICDs, and then a 3rd slot that rotates

AL: Need resilience, eg: Holiday weekend that [redacted] was on where you shut Schiehallion.
I d/w BJ – I would not have managed – if you don't do it, you de-skill.
2nd question – in that model, are there enough sessions?

TI: Don't know re sessions. Re that weekend, huge cultural problem. [redacted] left unsupported by IC management. I was picking up email from North of Scotland trying to help

[redacted]: Email evidence that IC management were aware, but did not support. Huge cultural issues

CP: whats stopping people doing IC?
PV: If supportive environment, would make job more appealing

[redacted]: Good to discuss IC issues across GGC. Only got throught hat weekend as PR came in to backfill clinical

CP: We all help each other
ABL TI has been extremely supportive. IC has lost its best resource. They really need to re-engage

RG: What does support env look like
PW: Don't want animosity around table – how do you get round that
Need to deal with that before being able to provide cover
Need Lead ICD at top
Will really struggle with changes in training to get ICDs
We cant effect change at our level

TI: Problem is organisation cant deal with bad news. I was continually undermined

KK: New cons put off due to cultural aspects of IC
PW: And that is coming from Kam who has masters in IC

CP: We are at risk of missing things. Could say Ive d/charged my duty but can your team of ICNs pick up problems?
AL: not my team of ICNs
CP: Will they know what to do with CPEs? Ongoing problem with Enterobacter – would they have picked this up?

RG: What is problem with meetings
TI: Managers ask clinicians to attend pre-meeting. its a stitch up as there is an obvious agenda. Often clinicians then excluded when it suits managers – why?

RG: Part of larger problem. Cant do this alone, need to stand together. But, we have agreed that ICNs on ground are good – who is problem?

TI: IC management. Will never change
RG: With collective approach, it can
TI: But you are still having to work with same people. Senior ICNs continually shutting down issues

RG: We can deal with that through meetings
TI: We are so far behind other places where it is now accepted that each HAI is preventable

AL: So you mentioned that you tried to change culture – did this work and can we get it back on track?

TI: Tried for long time but bottom line for them is that if not in IC manual, then not a problem. Cant move things forward. Cant shift these people

BF: 1st time we have sat down and talked at length about IC.

TI: Scenario: Weird GN infections. Assoc ND: This is gut translocation. That is wrong – how do we change that. I'm called a lone voice. How do you deal with that

RG: Through constant communication. Need 1 voice moving forward. Talk to 1 person at a time face to face.

CP: Person at top is the issue as well – JA

RG: there is a direct clinical line to JA via SD
CP: Wont work
RG: Why
CP: no other organisation works like this
RG: No other board as big as GGC
CP: We need direct access as per recommendations
RG: Worked with SD and he will escalate

BF: Things didn't work when you went direct to JA anyway?

TI: It did work initially until Sandra Devine was in ear of JA
Whole structure is wrong
Eg: Martin Connor at D&G has direct line to chief exec – why? To bypass middle management. DipCs in England have helped with exactly this problem
GGC are putting in layer upon layer of beaurocracy

RG: It wont work like that. Medics will go through medics

BF: If proposal to move IC into diagnostics is approved. Sandra and team will sit within us so we will have direct oversight

RG: What are take aways
AL: I've d/w North/AB/PV: Agreed to have an ICD meeting for support/knowledge exchange. I'll kick that off. Can utilise TC in QEUH/GRI.

AB: Bringing meeting back is good – like old ICD meeting. But nature of ICD work is needing to act in here and now. Is this for all MM or ICDs only?
AL: Will see

NK: Can I bring up issue of confidentiality. It transpires that details of this meeting have been discussed with MM trainees, and QE consultants were not referred to in a favourable way. Can we confirm that these meetings are confidential and any beach of this will be dealt with harshly.

TI: It was a discussion with one of our senior trainees who is working at QE currently, putting that trainee in a very difficult position. I will discuss with RG after meeting

RG: Thanks. I want to hear more details. Next meeting week after next

Comments on Independent review report from Drs Inkster/Peters, 07/07/20

Chapter 2

2.3.20. The guidance series specifies the type of standard tap for a hospital; at the time of the QEUH design phase this was a clear recommendation and the contractor followed the specification. However, in 2012 during the build phase, an outbreak report from Northern Ireland (1) about microbiological contamination of the flow straighteners at the tap nozzle necessitated a replacement programme. This was an example of evidence-informed change, with substantial cost implication but a direct benefit to infection control risk, guarding against water contamination and future risk to patients that may have been susceptible to infection.

Comment; No taps or flow straighteners were replaced. Advice from HPS recommended either tap removal or flow straightener removal in high risk areas. An alternative option was to retain taps and commence a water testing programme. This latter option did not happen until the lead ICD requested such in 2016.

Chapter 3

3.6.7 Touring the vicinity and including the waste collection and recycling facilities showed maintenance at a reasonable standard, and with no substantial accumulations of birds, specifically pigeons and also seagulls. These visits were admittedly single points in time and do not give assurances about week-to-week appearances and stewardship of facilities over long periods of time. In our regular visits to the hospital we did not detect substantial accumulations of pigeons or other birds that are known scavengers at other times, posing potential hazards in terms of infection.

Comment; Important to note that these visits took place **after** the Cryptococcal incident and after the recommended 80% reduction in onsite pigeons by pest control and subsequent work to achieve this. Did the review team see the pictures of pigeon guano from plant rooms, in courtyards and on window sills taken at the time of the patient cases? If so, what was the assessment of this? Did the review team have access to pest control call out logs from 2018? Did the review see photos of dead pigeons in the plant room which were withheld from the IMT?

Chapter 8

8.3.7. The Public Inquiry covered a range of matters relevant to the hospital and outbreak. The greater part of the report was given over to IP&C matters. Several of the key individuals who had close involvement with the outbreak and subsequent investigation have taken

leading positions in implementing the lessons of the Inquiry. This time period coincided with the build, commissioning and early operation of the QEUH.

Comment; Those that implemented the lessons from the VOL enquiry were still in position at the time of maintenance and the events in 2019 under current scrutiny .

8.3.9. The Vale of Leven Hospital Inquiry report commented positively on measures that NHS GG&C had taken to address lessons of the outbreak in advance of publication of the report. Nonetheless there were themes within the report that merit our attention and which are discussed later in this chapter. These include variable approaches across the NHS GG&C Board area and the persistence of behaviour that hampered effective team performance in the practice of IP&C.

Comment: Re persistence of behaviour - it is unclear that this cannot refer to the referenced whistleblowers who are singled out later in the report for criticism but crucially - we (current writers) were not involved at all in the Vale of Leven events. Others in the IPCT were.

A key recommendation from VOL was the role of the ICD being better defined nationally, this has not been undertaken to date.

8.6.3. Activities are listed as a table of information in the October 2014 paper mentioned previously – it includes advice on single room design, ward layout including the exceptional areas where it was open plan – critical care and renal dialysis. Advice on sink positions and adjacent facilities within rooms and within ward areas and specific clinical departments were all part of the role. There was specific medical input into the number of isolation rooms (March 2010), single room provision for critical care (July 2010); later when the decision to incorporate the Infectious Diseases (ID) service into the adult hospital was made, there was medical IP&C input into arrangements for infectious disease patients (September 2014).

Comment; by this stage (September 2014) the hospital had already been built and was approaching hand over stage. This is not made clear and is an essential fact in assessing why the final placement fell so far short of standards

8.7.5. Other colleagues who had interests in infection control and the built environment may have been sensitised to the issue by the Watt Group Report and the events that were taking place relating to the Vale of Leven Hospital and its fitness for purpose in providing acute healthcare.

Comment; this is conjecture with use of the word sensitised implying an over sensitivity rather than being alert to and informed regarding the risks based on experience. Can you provide evidence that staff were sensitized?

8.9.3. The Board's Deputy Medical Director embarked on a process, in collaboration with Human Resources advisers, to explore these concerns, and produced a report. The process did not apparently involve the lead ICD although aspects of the problem concerned him.

Comment; this did not occur until 2015 after the opening of the building, at which time the Deputy Medical director had received a letter from Drs Inkster and Peters stipulating all the

building concerns as well as Neurosurgery and other issues. The key point we made was the failure of the IPCT to deal with these issues in a manner in keeping with best practice. This is not clear in the report and is a serious omission in the timeline

8.9.6. There was a single initiative by the lead ICD to test water quality, over and above the assurances that the Board expected to receive from the contractor.100 Following that limited intervention, when a sample of water outlets were tested, there was a very brief communication stating that any water quality failures were remedied, and affirmed on repeat testing.

Comment; there is no mention of extensive water testing done by an outside company which reported hugely deviant TVCs - was this company approached to provide full results from that time? This is important as some TVCs were in the thousands and chemical dosing was being undertaken as a result. Did the review have access to chemical disinfection records?

8.9.9. As we discuss in Chapter 7, there was a water risk assessment report about water systems' compliance with Legionella prevention requirements in the months before the hospital opened, but it was not available to ICDs.102 The lead ICD regarded it as a matter for the Estates staff to address, although he had contributed to it.

Comment: this is not only witness statement (102); email evidence was submitted asking for the results to a number of people including the Board Water Chair and the Lead ICD and Project team. This is crucial in understanding what happened and the lack of information sharing a common and recurrent theme.

8.9.10.A second issue arose; there were particle readings indicating that the isolation rooms intended for –indeed already occupied by –adult haemato-oncology patients and including potential BMT patients on Ward 4B were unsatisfactory and showed evidence of potential risk for future patient infection by the airborne route.

Comment; Particle counts were 10-20 x acceptable levels in some rooms, this represents actual rather than potential risk to this vulnerable patient group.

There were many issues and in particular there is no reference to the issues within paediatric BMT despite evidence submitted by Dr Inkster. High particle counts, identification of pathogenic fungi on air sampling (Aspergillus and Mucor), holes in bedroom ceilings (with children occupying the ward and about to undergo BMT) and issues with specification and validation were evident in 2015. This was a hugely problematic situation as unlike adults there was no-where to move the patients to, which meant that subsequent upgrade of BMT rooms took place with patients in the unit. This is a **significant omission**. At the time there was a lack of contingency for paediatric haeamto-oncology patient and this remains the case with the 2A decant having to be to an adult ward not designed for this patient group.

8.9.11. This finding prompted the urgent transfer of the patients to the Beatson West of Scotland Cancer Centre, Gartnavel Hospital, where non-transplant patients remained for several weeks, and transplant patients remained for over two years before returning.

Comment; 'Whilst this statement is accurate there is a big part of the story missing. There was an attempt to move patients back to QEUH later in 2015 by senior management. Dr Inkster who was the sector ICD was tasked with leading on this by the lead ICD with no senior IPC support at meetings, with a transfer date already agreed and again no

information re specification and validation available to her i.e. exactly the same position as earlier in 2015. She immediately requested the help of HPS who agreed with her that the unit did still not meet the appropriate standards for BMT. This is important due to comments in the review suggesting ICDs do not seek expert opinion. There was further disregard of microbiology advice which on this occasion also included the microbiologist who had designed the Beatson.

8.10.1. The dysfunctions in the newly integrated microbiology team, highlighted above, persisted. The process of investigating the causes of friction between microbiologists prior to the hospital's opening proceeded to an investigation and a report; in response, management initiated further consultation and an organisational development process.

Comment; Importantly this only took place after Drs T Inkster and C Peters wrote a letter to the Associate Medical Director, Dr David Stewart, in 2015 expressing their concerns regarding the lack of infection control involvement in the new build project, ventilation issues within the hospital, and the management of incidents and outbreaks. Of note, although a report was produced this was not shared with the Drs raising concerns. Whilst an organisational development process took place this did not include microbiologists who raised concerns and pertained only to the infection control team. Also, this was not a continuation of previous actions, completely separate and again it is not clear that this focused on the Lead ICD's actions in relation to the new build. This impression given is that the issues were purely personal. This is inaccurate.

8.10.3. The senior laboratory consultant and manager sought to improve the professional atmosphere, engaged with the ICDs who had wished to resign their responsibilities, appointed a successor as lead ICD, and relinquished her duties of leadership back to the new lead.108 There was an expectation that matters would improve. They did, temporarily, but not in the longer run.

Comment: this was not about professional atmosphere, it was about information being withheld, and undermining of the local ICD role and inability to achieve what was needed for patients. This is again highly inaccurate account of the issues raised, in writing, regarding the patient safety issues.

8.10.4. The ICDs who remained in post still did not have confidence in the flow of environmental monitoring and air ventilation system performance information they were receiving about specific parts of the building, and continued to lack trust in the ability of management to address their concerns

Comment; was this a fair assessment by those Microbiologists in the light of what is now know?

8.11.14. The Review considers that quality of infection control advice relating to vital systems and standards, specifically with respect to both the water and air ventilation systems, was not sufficient to underline the importance of quality design and high standards of building practice. The available advice did not reconcile conflicts or uncertainties in guidance, areas for interpretation and missing guidance in the case of isolation rooms. The

advice did not address effectively the implications of alterations to the plans with respect to Bone Marrow Transplant unit and Infectious Disease clinical services.

Comment; what about in relation to water? Theatre? ICU? Endoscopy suites? Respiratory decontamination? CF units? Cardiac catheterization? Pentamidine room? There were many other issues other than adult BMT and Infectious diseases.

8.11.15. ICDs' relationships with the group of microbiologists in South Glasgow were under strain prior to the opening of the hospital.[114][115]Those with new responsibilities for the hospital as it opened reported a lack of information on which they could make, or seek explanations for, decisions. There was alleged withholding of reports containing information, which gave rise to further mistrust and a perceived lack of responsiveness of those in management positions to concerns and issues expressed by ICDs.[116]

Comment; There was actual withholding of reports, not 'alleged'. Emails were sent by ICDs requesting water tests results, risk assessments for Legionella (importantly the 2015 risk assessment from DMA reports emerged in 2018) and reports pertaining to validation of ventilation systems. These were not shared. This pattern continued with DMA risk assessments not being shared during the 2018 water IMTs, and new, unseen photos relating to pigeons in the plant room and pest control reports that have only emerged in recent months. Withholding of information from ICDs is a recurring theme and one that puts patients at risk

8.11.16. The scope of the ICD's role was contested by the newly arrived doctors who took up responsibilities from the point of patients first arriving in the hospital. These doctors did not accept assurances that their predecessor on the project had agreed, they lacked the management information they needed to inform their IP&C decisions and advice. Mistrust grew.

Comment – What is the reviews opinion of the scope of the lead ICDs role given the document SHFN 30? . There is no recognition that both these newly arrived doctors were not new to infection control, had experience in the built environment/refurbishment and were fully cognisant with the standards. Were they correct to except more information - especially in the light of the water being contaminated and the rooms and ventilation being so far off the mark? Mistrust grew? No; evidence mounted that there was real risk to patients.

8.12.1. This section describes the events relating to IP&C and the many responses of Incident Management Teams (IMTs) to address infection primarily amongst children in the haemato-oncology service that contributed to prevention, control and management of future infection. It covers the period of time after the opening of the new hospitals, in the 'Maintenance' phase within the Review's remit.

Comment - neither of us were informed that this was the remit of the review and did not submit evidence specific to the assessment of IMTs - infact one of us was specifically advised this was not required. It is deeply unfortunate therefore to find a full chapter on this

issue. Of more relevant to the remit would be the evidence (or lack of) of tap maintenance, shower maintenance, chilled beams, AHU maintenance, lack of yearly validation of theatres and specialist ventilation.

8.14.4.Whilst the early occupation of the hospitals in 2015 accompanied concerns about the state of the buildings, abnormal particle counts giving rise to concerns about the operation of air ventilation systems, missing information particularly about water quality and management, and infection risk, there were no reports in the first months that gave rise to possibilities that actual infection had resulted, shown by routine HAI monitoring and key performance indicators

Comment: It was more than particle counts with respect to ventilation systems. There was no information on specifications, commissioning or validation available for any specialist ventilated area in the hospital. This includes theatres, endoscopy and all intensive care units. Routine HAI monitoring and KPI were not in themselves sufficient at the time to detect organisms related to the build environment. CDI, MRSA, SAB rates are not pertinent and give false assurances. Subsequently environmental Gram negatives were added to the alert organism list to the national IPC manual on the recommendation of the lead ICD. The report mentions learning from incidents and it is important to acknowledge there are examples of learning from the QEUH being shared and being implemented at a national level between 2016-2019 as issues arose.

8.14.5. Several infections matter and the first outbreaks of infection during the period, on the wider hospital site, took place in buildings of the 'retained estate' – in the Neonatal Intensive Care Unit and the Neurological Sciences building. This gives rise to the second general point – the role of IP&C in QEUH/RHC was not solely confined to the new hospital, haemato-oncology patients and the events we describe here.

Comment; This was specifically beyond the remit of the review but one of us highlighted that the same IPCT management issues we experienced regarding the new build were also experienced in relation to the retained sites but were not required to give further evidence as this was not in the remit.

8.14.6. Neither were unusual infections occurring solely in QEUH; other hospitals in the NHS GG&C area were isolating unusual organisms, often of a similar nature to those reported in QEUH. The general profile of infection control in terms of recorded incidence of key infections and outbreaks in the 'New Build' hospital complex was as good as, or better than other comparable data, both in other hospitals and compared with the hospitals that QEUH/RHC replaced and also when compared with other hospitals across Scotland.

Comment; What have the review used as the definition of 'unusual organisms'? Stenotrophomonas, Cryptococcus etc. are not 'unusual' to the microbiologist. Furthermore, we are not aware of 'unusual' organisms being isolated elsewhere other than the occasional sporadic case.

As a brand-new hospital, we would expect the incidence and outbreaks to be better than any other hospital and certainly not comparable to the old hospitals that it had replaced. Ward 2A was a red flag at Scottish government level due to the unusually high number of incidents reported. This led to a situational assessment from HPS in 2018 which has been omitted

from the report (despite being submitted) but suggested these incidents were likely due to the abnormal ventilation strategy and not poor infection control practice.

8.14.7. The final aspect of background is the nature of the patient population that forms the focus of the infection clusters whose management we will proceed to review. Predominantly the patients who suffered from these infections were patients who would be susceptible to infection, including unusual infection – patients with hematological ('blood') cancers like leukaemia and lymphoma; in one or two cases, the patients had several concurrent conditions that weakened their immune system, although not a haematological cancer per se.

Comment; this is true and is WHY there is a need for specialist ventilation and water standards. It is not an appropriate excuse for infection rates that are amenable to prevention. This is not made clear and is concerning as it echoes many arguments in the past regarding HAIS being inevitable, which undermines efforts to prevent them

8.15.1. The aim of IP&C in this context is the initiation, establishment and use by the IP&C Team of the IMT to mount a consistently effective response to incidents, appropriate to the level of the incident, involving the correct disciplines and suitable levels of internal and external support.

Comment; No, the aim of IPCT is to ensure standards are met with regard to prevention, to have an alert team to new incidents, good clinical understanding of the unique aspects of care and the ability to rapidly resolve and implement novel measures to protect the patent from harm

8.15.3 Alternative chairing arrangement when the position of the chair as both leader and main investigator of a protracted and complex incident mandates this change.

Comment; The guidance pertains to public health outbreaks but states that in the hospital setting the ICD will chair the IMT **and** lead the investigation and management. Note the lead ICD has an MPH. Due to the nature of hospital outbreaks and specialist microbiology knowledge required the ICD is always the main investigator and the person most qualified to do so. The complex and prolonged water incident of 2018 was chaired by the ICD who also led on the investigation and management During the 2018 incident the lead ICD made repeated requests to the ICM for an operational group to be chaired by RHC management, running alongside the IMT as she found herself having to lead on comms and operational/contingency issues in addition to investigation and implementation of infection control measures. The 2019 incident became protracted due to continued challenge from management to the fact that there was a problem.

8.16.10. Although there was significant disruption to cancer treatment regimens and additional antibiotic treatment to clear infection, no deaths resulted from these infections.

Comment: Whilst the review concludes there were no deaths related to the 2018 water incident there was significant harm to patients and this is not discussed. It was a distressing

time for many patients and families, with patients requiring line removals in an operating theatre, antibiotics /antifungals, side effects and interaction of such and in some cases treatment delays. The case note review is yet to commence and will determine whether there were any deaths.

8.16.11. Fundamental works took place in December 2018 to insert a chlorine dioxide plant, sensors and dosing stations in the water system supplying the RHC; in March 2019, the system was installed by NHS GG&C for the whole QEUH complex. 124 125 Work continues on systems in Wards 2A & 2B of RHC, which remain closed at the time of writing.

Comment; it is not stated when this system was put in place for the adult building - this is important reading the 6A outbreaks. Of importance what work on environmental risks was undertaken on 6A where the paediatric haemato-oncology patients are now placed?

8.16.17. In 2019, and following the announcement of the Review, a series of gram-negative bacteraemia's were the focus of a prolonged IMT, starting in the spring until the autumn. 15 patients were affected.[127]At first, our Review team did not envisage that the episodes that were taking place as the Review set off would be part of our remit. Nonetheless the events are material to the Review as they formed a backdrop to the atmosphere in which interviews took place with witnesses. This set of IMT meetings –prolonged in individual duration in many instances and also over many weeks –were marked by sustained and unresolved conflict about the likely hypothesis that explained the infection cluster.

Comment; The lead ICD contacted the review in January 2020 when she noted in a parent letter that NHSGGC had made reference to the independent review investigating IMT processes. She emailed to the review to suggest a follow-up interview regarding the IMT processes and was told that the review had not looked at the IMT. Another subsequent email from the review stated that the '*there was no intention to devote specific attention to this aspect'* Dr Inkster's follow-up interview scheduled for April 2020 was cancelled by the review team. As Chair of the IMT she did not get the opportunity to fully discuss or submit evidence in relation to this topic. We are surprised therefore to read sections on IMT process in the report. The fact that cases continued to occur could infact be seen as a failure of the review process to rapidly assess the risks in the build and to insist on measures to mitigate those risks. It is therefore odd for the attention to be dictated into a dissection of the IMT process, rather than focusing on the remit which was actually to ascertain the risks to patients, the environmental source hypothesis unites all these water type incidents and this is not clearly brought out.

8.16.18 In the late summer, the chair was replaced by a senior public health consultant. The IMT was stood down in the following month.

Comment; The chair of the IMT was replaced in August. The IMT was not concluded until early November. This statement is inaccurate.

8.16.20 Did not dispute whether the sources were environmental but questioned the probability of a single source.

Comment: At no point did the chair of the IMT/lead ICD consider one single source. A range of environmental control measures and sources were investigated. Chilled beams became a focus of attention due to the fact they were dripping water. It was a high priority to deal with these as water dripping on to immunosuppressed children and their hospital beds is most undesirable and constitutes a risk. Through detailed investigation the IMT introduced additional cleaning of beams, chemical dosing of the circulating water system and alteration of dew point. Whilst the review mentions the chilled beam technology earlier in the report, they do not tie this in with these important subsequent findings and control measures.

Similarly, events came to light of water ingress into the ward kitchen, another potential source. This was denied by a facilities director and dismissed by him as a minor leak. Both of us are experienced in dealing with water damage and assessed the water leak as long standing based on stain patterns and presence of mould. That leak, coupled with suboptimal ventilation on the ward was a plausible source of Gram-negative bacteria. HPS were in agreement with this. Of specific note, this has never been clearly communicated with the parents despite a letter to Prof Craig White, Marion Bain and Fiona McQueen. Following these sources being addressed infection levels have remained very low with few bacteraemias recorded in the last 9 months. Did the review team see the photos relating to the water ingress in the kitchen or the SBAR of environmental risks submitted by all of the QEUH microbiologists? Did the review see the results from water testing of the chilled beams and environmental sampling?

8.17.1. The scale and persistent nature of this set of events is exceptional. For any large hospital to deal with this number of events may not be unusual, particularly where the number and type of vulnerable patient groups is high. One aspect of the hospital and its size is that there few comparators for the hospital, and so experience of the scale of the challenge is unusual, and rested largely on the shoulders of one person in this case – the lead ICD. It is little wonder that strains showed, although the quality of healthcare for patients in the face of waves of new events did not waver.

Comment: - this is an unfair accusation - “the strain showed” how did it show? and what is the evidence for saying so. This is pejorative.

8.17.2. The conduct of these investigations complied with guidance as set out in the manual, and was by and large impressive. The response to the events of 2018 that led to the closure of Ward 2A & 2B was particularly so…

Comment: The lead ICD who chaired and led the investigation is not mentioned here by title but is mentioned elsewhere where there are negative findings. This is bias.

8.17.6. What is clear is that the establishment of the IMT followed IP&C Manual guidance. However, the prolonged nature of the incident should have alerted first the Infection Control Committees (ICCs), then senior management to problems. In the circumstances there should have been escalation of the incident and review of its leadership.

Comment; In terms of escalation senior management were present at the IMTs. They included; Director for RHC, General Manager for RHC, Clinical Director for RHC, Infection control manager and Deputy Medical Directors. Director calls in the evenings discussed the IMTs, the Infection control representative was the HAI exec lead and Medical Director. Often instruction came back to the IMT from the Directors meetings.

8.17.7. There is no excuse for the 'extreme behaviour' as reported by one witness, and expressed by a large number of others in several ways, or the resultant intimidatory atmosphere that built around the IMT process during 2019. Amongst the accounts were reports of intolerance and lack of respect, for expertise and the integrity of the views of others.

Comment: It is unfortunate that this IMT process is reported on in the review without detailed discussions with IMT members. How many IMT members did the review interview and from which departments?

There is a recurrent theme of information being withheld at IMTs, a theme not captured by the review but for which plenty evidence exists. This underlying issue has not been addressed. In addition, there was direct denial of the fact of the chilled beams leaking. There is photographic evidence to the contrary. The Director for Estates is not cited in this regard, and again is open to the interpretation of bias. There is also no understanding of the level of expertise if those involved, nor the manner in which alternative Microbiology opinion was injected with no prior discussion. There is much to be learned, however there is persistent denial of any opportunity to go over this IMT despite both of us requesting this on numerous occasions.
Furthermore, there was the agreement to invite experts from GOSH to assess the data. This was cancelled with no explanation and has been an embarrassment between the hospitals. This is not dealt with and is an omission.

The IMT in question resulted in an anonymous whistle blow to HPS. The whistle-blower was concerned about the treatment of the Chair/Lead ICD, the lack of respect afforded to her and withholding of information affecting her ability to implement control measures. The internal investigation which took place led by the director of public health did not interview all IMT attendees rather the director selected who she interviewed. The internal report recommended that a formal HR process was not required, why then is this IMT a feature of the IR?

8.19.2. Medical microbiologists predicted this risk in their SBAR document of October 2017, identified the likely places where they would have impact, and a number of associated and relevant matters. They were correct.

Comment; ICDs were asking for results as soon as the hospital opened in 2015 and for Legionella risk assessments. This is important in light of the DMA reports that emerged. Whilst they were not actioned in early 2015 and again in 2017 these emails served as a prompt for the report to be located and actioned. That opportunity does not appear to have been taken. The SBAR in 2017 only highlighted what had been raised since 2015. This is not clear in the report.

8.19.3. The Review takes the view that, in the design, construction and commissioning of QEUH, the client and construction contractors set out to comply with standards consistent with a more conventional hospital; they should have taken greater account of the needs of all potential patients including those in the high risk groups such as severely immuno-compromised patients.

Comment - this view is not upheld by the evidence. Water contamination is not acceptable at those levels in any hospital, neither is the approach to ventilation in ICU, or theatres, or 2.5 ACHS. This statement is not in keeping with the evidence.

8.20.5. The Review is not in a position to pass judgement on the definitive interpretation of the views expressed or the supporting data (due to inconclusive scientific evidence) but is concerned that there appears to have been no functioning process to consider the data in the round nor to reconcile the clinical differences. Amongst the microbiology department of NHS GG&C there has been no capacity to agree to disagree.

Comment: - was there a view expressed by the IPC and Microbiology experts on the review? On the basis of the expertise of the Lead ICD and others in similar units it seems remarkable that a view cannot be taken off the "contaminants" theory as proposed by Microbiologists who had not even read the information and were entirely unfamiliar with the details of all the work previously done by the chair in managing extremely well the 2018 cases. Had their view prevailed in 2018, the remedial actions would not have been taken.

8.21.2. Each one of the elements in the 4 October 2017 meeting responding to a problem-defining SBAR document from the week before – bringing together concerns about the building, cleaning, water quality and clusters of infection – has substance and several proved to be predictive of problems that followed.

Comment; Actually, those points did not refer to the weeks before. The first column in that SBAR refer to when the issues were first raised. This is highly significant to understand the action of the Microbiologists and comes into chapter 9 also.

8.21.5*. Incident management was proficient. One can conjecture that the stress and learning of successive IMTs in 2018 resulted in two tendencies for practice in 2019 –first, to keep the incident management alive pending new cases arising –in 2018, three separate IMT processes dealt with the emerging problems. Second, there was a set of contested theories –that a single cause, a single source indeed, would again become apparent in the investigation of the blood stream infections of 2019, as they had in 2018 (the water and drainage system)*.

Comment : This **is** conjecture, the chair has not been spoken to regarding this. What evidence do the review have for stress? Instruction from both HPS and the Scottish government meant that every single episode of blood stream infection in this patient group had to be investigated and reported which is why there was a' tendency to keep the IMT alive'. We were instructed to do so. Furthermore there were in fact two triggers for the IMT process on this occasion; 1)an increase in Gram negative environmental bacteraemia's and 2)two cases of a rare and unusual atypical mycobacteria, M chelonae. This is in keeping with Chapter 3 of the National Manual guidance. One case of mycobacteria was linked through sophisticated whole genome sequencing to the water supply, the other case did not have concurrent water testing to compare the patient strain to. At no point is M chelonae mentioned. Again, at no point was a single source suggested.

8.21.8. The Review has already identified in Chapter 2 that the singular nature of large hospitals means that like-for-like comparison is challenging. We discuss later other factors that impede open learning and sharing of experience. Nonetheless, more effort is required to

benchmark the hospital's infection record with other very large general and highly specialist hospitals. In addition, however, successful prevention of infection does not rest on recording and reporting the incidence of infection, but the assurance of preventive systems and safety factors.

Comment: the data from GOSH is publicly available and is an exercise the review could have undertaken usefully to make more concrete statements.

8.21.9. Typing of microbes does not link firmly the environmental samples with consequent infection, other than in a very few instances. We await the case series review to determine the precise proportion of instances where investigators established a match.

Comment; Typing in environmental incidents is complex particularly water where you are dealing with biofilm. Patient and water isolates don't always match with typing and therefore one cannot use this method to prove water is not the source. Given that the case note review is retrospective not all the isolates will have been sent for typing and crucially there is a lack of water testing done prior to 2018 to enable matching should it occur. This point re typing is backed by experts and scientific literature and it is important those undertaking the case note review are aware of this. Furthermore, there were a number of cases that typing did match environmental isolates which is enough to strongly support the overarching hypothesis. This is a key omission.

8.22. IMT chairs and IP&C Leads need the requisite skills and support to be effective. Management of risk and prevention measures, as well as management of incidents involving very sick people and concerned clinicians, requires particularly high levels of blended talent

Comment: What are the qualifications and skills of the ICDs involved? What is the evidence that they did not have these skills? Why were they capable of being effective in the prolonged 2018 water incident? Were the CVs of the ICDs reviewed?

8.23.2. The general profile of infection control in terms of recorded incidence of key infections and outbreaks in the QEUH hospital complex was as good as, or better than other comparable data, both in other hospitals and compared with the hospitals that QEUH/RHC replaced and also when compared with other hospitals across Scotland.

Comment: what data is this based on? It needs to be publicly available for scrutiny, otherwise it is hearsay.

8.27.1. There is no well-established set of standards for investigation of unusual infections with a possible environmental cause, over and above conventional investigatory guidelines mentioned earlier – pathways and observations that are assured to isolate unusual airborne pathogens, or surveillance to detect possible hazard levels.

Comment: The relevant expectation as per title would be to have a qualified practitioner (ICD) with experience in outbreak detection and management and a sound understanding of microorganisms, in charge of leading the investigation, following well established first principles and methodologies, with the expertise to develop novel approaches as necessary.

8.27.2. The pathogens are extremely variable; their natural history is diverse; methods of entrapment and growth and identification are all challenging. Legionella is perhaps the most well-known and researched airborne pathogen; even in this case, often the best epidemiological investigations only reach an empirical rather than firm microbiological link. In

the case of Legionella, there are a limited number of possible routes of transmission, mainly through the air and in water aerosols.

Comment: Legionella is not a classical airborne pathogen in the sense of infectious nuclei spreading over large distances from person to person. It is however a waterborne organism that can be aerosolised and infect many individuals if exposed. It is unclear what “extremely variable pathogens are being referred to in this paragraph and renders the statement devoid of context and meaning. What is meant by an empirical link versus a firm microbiological link? Epidemiology is a powerful evidential tool that is complementary to laboratory typing etc., and neither stands alone as the ultimate evidential basis for such an investigation.

8.27.3. One indicator of such a limitation reflecting risk rather than a specific pathogen was the closure of the adult haemato-oncology unit soon after opening the hospital in 2015. The decision was based on a raised particle count indicating a general risk, rather than a particular pathogen.

Comment; Particle counts were 10-20 times higher than the acceptable level for a HEPA filtered BMT room. That in itself constitutes risk of invasive fungal infection. This was on a background of no commissioning or validation data and visual observations that the unit was not meeting the required specification. This paragraph does not link to the previous one. It leaps from a reflection on the nature of evidence base around the linking of airborne Legionella and cases, to the act of closing a ward based and flowing from a discussion on unusual pathogens. It makes no sense. The adult unit was closed as it did not meet any requirements for protective isolation to be achieved. The particle count was inevitable as a consequence of the condition and design of the accommodation.

8.27.8. So, we can conclude that guidance provides tangible thresholds for satisfactory functioning of an air system, although they may not correspond to specific thresholds for risk to patients in scientific study. That element of risk very much depends on the patient, their clinical context, and other factors.

Comment: the discussion on the ACH is limited in that there is good evidence of the impact of ACH - but not as an independent variable. Discussion of ACH in isolation from positive pressure, direction of air flow, HEPA filtration and infectious and protective isolation is meaningless.

8.28.2. These concerns were based on empirical and performance data, not on actual infection, and persisted though the early years of the hospital’s operation, sometimes resulting in the transfer of patients whose infections posed a risk to others to other hospitals with appropriate facilities

Comment: infections would not be picked up - e.g. TB has a long incubation period and many patents are discharged after a short space of time. No surveillance exists to exclude infections. The concerns were based on an expert level of knowledge of transmission routes of infection and the expected standards for accommodation, and a sound understanding of the lack of protection provided by the accommodation including design, malfunctioning and incorrect data provided.

8.28.3. Therefore, ICDs who are likely to be the most skilled members of staff in understanding the clinical significance of such risks are entitled to advocate with supporting evidence for their patients on the basis of the characteristics of a system's performance to prevent infection. This is preferable to resorting to investigation of incidents, when the results are often inconclusive and potential harm has already occurred. Nonetheless, they face the reality also of having to balance risk, considering alternative options to ensure patient treatment continuity, and to consider additional measures to reduce risk where alternatives are viable. Examples would be extra air filtration, extra bio-security and hygiene measures for staff and visitors, or anti-microbials that prevention infection (anti-microbial chemoprophylaxis).

Comment : It is not clearly stated that the ICDs did recommend these measures, or that these would not be expected to reduce the risks to the levels one would have expected from a hospital that had been designed and built and maintained appropriately and indeed the risk had been lower in previous older accommodation . There is no view on the acceptability of needing to take such measures - e.g. prophylaxis can be toxic, extra air filtration if not at the point of supply has limited success and can introduce new levels of contamination

8.29.1 We understand that where the pigeon remains were found does not match the air systems supplying specific parts of the hospital where certain patients affected by one microorganism (Cryptococcus) spent much of their in-patient care.

Comment: Inaccurate statement. Pigeon remains were found in one plant room; pigeon guano was found in more than one plant room including all four on the top of the building. Pigeon guano not remains is the source of Cryptococcus neoformans. Did the review have access to the pest control reports from GP environmental and all photos from the plant room? What was the opinion of the external microbiologist? Did the review assess the methodology used to demonstrate where air in the relevant parts of the hospital came from? Did the review have access to the air sampling results? Did the review see the photos of the fungal plates from air sampling? How does the review conclude that it is not possible for either patient to have breathed air that originated in the level 4 plant room particularly given that air moves freely between the four plant rooms?

8.29.2. The presence of pigeons within or in the vicinity of the hospital, or defects on the building that would allow the entry of a pigeon or other bird carrying a specific organism capable of causing a serious infection in a vulnerable person are not sufficient to establish a strong association or causative link.

Comment: They are sufficient when you have patients linked in time/place/person with a very rare infection and an identifiable source, particularly as pigeon guano or soil contaminated with it, is the known source of Cryptococcus neoformans. Furthermore, you have no new cases after source removal. This is basic outbreak management/epidemiology. Note textbooks on hospital hygiene discuss the risk of pigeons on hospital sites and European BMT guidance states birds should not be roosting at hospitals where BMT patients are housed. Pest control companies highlight the risks of pigeons in relation to ventilation systems.

8.29.3. There has been a series of investigations; it is prudent to propose and then investigate an association between a series of infections at certain times and the possibility of contamination linking to consequent infection. However, this association in this investigation falls short of a firm link between the events in the built environment and specific infections.

Comment: there is no detail regarding these investigations. It would be important to assess how many hospital IC practitioners, given these two cases (with the associated time line) and the plant room levels of contamination would do anything other than declare an IMT and agree to the hypothesis of a linkage as the number one hypothesis. The current investigation has been internal, fully under control of GGC HB and therefore fall short of an independent investigation.

8.29.4.On the reports we have reviewed and advice we have heard, therefore, we judge that the link between pigeons, pigeon guano or excrement, and air inlets in the vicinity of these finds providing contaminated air through high quality filters towards the patients involved, is not a sound theory on its own.133

Comment: It is a sound theory. The patients crucially were not in a **HEPA** filtered environment; therefore, the air was not as high quality as it should be for this vulnerable patient group. Pigeon guano was present in the plantrooms close to air handling units, there was evidence of water on the floor and pressure hosing used to clean the guano. Pressure hosing leads to the generation of aerosols. High level filters in place are effective to only 80%. There has been confusion as to the actual AHU that supply air to the vicinity of the patients, the occasions when these were serviced, the dates of the contamination, whether water pressure hoses were used, and the exact activities that occurred in those plant rooms. We do not have confidence that these have been appropriately considered or investigated by independent investigators to the appropriate level of scrutiny of the records.

Importantly the empirical evidence that could aid in understanding air movement would be the release of tracer particles in the plant rooms and detection throughout the hospital.

Furthermore, serology of staff may indicate levels of cryptococcal exposure at the QEUH. Future surveillance of cases may indicate an independent risk factor for cryptococcal latency/ infection as being at the QEUH.

8.29.5. The link between the patient who died and who was associated with Mucor infection has been explicitly discounted.

Comment: Again, no discussion with IMT chair, Whilst the post mortem revealed Mucor was not the cause of death, Mucor was still present in clinical samples from two patients. A likely source of Mucor was identified from a mouldy dialysis point which was remedied with no further cases. The incident report explains this hypothesis in more detail and again this is backed by scientific literature. Just because death does not result does not mean that adequate investigation and implementation of control measures should not take place to enable future prevention. This is the essence of infection control. The team followed the guidance in the national manual in relation to this IMT and its investigation and actions (removal of mouldy material and repair of the dialysis point) prevented further cases. No reference is made to the fact the plumbing was faulty and that there was backflow to the dialysis point from a sluice. Pulp from bed pans was found in the wall. Paper like material is a source of fungus. This again misses the opportunity to identify infection (not just death)

with is supposed to be the remit of the review. There is an omission to mention other deaths associated with infections. What methods did the review utilize for case ascertainment for both infections and deaths?

8.31.1 Engage specialist help early –sampling, engineering, epidemiology and clinical science. The National Centre for Reducing Risk in the Healthcare Built Environment should act as a key source of decision support and access to expertise

Comment: There is much reference to engaging specialist help early. Again, the lead ICD did just that but was not questioned in this regard or given the opportunity to submit evidence. Microbiologists are the experts in sampling. Experts in PHE (engineering) and in the Bristol Mycology lab (clinical science) were contacted by the lead ICD and involved from the very beginning of the Cryptococcal incident, as were scientists in an Ayrshire veterinary laboratory. There are many other examples. HPS and HFS were involved at many IMTs and supported the lead ICD with upgrades to ventilation. The lead ICD was corroborating with colleagues as far afield as Boston US (Cryptococcus), Australia (ward 2A) and Germany (water incident and M chelonae).

8.33.1. ICDs are entitled to express their concerns and have them taken seriously on matters of infection prevention and the built environment. They should work with other stakeholders to develop effective solutions.

Comment; this is a very distancing statement and ICD denigrating statement in the context. Other stakeholders should work with ICDs to find solutions as the ICD has the expert knowledge and role and responsibility to identify these risks and understand the extents that measure will mitigate and methodologies to measure efficacy of mitigation methods.

8.33.2. All hospitals need to plan and have in place assured air ventilation systems that perform in the way they are intended or designed.

Comment; this is actually simply a standard that is already in place - this hospital should have followed these standards/guidance. The review fails to mention the importance of annual validation reports and noncompliance with such. The lead ICD established a specialist ventilation group to ensure this was embedded. Note in 2019, some specialist areas had never been annually validated. When annual validation was undertaken issues were identified with several critical care areas.

8.33.3. Without knowing the thresholds for air quality that would quantify and minimise infection risk, we look to general measures: there should be continuing efforts to ensure the performance of the systems in place, assuring air quality for all patients, particularly patients vulnerable to airborne pathogens, and make specific provision for positive and negative pressure facilities for specific groups of patients and nearby patients and staff.

Comment; These standards are in fact established. Was a literature review undertaken? Research indicates that in a HEPA environment fungal counts should be < 1 cfu/$m^{3.}$ WHO has guidance for air quality in indoor and outdoor air, air sampling cutoffs for operating theatres are also well established?

8.37.10. There is a small scientist workforce. The IP&C service reports through its manager (who has a nursing background) to the Board Medical Director (see Appendix A) who represents the function corporately, and nurses report on professional matters to the Board Nurse Director.

Comment: This fails to identify that in governance terms the Medical Director was the Board representative with responsibility for HAI - i.e. the HAI executive lead.

8.37.13. One overt sign of that friction was the process whereby microbiologists on the new hospital site took part in a listening exercise followed by organisational development in 2015. The exercise achieved neither an inclusive approach in its process, nor execution of the findings.147 There was involvement in this process primarily of laboratory-based colleagues, although corporate management commissioned and oversaw the exercise.

Comment: There is an omission that there had been one such exercise that was extensive in Microbiology post laboratory merger that failed to report and that involved key individuals that recurred in later tensions.

8.37.15. The new lead ICD had previously clashed with her predecessor when taking up her responsibilities in the new hospital, and did not feel bound by the practice and decisions of her predecessor and his influence on the team she now joined. There was a legacy of mistrust of the leadership team by the medical microbiologists who staffed the IP&C service, and its ability to solve problems effectively.150 But the new leadership neither engendered a followership, nor demonstrated their own cohesion as a team.

Comment: What is this comment based on? Who was interviewed? No witness statement reference. Were all ICDs in the team interviewed?

8.37.17. To nurses, this was the continuing additional workload created by building- related problems over and above their routine clinical work; to microbiologist colleagues with and without formal IP&C responsibilities (all microbiologists provided medical IP&C advice as part of their microbiology on-call responsibilities) who perceived that their concerns about the building failed to be addressed adequately by management – IP&C management, Estates and Facilities management, and more senior general management. As a consequence, the resilience of IP&C leadership eroded, and it was not capable of addressing adequately the series of further adverse events that then arose.

Comment: The key issue here is not if there was a perceived lack of issues being addressed - but, actually were they? Is there evidence that at that stage, over a year since

problems emerged, that anything had been fixed? It matters to be able to ascertain the legitimacy of these concerns.

8.37.18. In 2017, there was an emerging picture of very unusual organisms causing bloodstream infections, with few common microbes, no particularly strong links between cases, several possible explanations, and weak connection to environmental sampling. In the middle of the year, the lead ICD who had been just over one year in post, took ill and was absent for a prolonged period. Temporary leadership from a senior colleague was in place. In late September, three microbiologists then wrote to the Medical Director with a detailed list of concerns, covering a range of IP&C related matters. This communication became the material that constituted Stage 1 of the whistle-blowing process.

Comment: Important to note that infant there was a Lead ICD in place (it was not clear that Dr Inkster would return) and that was his title.

Omitted from this potted history is the fact that one of these microbiologists was an ICD, who, along with three other ICDs (not Drs Redding or Peters) wrote letters of complaint about the governance arrangements and the safety of their roles, and asking to give up their ICD role. This included claims of bullying by the incumbent Lead ICD at that time in 2017. This has been entirely missed by the review and is a very important reason for the context of the whistleblow.

8.37.25. The Clinical & Care Governance Committee (CCGC) has oversight of clinical performance, a slightly different proposition to the activities of the ICCs but nonetheless it is an overseeing body for accountability for clinical performance. It is chaired by a Non-Executive Director of the NHS Board. The Medical Director took the 27-point action plan first to this committee, and it was then remitted back for discussion to the BICC. The CCGC continued to receive updates on progress with the plan's actions.

Comment: The medical Director was the Director with HAI remit and responsibility, hence was the appropriate director for the whistleblow step 1. Of note the action plan was not seen by the whistleblowers till February 2019, and were not asked to comment on the accuracy of the action plan in addressing their concerns. Also, of note the names of the whistleblowers were shared with those committees and rendered the whistleblow non confidential.

8.37.26. At the point of presentation and comment on the action plan to the BICC (January 2018), the lead ICD had returned to work. Actions continued to be addressed, although the lead ICD did not perceive it as a document that she adopted, owned or sought to implement.153 154 Concurrently, a series of IMT processes began that absorbed much of the lead ICD's attention, and led to the closure of Wards 2A & 2B of RHC in September 2018.155 156

Comment : This reads like the lead ICD disregarded her colleague's concerns. She did not. The reason she did not own it was explained to the review and evidence submitted. The action plan was developed whilst the lead ICD was off sick in a meeting chaired by the medical director. A response to the report was issued before the lead ICD returned by her colleague who had covered her and by other members of the IPCT. The document was amended by the lead ICD on return as there were inaccuracies. These amendments were not endorsed by the organisation therefore the lead ICD chose not to work from an inaccurate plan. In 2019 a request for updates to the action plan were made from Directors, the lead ICD was initially excluded from this email trail, it was not her action plan and sat at a

higher level. This does not mean she ignored the concerns. She continued to progress the issues.

In relation to being 'absorbed by IMTs' it is important to note that the lead ICD was only working 2-3 days a week between January and July 2018 on a phased return. Despite requests for additional ICD resource from her this did not happen.

8.37.27. The action plan was still under active review in March 2018 at the time of work carried out to address Stage 2 of the whistleblowing event. The action plan was next considered in correspondence in December 2018.

Comment: It was the sharing of the action plan and the realization of its inaccuracies and gaps in understanding of the issues raised that led to the WB stage 2.

8.39.2. This has also created difficulties with varying perceptions and understandings of the managerial/professional line between the Board lead ICT, and in particular the lead ICD, and the Board Medical Director.

Comment: NHS GGC differs from other health boards in that it has a lead ICD job description. The lead ICD position within the organisation is clear, reporting for infection control to firstly the ICM who then reports to the HAI exec lead (Medical director). There is no direct line from the lead ICD to either the HAI exec lead or the Chief executive and the lead ICD does not attend meetings with the board, IPC representation is from the HAI exec lead. There is a clear escalation process documented in the lead ICD job description by exception reporting and the review were given examples of this in evidence submitted.

8.39.6. The whistleblowing episode beginning in 2017, lack of resilience of management arrangements and instability of the lead IP&C Team's relationships set the scene for contested leadership into a particularly turbulent period, when the microbiologist community could not find the capability that would have enabled them, when it was important, to be able to agree to disagree respectfully. The IP&C team continued not to function as a leadership team.

Comment: It is unfortunate that such serious deficiencies have been put down to being unable to agree to disagree. Where are the facts relevant to this? In medicine best practice is not just agreed or disagreed it is expected to be followed. It is a deficiency of the review that they have been unable to ascertain clearly what was the correct view regarding the risk of water and whether this should affect any assessment of the validity of the need to disagree.

8.39.7. The reasoning behind this deterioration is not confined within the leadership team; they clearly bear responsibilities; nonetheless, in a community of highly autonomous yet interdependent professionals, it is a joint responsibility to ensure an effective service for the population it serves, and to help to agree and implement remedies when matters go wrong. This is the task that is in progress now.

Comment*:* Again, there is no comment on the actual matters on which there was disagreement. Should a Microbiologist simply say “in order to agree I will withhold disagreement that contaminated water and odd infections require intervention “

8.40.1. In practical terms the failure to address and resolve differing clinical opinions relating to IP&C has resulted in confusion that does not serve the clinical community, management or patients in the hospital well. Managers, directors and contractors all reported problems with inconsistent and sometimes contradictory IP&C advice.

Comment; yes, we said the building did not meet standards, others said it did. Which is it?

8.40.2.The Lead IP&C Team has focused primarily on operational matters and reporting requirements, and can function where there is no need to reconcile differences or solve problems; it lacks resilience, strategic leadership and connectedness to its local teams, to the external IP&C community and to sources of expertise.

Comment: The lead ICD in an interview to HIS in early 2019 highlighted the lack of resilience in the team and the lack of ability for her to focus on strategy due to the number of incidents and lack of infection control doctor resource. She highlighted the need for NHSGGC to have a DIPC role to ensure ICD expertise at board level as she was concerned about the accuracy of information they were receiving. She also discussed these issues and internally and there were a series of follow up meetings with the HAI executive lead regarding such.

The lead ICD has extensive connectedness to external IPC community and expertise via her roles as Assistant editor of the Journal of Hospital Infection, Module Lead on the Infection control MSc, Chair of the National Consensus Groups and representation on various other national committees. She is also a member of the Scotland ICD network and the British Infection association forums. She established links with Alderhey Children’s hospital, Leeds Children’s hospital and Great Ormond Street. She visited GOSH on her own accord after NHSGGC sent estates colleagues to meet with medical staff there and did not include microbiologists in the invite.

8.41.2. Of the IP&C Leadership team, the nurse leadership has higher specialist training in infection control

Comment; This implies that the nurse leadership is more qualified. The ICDs also have higher specialist training. How may ICDs were interviewed and had CVs reviewed? The lead ICD teachers the Masters in Infection Control course that many of the nursing staff undertake. Some of the ICDs have an MPH and Masters in Infection control.

8.41.5. All microbiologists who participate in on-call in NHS GG&C cover infection control responsibilities when on-call whether or not they hold infection control ‘Programmed Activities’ as part of their core job plan. Some express great interest in their job as ICD,

although they feel pressure in the role at times. Several also have taken interest and acquired expertise in the built environment and there are examples of doctors developing that interest to a very high level of knowledge and academic study.

Comment: This is part of our training, and specialist interest has been acquired not just through academic study, but experience of dealing with incidents, networking and attendance at courses and conferences.

8.41.6. More recently, standard setting bodies have specified infection control training as part of overall specialist training in infection. However, employment to demonstrate competence in the topic of IP&C is not mandatory.

Comment: Infection control has always been a component of the FRCPath examination and the medical microbiology curriculum.

8.41.8. We judge that the job role of an ICD has both a very distinct knowledge set and requires a particular skill set and experience. It is workable for a microbiologist to belong to an environment that orbits around laboratories and specific clinical settings, interacting with laboratory and fellow clinical colleagues.

8.41.9. The effective ICD requires a much broader grounding in public health skills, multi-disciplinary clinical engagement, risk assessment, communication and balance of risks, but crucially the skills and ability to influence a circle of people outside the clinical realm, not least general management, engineering and facilities management. As a clinician-manager, they hold responsibilities to take and to implement decisions for the organisation.

Comment: Where is the evidence that the ICDs lacked training / expertise? The ICDs have proven track records in getting problems sorted and working effectively in teams. The review fails to engage with an understanding that it was the nature of the problems being related to potential culpability of a botched design and build and maintenance that seriously impeded the ICDs ability to gain traction within the organisation to admit to the extent and urgency of the problems. In total eight microbiologists refused to take on the role. Are they all deficient in these characteristics/ knowledges? What about the higher leadership deficiencies in engendering a culture of listening to the appropriate expert role?

8.42.5. In practice, dual accredited Infectious Disease / General Internal Medicine consultants spend much of their time as physicians in General Internal Medicine, whereas dual accredited ID / Microbiology consultants will function mainly as microbiologists. The emergence of a robust and recognisable ICD role from this evolving picture is not a prime consideration.

Comment; did the review interview either of the National Training Programme Directors? It has been very much recognised by the TPDs and infection control training has been incorporated and close links established with HIS with trainees attending training days and courses.

8.43.2 The effective ICD requires a much broader grounding in public health skills,

Comment; The lead ICD has a Master's in Public Health, other ICDs have a Masters in Infection control. It is not clear what further public health skills are needed and why, these are hospital acquired infections for which the microbiologist is the most relevant expert.

8.48.1.HPS senior staff became involved by these two routes of referral.[164]NHS GG&C does not regards as the 'go to' organisation for all types of expertise, however, preferring to source highly expert advice direct from contacts and through networks that it already knows. Such a set of arrangements is not a formal matter, although HPS accepts this state of affairs.

Comment; This statement contradicts previous where it was stated that there was not connectedness to external expertise. Why would HPS be regarded as the 'go to? Are other clinicians expected to go to a national body prior to discussing cases with colleagues? Why would it be different for an ICD?

8.48.6. Thereafter, relationships have become more strained. The report was subject to review and detailed criticism by hospital microbiologists. Throughout the 2019 Incident Management series, tension built. This was perhaps not surprising given the important and gradual development of events in that year and the previous year.

Comment: As the microbiologists supplied epidemiological data HPS requested our views and input and healthy debate ensued. This sentence fails to appreciate the tension was largely between HPS and those opposing the Lead ICD views, not the lead ICD. This is crucial as otherwise the perception of a failing and lone Lead ICD is perpetuated and is not true to the facts.

8.48.7 The HPS representative, a senior and experienced nurse, opted to go to several meetings with a colleague for support

Comment: It must be noted that this was **after** the lead ICD was requested to demit as chair i.e. This is also relevant to meeting durations which became much longer, also referenced by the review.

Chapter 9

9.4.2. Enhanced professional appraisal must, similarly, encompass critical appraisal and reflection. Critical incidents where Incident Management Teams (IMTs) present dilemmas and challenges should provide candid and confidential material for discussion with a view to continuous improvement.

Comment: IPC is already a mandatory part of the ICD medical appraisal. We were not asked for evidence regarding this - we both included exactly this reflection in our appraisals. This should have been noted if it was being raised as a deficiency.

9.5.2. Incident management and problem assessment inevitably involves hypothesis development and testing; governance must ensure that hypotheses are sound, contestable and the debate that strengthens or removes hypotheses is respectful and transparent.

Comment: Once again hypothesis generation whilst an IMT discussion, it is largely the ICD who is trained in biological plausibility of routes of transmission, laboratory limitations and clinical consequences and presentations. The issue, had the review had the opportunity to discuss the IMTS in detail, was that non-qualified individuals raised and objected to hypotheses and substantially impeded the smooth running of the IMTs. Did the review assess the qualifications of those contesting hypotheses and their evidence for doing so?

9.5.12. We find that there have been very important advances in infection control since the framework of IP&C came into effect. Many lives have been saved by sustained and coordinated action; NHS GG&C and NH Scotland hospitals deserve credit for this achievement. It is, however, an opportune time to turn to focus on the rising proportion of less common infection alongside conventional and still-important HAI monitoring. This requires more sensitive and sophisticated problem assessment, more involvement of disciplines and technologies that add intelligence to current levels of analysis, network expertise nationally and internationally, and use of evidence to inform technical advice that crosses the building, engineering and clinical disciplines.

Comment: Why did some individuals readily identify these issues? They were grounded in a longstanding literature on the subjects and have a sound grasp of Microbiology. In getting caught up in team dynamics, the essential point that some did keep up with challenge has been missed.

9.6.2. Leaders were frank with us about the scale of the challenge in the integration of clinical teams onto one site, from four different sites, each with their own cultures and practices.179 In 2012, when laboratories came together on a single site south of the River Clyde, work was undertaken to integrate teams. However, there was limited progress toward integration of the microbiology teams in contrast to other departments.180 The reasons for this are not entirely clear.

Comment: Are the review aware of an HR investigation into this?

9.7.2. The management figures included some of their own professional peers. This progressive picture that dates back several years led to events in 2017 and subsequently undermined trust within the group of doctors; in turn, it undermined the effectiveness of the service overall. The ability of professional groups, especially self-regulating professional groups, to function as a team is a matter of good governance. Management systems find it difficult to seek and receive assurances if the links between professional group activity and accountability for clinical performance are not strong.

9.7.3. The operation of the AICC was founded on the reception and ratification of nationally prescribed key performance indicators (KPIs) and did not focus on exceptions such as atypical single incidents or unusual clusters of infection. It was left to the Chair of the BICC – the Board Medical Director – to articulate concerns and highlight risks about the 'New Build', seeking a stream of assurances about IP&C colleagues' involvement in decisions about the building.187 Answers to requests for assurances were not forthcoming on several important issues at the time of completion of the hospitals.

Comment: There is a complete omission of the key infection Control Senior Management Team meetings which occur monthly and which is operational with minutes going to the AICC and BICC and chaired by the ICM. What was its role in these decisions/lack of oversight?

9.7.4. When microbiologists raised concerns that initiated the whistleblowing event in 2017, NHS GG&C management compiled an action plan of 27 items, and these were presented to the Clinical and Care Governance Committee (CCGC) at an appropriate level of detail.188 Discussion resulted, and we understand from those the Review met that the committee is still monitoring the implementation of the action points.

Comment: Of note - and shared with the Review is that the action plan is flawed in its lack of accuracy with regard to the issues raised and actions taken. Those raising the issues were not bystanding observers, but fully immersed, relevant expert Microbiologists and they were entirely excluded from being able to comment on how their issues were dealt with or presented/ misrepresented to those committees. This is a major issue in the breakdown in trust and transparency of the process within the Board governance.

9.7.5. The amount of business conducted by the Infection Control Committees (ICCs), not least standing items, was very substantial. The pattern of reporting of Infection Control matters to Boards and the Scottish Government is of attainment of national performance targets and problem solving, much less commonly problem identification and working towards solutions before completion. There was limited disclosure of alerting information to the Board; primarily reports were of completed episodes. These observations are consistent with criticisms made in the Vale of Leven Hospital Inquiry9.

Comment: This is an important point for wider consideration - how are incidents and cases reported to the public? There is great variability across Scotland and why should MRSA and C diff be openly reported and not environmental cases? Whose role was it to alert the board to ongoing incidents?

9.7.7. The Board was briefed on regular occasions throughout the time of the construction project and into the life of the new hospital. The content of such reports comprised

assurances of progress and management of major developments in the course of business. Until the spring of 2018, in the context of IP&C, when the first major cluster of blood stream infections associated with water contamination became apparent, there was documentation that noted only routine reports. From that point there were briefings and, principally, minuted responses to steps that NHS GG&C Board's leadership had put in place12.4 We make findings earlier about the inability of the ICDs to find a way to discuss and resolve contested theories of what causes clusters of serious infections, and miscommunication is one manifestation of this practice.

Comment: What about the 2017 cases which had been raised as an issue by the ICDs? and requests for water testing made. This is omitted form the review. On several occasions in 2019 ICDs requested input from senior management to resolve these contested theories. Microbiologists wrote to the new Chair of the IMT to request that discussion took place. The entire QEUH microbiology department submitted an SBAR delineating the environmental risks in ward 6A, to this day we have not had assurances that these risks have been addressed/mitigated. We continue to raise concerns regarding the accuracy of information given to parents. We asked repeatedly for an opportunity to discuss with the HAI exec Lead through a meeting with the Chief Operating Officer. This was denied.

9.12.5. The behaviour of individuals has been, at times, inappropriate.[189]Reports of the conduct of the prolonged IMT through much of 2019 illustrates this point. We heard accounts and allegations of bullying behaviour and intimidating conduct at meetings – 'extreme behaviour' in one account.[190]Our observations relate to the behaviour of individuals; we found no evidence of institutionalised bullying in NHS GG&C.

Comment : Given that only 40 people were interviewed and some of these were parents and contractors how can the review conclude there was no evidence of institutionalised bullying in an organization the size of NHSGGC. It is disappointing to see such a broad conclusion being based on a process that was not designed to answer the question.

9.12.6 There were several occasions where NHS GG&C staff are alleged to have expressed dismissive attitudes toward staff and teams in other organisations who had a role in scrutiny and external investigation

Comment: There is no witness statement referenced to this claim. What is the evidence for this statement?

9.12.7 *We heard at several interviews of professional staff who believed that their concerns had not been taken sufficiently seriously and, in the view of some, this was linked to gender discrimination. However, in trying to substantiate allegations and form a view, we found that examples of discrimination or behaviour of one type or another were not confined to a particular gender.*

Comment : No witness statement attached to support this opinion. Furthermore, this process was inadequate as a means to address concerns regarding sexism.

9.12.18. Theories, hypotheses and possibilities have been transmitted and discussed in the media and Scottish Parliament in a way that has given them an undeserved provenance. In the case of the reported death of a patient from the fungal infection Mucor, subsequent analysis disproved the link between the event, the pathogen and the patient outcome but there has been little success in retracting or replacing the original and disproven narrative.

Comment*:* The IMT which initiated the the communication with HPS re Mucor followed precise protocol. At that time the patient had not died. The Mucor was not investigated due to death but due to two cases from which the organism Absidia was isolated, linked in time place and person, with a clear likely source of leaked bed pan pulp into the wall space of the index case. The death came later and that was communicated by the family to the media. Therefore, the report from the IMTs related to the infection (not contested) and was appropriately reported to HPS. The source is far from hypothetical, it was the conclusion of the IMT and was not challenged by the debrief IMT.

9.13.1. We find a mixed picture on communications. The communications between clinicians and patients and their families have been, by and large, of high quality. Transmission of sensitive clinical information from hospital to headquarters was sound. There are learning points for communication within the IP&C professional community, between that community and other disciplines that influence patient safety factors, and strategic communications when a succession of adverse events occur and need explanation.

Comment: It is disappointing to note that clear breaches in the communications to the families has not been picked up. In particular the assertion that in a leak in a kitchen posed no risk of fungi. Photos, and laboratory evidence as well as the very very basic principles of BMT accommodation and water damage indicate otherwise, but this has been ignored not only by the review, but the oversight committee and communications sub group members to date.

9.21.3. As noted, this was not in the remit of the Review and so there was not a call for evidence specific to this and of particular note not all the whistleblowers were interviewed rendering the investigation incomplete.

9.23.1. Whistleblowers raised concerns via Steps 1 and 2 as detailed above and one individual is now pursuing Step 3 of the process. This was done sequentially and was seen by the whistleblowers as a way of escalating their concerns because they felt they had not been adequately addressed

Comment: This is the exact description of what a whistleblow is, it is not clear as to whether this is accepted by the review as valid or not and level doubt over the validity of such an approach which casts a slur on the process followed.

9.23.2. In relation to the QEUH situation the Review was also made aware of a whistleblowing event where concerns were raised with the Medical Director of NSS in relation to behaviours at an IMT meeting. This was subsequently referred to NHS GG&C and investigated by the Director of Public Health in her capacity as a designated senior

manager for whistleblowing. More recently it came to light that one of the original whistleblowers has raised a further concern via the whistleblowing route, this time in relation to how the original whistleblowing event has been conducted.

Comment: It is not clear that this is the same director for public health who had dealt with the Step 2 Whistleblow, and there is no comment on the adequacy or otherwise of this process to answer the whistleblow concerns.

9.23.5. Prior to whistleblowing, microbiologists raised concerns about potential infection risk in the new QEUH and RHC buildings and the failure of some of the hospital rooms to meet the required specification for the intended patient groups. 196 In Chapter 8, we report their dissatisfaction about the IP&C structure, function and reporting arrangements. NHS GG&C's new lead ICD, in 2016, questioned some of her predecessor's input to the planning and commissioning of the QEUH building and some of the decisions taken in signing off the specification of clinical facilities

Comment: Of note these issues were raised since 2015 and it was not just those that pursued the whistleblowing policy that had raised these concerns. These concerns reflected those being expressed by microbiologists who had been ICDs. The Lead ICD was attempting to deal with the problems through IP&C structures and managerial routes but her colleagues chose to raise a whistleblowing action. This happened during a period when the lead ICD was absent from work. Important to note why colleagues chose to whistleblow when the lead ICD was absent from work. This was due to culture issues, lack of information sharing, intimidation of ICDs, which occurred **after** the lead ICD went off sick and the culture reverted to norm i.e. lack of openness, transparency and information sharing and a lack of support for ICDs

The microbiologists in their letter to the Associate medical director in 2015 raised more than failure of some rooms to meet specification. Entire units/wards were involved and there was also concern regarding parts of the retained estate and the IPC approach to management of outbreaks and incidents, in particular the NICU Serratia outbreak. Subsequent to this letter a lack of openness and transparency led to NHSGGC IPCT having to attend a meeting in St Andrews House with SG officials to discuss this particular NICU incident.

9.23.7. The Board's senior managers accept the fact of the whistleblowing process, its necessity and benefits, and the need to address concerns when raised. In this instance NHS GG&C's Directors listened to the concerns and sought to address them.

Comment: In their own view. There is evidence that demonstrates that their response was inadequate to the concerns raised. This is not discussed. Such as an instance that the PPVL rooms were built to specification- an assertion that has now been clearly overturned.

9.23.10. Matters have been further complicated as the process has progressed. When the matters were taken to Step 2 the whistleblowers expressed new, additional concerns about

the way they perceived they were being treated, feeling that they were becoming isolated and that their reputations were being tarnished. As part of the Step 3 action, concerns were raised about the factual accuracy of some of the external communication relating to the original concerns and the actions taken.

Comment: This was expressed within the confines of a confidential meeting under the terms of the whistleblowing policy which assures safe and confidential space to raise concerns. Not only was this anxiety regarding reputation and targeting shared widely in conjunction with our names - it now appears in a review that is on the web. It is easy to discern who these people are and this is a breach in confidentiality and is entirely unrelated to the remit, adding nothing to the relevant conclusions of the review. We would like this statement retracted.

Of note there was a third whistleblower was not interviewed despite being willing and being assured they would be.

9.24.5. The gram-negative contamination and infections were seen by some microbiologists as inevitable but clinically-manageable consequences of the environment and the vulnerable patient population in question.199 The Review is not in a position to pass judgement on the definitive interpretation of these views or the supporting data but is concerned that there appears to have been no process to consider the data in the round or to reconcile the clinicians' differences.

Comment: What is the view of the Microbiology expert on the review? Why is there no record of opposing views previously when it clearly had an impact on the credibility within the organisation of the lead ICD?

9.24.6. The media or individuals unconnected to the organisation involved, have obligations when approached by whistleblowers. They need to establish the validity and accuracy of the whistleblowers' claims and the previous steps taken to address them. These observations serve not to undermine the policy of whistleblowing but they do seek to ensure that fact, context and perspective are central to the practice of addressing whistleblowing.

Comment: This comment coming as it does in the context of those pursuing the internal WB amounts to an allegation of media and individuals unconnected to the organisation being given incorrect information. We request that this is retracted or reworded so as not to imply that this was done by the same individuals. This was not put to us; we had no right to reply and this is an inappropriate accusation.

9.24.9. To ensure that concerns are managed correctly and whistleblowers have appropriate support it is essential that there is regular detailed feedback subject to the caveats outlined above. In this case several witnesses in the Review, including NHS GG&C Board members, have indicated that communication with the whistleblowers could have been better and had it been so, then the course of events may have been smoother.

Comment: This was not put to us. No right to reply given. While there is no doubt communication could be better, once again it is the facts, the details that matter here. There is an implication that things were being managed just fine, and that the whistleblowers were inexpert uninformed individuals. This is far from the truth. They continued in the roles of

Microbiologist, giving ICD input, saw new cases emerging, were involved in epidemiology data gathering, laboratory work on taps, and continuously observed the reality on the ground regarding ventilation etc. The key question here which is notable by its omission is - were those 27 points valid? When and how were they resolved? Would any of this have been resolved had the whistleblowers not blown the whistle?

9.24.10. The Review is concerned that there seems to be no mechanism described or agreed to conclude the whistleblowing process in the event of continued disagreement between the whistleblower and the NHS Board as the accountable body. This is particularly true if continuing discontent is related to the NHS Board not implementing the whistleblowers' recommended solutions.

Comment: There is a mechanism via an external whistleblow under PIDA and this was the measure recommended to us by a number of lines of professional advice

It is inaccurate to state that we wanted our solutions in place. We required truthful, accurate evidence that the issues raised were understood and being actioned in a manner that reduced risk in a timely and patient centric manner.

9.24.11. While, as stated above, it is entirely reasonable, and indeed extremely helpful, for whistleblowers to offer potential solutions there can be no expectation on the NHS Board to be bound by these suggestions. It must be for the NHS Board through its governance processes to satisfy itself that any actions taken are appropriate and adequate. While this concern emerged from the Review's observations of the situation in NHS GG&C the principle has potential application for any NHS Board involved in a whistleblowing action.

Comment: Again, we do not recognise this as a valid allegation. We asked for risk to be rectified. We have relevant expertise and indeed repeatedly were roped into giving advice on these very issues. This is a superficial understanding of the issues and how they were managed.

9.24.12. Clinical colleagues of the whistleblowers have expressed mixed, often contrasting, views.200 Some have sympathy with the whistleblowers and their sincerely held views, some dispute the views, while others are unhappy about the manner in which the views have been expressed and pursued.

Comment : We have not had the right to reply and while it is reported , the review do not state whether evidence supports this view. Our reputations have been damaged by this statement and we wish to understand what this pertains to and whether those holding this view would have any conflict of interest in our views being correct.

There is no connection by the report from this section to the fact that they now accept the accuracy of our concerns. This matter as it puts the objections into context and intact a cursory reading of what happens to whistleblowers in the NHS would reveal that this is classical undermining and character assassination of whistleblowers.

9.24.13. It has been claimed that the whistleblowers pursued their concerns in a way that others found intimidating and that they were not prepared to listen to the views of others and

were trying to make evidence fit a particular hypothesis. Neither were they prepared to allow time for actions to be implemented. The behaviour of one of the whistleblowers was criticised by colleagues.202 203

Comment: The evidence seems to have fitted the hypothesis of the review's conclusions on the building too. So how is this a valid statement to make. This is again a clear criticism of the WBs and again no right to reply. We contest that this statement should be in the public domain without a proper investigation into the allegations.

9.24.14. Senior clinicians have commented about the detrimental effect whistleblowing, and the way it had been conducted in this instance, had on patients and families and their confidence in their clinical management.204 Some clinicians and managers have remarked to us about their concern that established processes had not been exhausted, that going out with these processes undermined the clinical community's cohesion and that the reputation of clinical care is in some ways tarnished if the senior medical staff cannot resolve their concerns within their own ranks and with their managers.205

Comment: Once again we take it from this that this relates to external whistlblowing. No mention is made of advice taken from the whistleblowing line and other agencies, and again there is conflation of the actions of numerous individuals. It is simply unacceptable to have hearsay presented as fact in this public manner.

9.24.15. One senior clinician was concerned that the way one of the whistleblowers raised their concern and presented supporting evidence compromised patient confidentiality and allowed at least one patient to be identified in a meeting.206

Comment: This is a very serious allegation and we were unaware of it until reading it in a public document, in which our identities is readily ascertained. We request a retraction with immediate effect

9.24.18. What is clear is that whistleblowing can cause damage to the internal relationships of the organisation and to the whistleblowers' place within that organisation, which is difficult to repair. Processes that have been so conspicuously ruptured do not readily heal – they include the relationships, trust and shared values that underpin the effective functioning of a complex organisation.

9.24.19. There is a need on all sides to recognize that and seek ways of mending the damage as well as restoring stakeholders' confidence in the organisation, while addressing the original reason for whistleblowing effectively. Addressing the wider systemic implications of an incidence of whistleblowing are often as important, if not more so, than addressing the specific concerns.

Comment: These statements present a false equivalence in the actions taken by whistleblowers following the policy, and in this case now backed by a huge amount of evidence as being valid in identifying real risk to real patients, and the classical response of an organisation to those individuals. This can be read, and has been read by many as a veiled intimidatory tone to put whistleblowers off. If this is not intended, we request wording to move away from that inference.

9.24.20. Ideally the measures of success of whistleblowing would include acknowledgement by the accountable organisation that they listened, understood and investigated the concern,

took any remedial action and sought to work with the whistleblower to enable them either to continue in or successfully reintegrate into their role(s) without detriment. In this case this has not yet been achieved.

Comment: It would be useful to understand if the review has the evidence to state that those very serious patient safety issues have infact been adequately addressed at the present time?

9.24.21. Despite resolution at Step 2 of the NHS GG&C process being recorded, it was the view of the whistleblowers that the proposed actions were not delivered and the concerns remained. One whistleblower feels their position has been vindicated by the NHS GG&C Board's decision to pursue legal action against the contractor, while another has taken their concerns to Step 3 of the whistleblowing

Comment: This is an identifiable quote - something we were assured in taking part would not happen. This jeopardises the likelihood of whistleblowers coming forward in future with openness and candour to such a review. Please can this be retracted.

9.25.1. Following a whistleblowing incident, NHS management, whistleblowers and the clinical community from which whistleblowers come need to recognise the significance of the event and commit to resolving matters on several levels – the matter of concern itself, the relationships and established management processes that were not used to address concerns, and the culture and practices that may have led to the use of whistleblowing.

Comment: At no point is it made clear that line management structures were utilized extensively prior to the whistleblow. This is not a fair reflection of the careful, patient escalation of the issues over the years prior to the whistleblow despite evidence being submitted to this effect.

9.25.2. However damaged and distant the relationships between whistleblower and management, there needs to be an agreed link or contact between the two parties (whistleblower and NHS management) until there is full resolution of the episode. Regular and detailed communication between the organisation and the whistleblowers is essential. At an early stage there should be recognition of the need to explore mediation or other means to resolve any underlying problems that contributed to the event and its handling.

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Comment: This is a superficial and top down view of the act of whistleblowing and lacks the insights that would understand the power imbalance inherent in the act of whistleblowing. This is not a meeting of equals who fall out and seek mediation. This is about professionals, doing their ethical duty to raise issues in good faith, in fear and trembling, facing ridicule, undermining, unpleasantness, career suicide and more. They are met by a group of powerful, and in this instance conflicted persons. Mediation is not appropriate. Externalised and robust scrutiny with powers to intervene is actually what is required in order to keep patients safe, and staff psychologically safe.

Re: Ward 4C QEUH

PETERS, Christine (NHS AYRSHIRE AND ARRAN)

Mon 30/12/2019 12:15

To:INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted] lesley.shepherd[redacted] keith.morris@[redacted] Fiona.McQueen@[redacted]

Cc:BAIN, Marion (NHS NATIONAL SERVICES [redacted]

Thanks Teresa,

I agree that the GGC statements as reported in the press (and therefore may not be complete) do not reflect my understanding of the 4C /4 B set up.

In 2017 I raised the issue of 4b not being entirely HEPA filtered and concerns regarding the likely limited outcomes of the proposed remedial works to that ward. I understand that recent air sampling results and assessment of the ventilation concurs with this view . I also raised repeatedly the need for a patient placement policy that matched clinical risk to accomodation provision in relation to all immune compromised patients in agreement with your attached emails.

It is also worth noting that 4C is not a general ward that meets SHTM standards on ventilation for general wards as Air change rates are 3 rather than 6. Further more chilled beams are in situ as noted in the minutes you attached . This does not seem appropriate for the patient groups described .

Kind regards

Christine

Dr Christine Peters
Clinical Lead Microbiology
QEUH

From: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)
Sent: 30 December 2019 11:59:31
To: lesley.shepherd[redacted]; keith.morri[redacted] Fiona.McQueen[redacted]
Cc: PETERS, Christine (NHS AYRSHIRE AND ARRAN); BAIN, Marion (NHS NATIONAL SERVICES SCOTLAND)
Subject: Ward 4C QEUH

Dear all ,

I have just returned from annual leave today and note the media coverage regarding the HSE improvement notice for ward 4C

It is very concerning to read the statement from GGC

I raised concerns regarding 4C in December last year **before** I was aware of the Cryptococcal case in the ward, in response to the engineering report we had from ward 2A/B .

A50002331

The email below from the lead haematology clinician confirms that high risk haematology patients are housed in this ward.

Ward 4C was escalated along with other ventilation issues to the ICM and HAI exec lead (emails attached) Subsequently I wrote an SBAR which was sent to the specialist ventilation group and the Facilites Director (attached). You will note from the minutes (item 7) that members of the group endorsed the SBAR.

These patients were originally due to be placed in ward 4B, John Hood devised the specification . They were moved to a general medical ward following the late decision to move BMT patients across from the BOC into ward 4B.

The response from GGC is not making any sense to me . The same haematology patient population in the north of the city is housed in a fully HEPA filtered ward (B7, BOC) We also plan to upgrade ward 2a housing the paediatric equivalent haematology patients . The SHTM is very clear on the requirements for neutropenic rooms

Also worth noting that ward 4B is not fully HEPA filtered as stated in the media response. Only the rooms are. The corridor and other spaces are not ,hence why we have had to implement a door closing policy. This was a risk highlighted by the HPS SBAR and microbiologists at the time of the upgrade in 2017. Air quality results from regular monitoring reflect this .

Kind regards
Teresa

Dr Teresa Inkster
Consultant Microbiologist, QEUH
National Training Programme Director Medical Microbiology
Dept of Microbiology
Queen Elizabeth University Hospital
Glasgow
Direct dial : [redacted]

From: Hart, Alistair <Alistair.Har[redacted]
Sent: 06 December 2018 09:46
To: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)
Subject: RE: Ventilation

Hi Teresa,

- recent history of neutropenia (<0.5) for > 10 days - YES WE DO, CONSTANTLY< (AML AND ALL PATIENTS)
- allogeneic stem cell transplant - RARELY, USUALLY JUST FOR A DAY OR " DUE TO BEDS< NOT A ROUTINE PROBLEM
- prolonged use of steroids i.e. > 3 weeks - YES, ALL PATIENTS.
- treatment with T cell immunosuppressants during the past 90 days - YES, FLAGIDA TREATED PATIENTS AND SOME CLL PATIENTS (THIS ASSUMES THAT FLUDARABINE IS CLASSED AS A T CELL SUPPRESSANT (WHICH IT IS AMOUNGST OTHER THINGS).)

Happy as always to discuss whenever suits.
What could the implications be?.....!

Cheers
Alistair

PS ALL isn't all, mean acute lymphoblastic leukaemia

From: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]
Sent: 05 December 2018 15:00
To: Hart, Alistair
Subject: [ExternaltoGGC]Fw: Ventilation

Hi Alistair,

When we decanted the paediatric haem-onc ward we took the opportunity to review the ventilation as there were some concerns. A number of issues have been identified which have implications for other wards on the site, one of which is 4C

I have been asked a question from estates - highlighted in email below. I need to give this some thought . Can I check first of all if you have patients with the following risk factors in 4C;

- recent history of neutropenia (<0.5) for > 10 days
- allogeneic stem cell transplant
- prolonged use of steroids i.e. > 3 weeks
- treatment with T cell immunosuppressants during the past 90 days

Thanks

Kind regards
Teresa

Dr Teresa Inkster
Lead Infection Control Doctor NHSGGC
Training Programme Director Medical Microbiology
Dept of Microbiology
Queen Elizabeth University Hospital
Glasgow
Direct dial : [redacted]

From: Wilson, Andy [redacted]
Sent: 05 December 2018 13:23
To: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)
Cc: Steele, Tom
Subject: Ventilation

Hi Teresa,

We are progressing with the work discussed to review, and improve where necessary, the pressure regimes across a number of wards; 4C, 5C, 5D, 7A & 7D.

As discussed today, following the changes made to the operating parameters for the plant across all of these wards, we have already confirmed that we have been able to achieve the 1Pa negative pressure in the room vs corridor for ward 5C and our next area of focus for balancing work is ward 5D. I am awaiting confirmation from the contractor of what has been achieved in 5C.

As discussed today, you are not certain that a positive environment is correct for all patients in 7A & 7D and will need to get confirmation from clinical colleagues before proceeding so I have put on hold further work to these wards until confirmed.

For ward 4C, we will continue with work to provide as positive an environment as possible but it would be useful to know the [redacted] positive pressure you would like to see in the room so we know whether simple re-balancing may be

sufficient or whether we should progress with consultant reviews of the system to identify what size / power of fan is required to achieve the desired pressure regime. Can you please confirm the minimum positive pressure that would be acceptable for 4C?

Thanks,
Andy

Andrew S. E. Wilson | CEng MIMechE
Sector Estates Manager (South)

Queen Elizabeth University Hospital
1345 Govan Road
Glasgow
G51 4TF

[redacted]

estates email ventilation 4C

INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)

Fri 07/12/2018 15:52

To:Wilson, Andy [redacted] Powrie Ian (NHS GREATER GLASGOW & CLYDE) [redacted]

Cc:tom.steele@[redacted] Hart Alistair (NHS GREATER GLASGOW & CLYDE)
[redacted]

Hi both,

I met with Dr Alistair Hart today who is the lead haematology clinician for South Glasgow. We discussed the ventilation requirements of ward 4C. This ward is essentially the adult equivalent of ward 2A haemato-oncology (non bone marrow transplant).

From the info I have at present this ward was designed as a normal hospital ward with no specialist ventilation i.e. 2.5- 3 air changes and from testing myself and John did, slightly positive pressure. The original intention was to place these patients in ward 4B which did have a specification devised by Dr Hood but there was a late decision to move adult BMT into that ward. Part of that specification was positive pressure and hepa filtration and I have confirmed with Peter Hoffman, Public Health England, that this would still be appropriate.

From discussion with Alistair regarding the patient group the specification for this ward should be at least;

- 6 air changes/ hour
- positive pressure 6PA
- Hepa filtered rooms

Is it possible therefore to proceed with the following;

1) A feasibility study based on the above spec
2) Confirmation of current pressures within ward 4C (at a subsequent meeting with an ID physician she enquired whether the recent reversal of pressure in 5C to negative would impact on the floor below? , a good question and I don't know the answer)
3) Confirmation of the ductwork configuration in 4C, is it the same as current configuration in 2A?

This ward also houses renal transplant patients who similarly, due to degree of immunosuppression, should be in a protective environment

Happy to discuss further

Kind regards
Teresa

Dr Teresa Inkster
Lead Infection Control Doctor NHSGGC
Training Programme Director Medical Microbiology
Dept of Microbiology
Queen Elizabeth University Hospital
Glasgow
Direct dial : [redacted]

A50002331

From: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)
Sent: 08 January 2019 17:19
To: Walsh Thomas (NHS GREATER GLASGOW & CLYDE)
Cc: John.Hood[redacted]
Subject: Fw: Airborne pathogen infection control

Tom , I will be on annual leave from Wed , back on Tuesday 8th. When you meet with Tom Steele about ventilation can you raise the following outstanding issues. These were raised at a meeting myself and John attended about ventilation on Dec 19th.

1) Clarification of pressures in 5C/D 7A/D . I now have the results for 5C/D and 7D but not for 7A. I was asking repeatedly for results of pressures in these wards and did not receive them until a meeting on 19th Dec . The reports are dated 2nd-9th November. Access to these results may have avoided some of the clinician anxiety. Also need to know how these rooms will be monitored moving forward so we are not in the same position again.

2) Feasibility study for ward 4C - do we have a timescale for this?

3) Risk assessment for endoscopy issue and update on validation reports from ACADs and QEUH endoscopy units which remain outstanding.

4) Update on negative pressure room upgrade, what are the issues and the timescale.

I am still of the opinion that ventilation requires a group similar to the water technical group to work through these issues. I am also concerned regarding the lack of documentation of discussions relating to ventilation.

Kind regards
Teresa

Dr Teresa Inkster
Lead Infection Control Doctor NHSGGC
Training Programme Director Medical Microbiology
Dept of Microbiology
Queen Elizabeth University Hospital
Glasgow
Direct dial : [redacted]

Re: QEUH Critical/Specialist Ventilation Systems Steering Group

INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)

Fri 05/07/2019 15:07

To: Mcneil Elaine (NHS GREATER GLASGOW & CLYDE) [redacted] Conner Darryl (NHS GREATER GLASGOW & CLYDE) [redacted] Steele, Tom [redacted] alan.gallacher@[redacted] [redacted] Connelly Karen (NHS GREATER GLASGOW & CLYDE) [redacted] Dodd Susan (NHS GREATER GLASGOW & CLYDE) [redacted] Pritchard Lynn (NHS GREATER GLASGOW & CLYDE) [redacted] French, Sofie [redacted] Purdon Colin (NHS GREATER GLASGOW & CLYDE) [redacted] Clarkson, Kerr [redacted] Guthrie James (NHS GREATER GLASGOW & CLYDE) [redacted] Riddell Mark (NHS GREATER GLASGOW & CLYDE) [redacted] Peters Christine (NHS GREATER GLASGOW & CLYDE) </o=MAIL/ou=NHSFB01/CN=Recipients/CN=ZLGFFYKV>; Grayson Gary (NHS GREATER GLASGOW & CLYDE) [redacted] Thomson Iain (NHS GREATER GLASGOW & CLYDE) [redacted]; Pirie, Mary [redacted]

Cc: Hamilton Pauline (NHS GREATER GLASGOW & CLYDE) [redacted]

1 attachment

SBAR 4C.doc;

Dear all

One of my actions from the last meeting was to construct an SBAR in relation to 4C which I have attached

Can I have any comments back by Monday 22nd July

Thanks
Teresa

Dr Teresa Inkster
Lead Infection Control Doctor NHSGGC
National Training Programme Director Medical Microbiology
Dept of Microbiology
Queen Elizabeth University Hospital
Glasgow
Direct dial [redacted]

From: McNeil, Elaine [redacted]
Sent: 26 June 2019 09:17
To: Conner Darryl (NHS GREATER GLASGOW & CLYDE); Steele, Tom; INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE); alan.gallacher@[redacted] Connelly Karen (NHS GREATER GLASGOW & CLYDE); Dodd Susan (NHS GREATER GLASGOW & CLYDE); Pritchard Lynn (NHS GREATER GLASGOW & CLYDE); French, Sofie; Purdon Colin (NHS GREATER GLASGOW & CLYDE); Clarkson, Kerr; Guthrie James (NHS GREATER GLASGOW & CLYDE); Riddell Mark (NHS GREATER GLASGOW & CLYDE); Peters Christine (NHS GREATER GLASGOW & CLYDE); Grayson Gary (NHS GREATER GLASGOW & CLYDE); Thomson Iain (NHS GREATER GLASGOW & CLYDE); Pirie, Mary
Cc: Hamilton Pauline (NHS GREATER GLASGOW & CLYDE)
Subject: QEUH Critical/Specialist Ventilation Systems Steering Group
When: 24 July 2019 11:00-13:00.
Where: Facilities Meeting Room 5, Ground Floor, Facilities Department, Labs Building, QEUH

A50002331

Invite Sent on Behalf of Darryl Conner

Dear Colleagues

The next meeting is scheduled for Wednesday 24 July 2019 at 11am, in Facilities Meeting Room 5, Ground Floor, Labs Building, QEUH.

Regards

Elaine

No	Log no.	Topic	Action	Owner	Update
1.15.1.21	2	NICU	Was suggestion to change to trap device taken on board if Y/N relation to be provided	TS	
2.15.1.21	3	General statement	TS to share the external thermal imaging scan of the building	TS	
3.15.1.21	3		It is essential that any reports of concern are reported, recorded and escalated as a matter of urgency.	FIO	
4.15.1.21	4.1	ITU	TS to arrange a visual inspection of RDU outlets and where there are signs of water ingress.	TS	
5.15.1.21	4.2	ITU 4C	Continued discussion is required re Neutropenic Patients in 4C. AW to, with Tom Steele, create a discussion and consideration space to explore further potential of Ward 4c	AW / TS	
6.15.1.21	4.4		High risk patient areas: Filters in ITU: Patient and isolate to be matched Acknowledge what is being done already How do we go forward: Tighten up link between patient and water testing? How do we protect niche clients? National guidance review	TS/HFS	
7.15.1.21	8	Historical issues with current potential consequence	TI to clarify specific rooms to be classified for use	TI	
8.15.1.21	8		TS to liaise with Darryl to clarify what is required (2016 report) PPVL Rooms	TS	
9.15.1.21	8.2		AW to ascertain status re air sampling in relation to the specified area in 4C	AW	
10.15.1.21	8.5		TS to clarify with Gerry re decision at Board Water Technical Group and evidence re lack of biofilm.	TS	
11.15.1.21	8.8		TS to clarify status of bronchoscopy endoscopy unit	TS	

12.15.1.21	8.8		TS to clarify membership of Critical Ventilation Group verification group from IC	TS	
13.15.1.21	8.9		Respiratory physiology lab: Room identified in children's hospital: Clarify status of completion	TS	
14.15.1.21	F	Theatres doors	TS and CP to explore how best to provide assurance CP to recover original document.	CP	
15.15.1.21	H	Chilled Beams	TS to confirm if BMS has been reconfigured any previous condensation issues re summer 2020	TS	
16.15.1.21		IPC issues	AW to arrange a process to discuss and update the IPC issues on the historical log	AW	
17.15.1.21		Collaboration	How does GGC create collaboratively utilising skills and knowledge e.g. • Fabric • Water • Ventilation AW to lead a conversation within NHS GGC that connects, utilises and builds good communication and opportunities to use expertise across the clearer safe environment as part of the gold and silver command	AW	
18.15.1.21		Ongoing reviews	Arrange dates for future log review and sign off	AW	

Comments

1)It has been confirmed that the DMA reports were known about in March 2018. Therefore, not only were estates colleagues present at IMTs who had knowledge of these reports but also senior management and colleagues from external agencies. This is a serious issue. As chair of the IMT I remained oblivious for several months. Despite generating multiple theories /hypotheses those in a position to support or discount these did not speak up. Withholding this information impacted on the pace of investigation and control of this incident. It has also meant that parents, families and clinicians were not given more accurate information. The uncertainty around the hypotheses caused anxiety for families and led to a lack of trust. Clinicians also lost trust because it appeared IPCT were not in control of the situation. Are there plans to investigate this further? Surely this is a conduct issue? It is difficult for me to consider that this was anything other than deliberate collusion to not make this information forthcoming given the number of individuals involved. Establishing when exactly my infection control colleagues were given this information is also important – was it the end of June as I was led to believe and the documentation suggests or before then? If before, this points to serious dysfunction within the IPCT. Presumably the health minister made updates to Parliament without this information too. Patients, families, staff were all misled for months, as a result of the failure to share this information.

I also refer to minutes of the water safety meeting whilst I was absent in 2017 where the following statement was made *'Infection Control colleagues are looking at historic records. MAK noted there is no reason to obtain access of historic records, IP noted the expectation from Infection Control colleagues is for testing to be undertaken in these areas, MAK will direct the issue to the Director of Medicine. '*

From 2015 onwards the recurring theme has been for water results, and risk assessments to be withheld from ICDs. Given that Cryptococcus now features in the timeline, all of the evidence surrounding this incident also should be considered as it points to a continuous theme, that of failing to share information with ICDs/microbiologists which would have enabled them to make informed decisions. There are other examples of ICDs being placed in the position of decision making without having all relevant information to hand e.g. adult BMT upgrade and the Cowlairs incident. All information should be disclosed to experts regardless of the assessment made by those with the information.

2)It states in the timeline that microbiologists formally reported concerns in the SBAR dated 2017. Were the concerns raised in 2015 not considered formal and if not why not? It is further stated in the timeline that 'the review of the information sources used to create the timeline do not contain any record of these concerns being raised'.

This is inaccurate as I and others have provided evidence demonstrating escalation. Whistleblowing is not the only formal route to raise concerns. The more typical route is via line management. This was undertaken, with reasons for resignation being sent to senior management and a formal letter detailing concerns to Dr David Stewart, Associate Medical Director. A formal HR process was undertaken which reflects the escalation of concern .This is an important point as it highlights the approach taken by GGC to concerns raised by microbiologists. Regardless of whether Dr Stewart escalated these concerns higher, as far as the microbiologists involved are concerned, they formally raised concerns via the appropriate line management route. There were also multiple emails requesting water results and risk assessments sent by ICDs.

In fact, GGC themselves acknowledge these issues were raised in a comment in a Herald newspaper article *'In 2015, when the new hospitals opened, there were a range of issues raised as would be expected in any new building which local managers sought to address' 14/7/19*

I would disagree that the issues we raised were to be expected, they were clearly not as we now know from the events that have unfolded.

3) There remains confusion in relation to *M chelonae.*

The IMT was reconvened in 2019 for two reasons 1) Gram negative bacteraemia's 2) **Two** cases of *M chelonae.* At no point was no link made between the two cases by myself as Chair of IMT. We need to distinguish between no link as in no cross transmission via patient's vs a link to a common environmental source, the latter being suspected. It clearly states in the minutes dated 19/6/19 that: '2 cases in one year to be considered a data exceedance' A HIIORT sent to HPS listed 2 cases of MC as meeting the case definition. We went on to investigate as an incident, developed an action plan specific to MC and undertook further water testing.

There was however a failure of senior management to accept and report /escalate as two cases. This differentiation needs to be clearly made.

Furthermore, there remains a failure of senior management to accept the link to the water supply established by whole genome sequencing and case 2. Also missing from the timeline is the fact that MC was isolated from outlets in RHC including ward 2A and operating theatres and not just from 6A. The epidemiology suggests case 2 acquired MC from a procedure undertaken in an anaesthetic room. It is also stated that GNR have now been added to routine water testing. What about MC and fungi as these were both found and should still be tested for to ensure eradication.

4) It is stated in the timeline that 'certain MB/ICDs have advised it is their understanding that it was raised TVCs that initiated the investigation in to Cupriavidus 'This is FACT. Raised TVCs in the aseptic pharmacy preceded the patient case which was identified on a look back exercise. I have all the documentation and this was also presented at a national conference

5) It is noted that the lead ICD changed between March -May 2016. This was mid-April 2016. The change in lead ICD between June 2017-January 2018 and from August 2019 onwards is not marked on the timeline. Can this please be added?

6) It is reported that links were not made with previous IMTs in 2018. On return from sick leave, I was told there were no significant issues to handover and that to delete all emails and start afresh. The volume of emails was in the thousands and it was not possible for me to read all of them. I received no formal handover and raised issues with infection control senior management regarding this. Of concern is that two permanent members of IPC senior management present in the 2018 IMTs had knowledge of the 2017 incidents but did not raise these. The issues here are probity and lack of medical handover.

It is stated that microbiology colleagues were reporting increased numbers of bacteraemia to microbiology colleagues. They were also reporting them to IPCT senior management which included the acting lead ICD , ICM and ANDIPC. From the emails I have subsequently seen colleagues were appropriately escalating a range of concerns, however these were not being acted upon. Information was also not shared with ICDs regarding the adult BMT refurbishment in 2017 and they were expected to make decisions without being fully informed.

7)Key information sources missing from those used to generate the timeline are the external reports from Dr Susanne Lee and Intertek.

8) There are sections of the timeline discussing adult BMT and isolation rooms for infectious disease patients. Significant omissions from the timelines are the discussion regarding ward 2A with respect

to air sampling results, holes in the ceiling and ventilation in 2015 ,the planned move back to QEUH of the adult BMT in late 2015 and the governance/decision making in relation to these. Meetings were held re 2A in 2015 chaired by the HAI exec lead and Chief operating officer and with other members of senior management present .Were these issues discussed and reported at AICC/BICC/Board at the time and before Sept 2016 as per the timeline? If not why not?

9)It is stated that the LICD submitted a paper re the role of IPCT in new builds and that advice was sought from HPS/HFS/Peter Hoffman. No advice was sought. The paper is simply a summary of key points from SHFN 30. LICD was instructed to produce this document by the then Clinical director for IPC (Dr Cruickshank) in response to IPCT stating there was no guidance that stated IPCT should be involved in new builds and an email from ICM querying the role of IPCT in commissioning. This was despite the CEL letter from 2007 and SHFN guidance. This is important as it highlights failure to implement CEL 2007. It is also important in that several minutes of meetings that were subsequently shared ahead of the independent review demonstrated that IPCT were infact present at many new build meetings and important discussions took place at BICC with respect to infectious diseases and BMT patients. Why then when these issues were raised by ICDs in 2015 were they so readily dismissed?

10)The timeline states that although not recorded in the minutes of the AICC meeting the rates of Pseudomonas in appendicectomy patients were deemed acceptable. This is a very unreliable information source. By whom was this statement made? Please record that LICD was not in agreement with this. We were above any acceptable baseline which is why I initiated investigations.

11)There continues to be reference by GGC to endogenous infections being common. Yes, they are but from normal flora. Cupriavidus spp ,Delftia spp, Steno spp etc are not considered normal flora. Rates of infection are very low currently following all the environmental control measures and established CD system. This supports an environmental source. If considered normal flora why would this suddenly change and why do we not see this pattern of infection in other high risk groups. Normal flora are considered Staphylococci, enterococci, E coli, other streptococci etc. There is reference to whole genome sequencing results for Enterobacter saying they were unrelated and likely gut source. Unrelated to other patient isolates or environmental isolates? How were environmental samples selected? Were they contemporaneous, if not how was the applied to interpretation of snp distance? How many colonies from each agar plate were typed? It is rather bizarre that WGS has been undertaken in relation to an incident I have chaired and results not shared nor my opinion sought with regards to interpretation.

12)There remains failure to acknowledge the Executive control group. This is important in governance terms as the IMT was not standalone, it reported to this group. This is clear from the minutes which also state that the escalation process for the Chair (Director of RHC) is to the HAI exec lead and the Chief Operating Officer. A governance structure was therefore developed to give oversight to the work of the IMT and WTG and ensure completion of actions. Has the evidence from this executive control group been reviewed and was the governance considered effective?

13) There is no reference to the escalation by myself of ventilation issues and request for project management to the ICM, HAI exec lead and Director of facilities in late 2018/early 2019 following discovery of issues with ventilation in 2A. This is important as it illustrates a lack of response/engagement following changes made to the estates/facilities team and ongoing failure to respond to microbiologists raising concerns by senior management. This was also evident by the lack of information sharing regarding pest control and plant room pictures during the cryptococcal IMT,

failure to send air sampling results during the Cowlairs investigation and denial of water leaking from chilled beams.

14) I cannot comment on the timeline between June 2017-July 2018 and from August 2019 onwards. However, I would urge that you clarify the events surrounding the 2017 Stenotrophomonas cases. I have seen an email demonstrating an ICD asked for water testing on August 2nd (the timeline says Sept). It also states 118 samples were tested and all negative for Stenotrophomonas during 2017. I would suggest checking this with Christine or [redacted] as I don't think this is accurate.

Other issues

1) There is continued reference to differences of opinion. Despite myself and other microbiologists requesting resolution there is still no mechanism within the organisation to resolve differences of opinion. I have yet to see in writing the difference of opinion and the scientific evidence for such. The approach taken is to support opinion that minimises damage to organisational reputation and is influenced by medical hierarchy and establishment, rather than expertise. It is important to educate where there is such a difference of opinion.

2) Sources of information – it was clear on speaking with the case note review team that they had not been given access to all relevant information with regards to IMTs and other expert reports. As the person responsible for chairing the IMT I consider myself a primary source of information. Failure to engage with me at an early stage in the process was a feature of the Independent review, the oversight board itself initially and now the case note review. As a result, not all available information has been reviewed. Bias was cited by the CNR as the reason for not meeting with me, but this bias does not appear to have been considered when speaking to other members of the IPCT. All of this results in inaccuracy, alternate views to gain prominence and delays in reporting, whilst clarification is sought. This impacts negatively on the integrity of the process and trust/confidence

3) There is continued reference to the following;
   a) Typing. There remains a failure to understand the complexities of typing in relation to an environmental incident. To quote the Susanne Lee report *'However to be sure that there is no patient strain in the system, multiple isolates from several samples from around the site where the patients may have been would have to be picked and identified. Statistically you would need to identify at least 30 different isolates from each culture plate to be sure a particular strain was not missed '* . Typing can only include , not exclude in an environmental incident. It is clear from discussion with CNR that WGS has been misinterpreted by microbiologists not involved in the 2018 incident who fail to understand the point made by S Lee above and the need for contemporaneous environmental samples.
   b) Use of SPC charts – I have been raising this both locally and nationally as inappropriate methodology for environmental Gram negatives for a number of years. On return from sick leave the trigger approach I had developed had been replaced by SPCs as it was felt the triggers were too sensitive. SPC charts are suitable for endemic pathogens such as MRSA or CDI where baseline levels are able to be established for at least 25 data points. They are not suitable for exogenous acquired organisms.

c) The continued referral to the term ‘single source’ in the HPS report to deduce that the water system was not the source. This term refers to a single ‘point’ source such as a single contaminated tap or item of equipment. We know that this is not a single source outbreak. The epidemic curve is compatible with that of an ‘intermittent source ‘, which fits with a contaminated water/drainage system as a source.

All of these issues require resolution in the interest of future prevention. Continuing to adopt these narratives when investigating future incidents will result in underestimation of exogenous acquisition of environmental Gram negatives.

NHS
Greater Glasgow and Clyde

Corporate Infection Control Service
Lead/Co-ordinating Infection Control Doctor

The Corporate Infection Prevention & Control Service within NHSGGC is seeking applications from members of the existing Microbiology Team for the role of Lead/Co-ordinating Infection Control Doctor.
This key role provides an opportunity for a committed and forward thinking doctor to contribute to the ongoing development of the ICP Service in the context of major clinical service reconfiguration.
In recognition of the responsibilities of the role this post will attach a responsibility allowance along with an expected commitment of 2PAs designated in the job plan.

As Lead/Co-ordinating Infection Control Doctor you will:-

- Provide leadership to infection control doctors and medical leadership for the wider Clinical Services within NHS GGC
- Provide medical advice on IPC issues to Board Directors
- Act as a key member of the Infection Prevention & Control Service Management Team working closely with the Infection Control Manager and Associate Nurse Director, Infection Prevention & Control.
- Support cohesive working of local ICTs and effective liaison between infection control doctors, clinicians from all specialities.
- Support the Board Infection Control Manager in the development of the service and the implementation of change.
- Contribute to the development and implementation of the Annual Infection Control Programme
- Work closely with Microbiology Management Team to ensure appropriate medical input to IPC Service

Applications should be submitted in the form of a CV with a statement in support of the application.
Applications should be submitted to Ann Lang, PA on [redacted] (email: ann.lang[redacted]) with a closing date of Friday 4th March 2016.

Tom Walsh, Board Infection Control Manager on [redacted], or Dr Anne Cruickshank, Interim Clinical Director on [redacted] are happy to discuss the role informally with any interested candidates.

Once completed, please return to HPS Infection Control Team at: NSS.HPSInfectioncontrol[redacted]

Name:	
Organisation:	
Date:	
Document Title:	**National Infection Prevention and Control Manual Chapter 3: Healthcare Infection Incidents, Outbreaks and Data Exceedance; HIIAT; HIIORT; Alert organisms/conditions/list and Hot Debrief**

*Please provide further detail in comments column.

Errors or Omissions : Chapter 3 : Healthcare Infection Incidents, Outbreaks and Data Exceedance		
Yes/No*	Section / Page No.	Comments / Suggested Amendments

Comments : Chapter 3 : Healthcare Infection Incidents, Outbreaks and Data Exceedance		
Yes/No*	Section / Page No.	Comments / Suggested Amendments

Errors or Omissions : Appendix 13 HIIAT		
Yes/No*	Section / Page No.	Comments / Suggested Amendments

Comments : Appendix 13 HIIAT		
*Yes/No	Section / Page No.	Comments / Suggested Amendments

Errors or Omissions : Appendix 14 HIIORT		
*Yes/No	Section / Page No.	Comments / Suggested Amendments

Comments : Appendix 14 HIIORT		
*Yes/No	Section / Page No.	Comments / Suggested Amendments

Errors or Omissions : Appendix 15 Alert Organisms/conditions/list		
Yes/No*	Section / Page No.	Comments / Suggested Amendments

Comments : Appendix 15 Alert Organisms/conditions/list		
*Yes/No	Section / Page No.	Comments / Suggested Amendments

Errors or Omissions : Appendix 16 Hot Debriefing Document		
Yes/No*	Section / Page No.	Comments / Suggested Amendments

Comments : Appendix 16 Hot Debriefing Document		
*Yes/No	Section / Page No.	Comments / Suggested Amendments

Any further comments? Please use the box below to write any additional comments):

From: Shariff, Imran
To: Shariff, Imran
Subject: FW: Ventilation BMT Unit
Date: 19 March 2020 09:29:15

From: Walsh, Tom
Sent: 03 July 2015 14:34
To: Armstrong, Jennifer
Subject: FW: Ventilation BMT Unit

Hi Jennifer

The situation at BMT has escalated today and I'm just heading over to a meeting where the issues below will be discussed.

Tried but unfortunately haven't been able to talk to Gary in advance of the meeting.

I have made clear my concerns relating to the implications of moving BMT patients back to Beatson. Hopefully this won't happen but wanted to give you a heads up.

KR

Tom

From: Peters, Christine
Sent: 03 July 2015 13:35
To: Peters, Christine; Walsh, Tom; Jenkins, Gary; Campbell, Myra
Cc: Joannidis, Pamela; Inkster, Teresa (NHSmail)
Subject: RE: Ventilation BMT Unit

Hi all,

From the ICD and microbiology point of view:

Current SItuation

Currently Allograft BMT patient are accomodated on 4B at the new southern General.

Parameters for Quality of AIr

1. AIr Exchanges: verbal report of 6ph - ICT have no written data to confirm this (ideally 12ph required)
2. Pressure Differential between rooms and corridor - verbally reported to be at just above 5 - ICT have no written data on comissioning values or new values after alteration to AHU, however this would meet the 5-10 target if sustained
3. Particle counts on 2/7/14 still above upper limit of 1000 in 12 rooms, corridor (which has extract only and is negative to rooms but positive to rest of hospital) particle count of >61452
4. Fungal sample plates from 29/06 from rooms have fungi growing through - too early to speciate

5 HEPA filters: ICT do not have comissiong data - efficiency not tested to date

6. Ceiling have non sealed tiles

Monitoring

1. No means to constantly monitor pressure differentials either locally or centrally
2. No water testing yet carried out to our knowledge - this has been requested 26/07

Water Quality

1. ICT do not have written specifications ? filtered water ? legionella testing results

In summary we are not in a position to assure safety of the 4B environment for the patients in terms of water borne or air borne infections particularly with the knowledge that there are massive demolition and building works ongoing on the site. This will need to be weighed by clinical colleagues against other risks in relocating as Teresa has indicated. We are aware that the Beatson facility is safe with regard to air and water quality.

regards,

Christine

From: Peters, Christine
Sent: 03 July 2015 12:18
To: Walsh, Tom; Jenkins, Gary; Campbell, Myra
Cc: Joannidis, Pamela; Inkster, Teresa (NHSmail)
Subject: RE: Ventilation BMT Unit

HI Tom ,

I am concerned that although there has been a considerable iimprovement in the particle counts , the room counts in half the rooms are still above the accepted upper limit and the corridor counts are very high. We would not expect any further improvements if no further changes are made to ventilation parameters.

I think it would be It would be useful to go ahead with a meeting to fully assess the new situation.

regards,

Christine

From: Walsh, Tom
Sent: 03 July 2015 12:14
To: Jenkins, Gary; Campbell, Myra
Cc: Joannidis, Pamela; Inkster, Teresa (NHSmail); Peters, Christine
Subject: FW: Ventilation BMT Unit

Hi Gary, Myra

Very useful and focused meeting yesterday. We have the attached interim results from the air sampling following the initial engineering changes agreed yesterday and Pamela is confirming the increased cleaning regime.

More than happy to meet today but I was thoughtful as to whether this constituted sufficient immediate "step change" in improvement for the clinical team at this point?

I wondered if there was value in postponing and evaluating continued improvement on Monday when the engineering/ ventilation/ cleaning changes had time to more fully "bed in"?

KR

Tom

From: Inkster Teresa (NHS GREATER GLASGOW & CLYDE - SGA20) [redacted]
Sent: 03 July 2015 09:51
To: Walsh, Tom; Peters, Christine
Cc: Joannidis, Pamela
Subject: RE: Ventilation BMT Unit

Hi Tom . I have attached the particle counts which were performed yesterday afternoon . I have been told verbally that the pressure was increased to 5.2 PA (acceptable range 5-10PA) but I have not seen written evidence for this.
As you can see the particle counts are better and that 9 out of 24 rooms are now <1000 . The questions/ issues we still have here is how long can the pressure be maintained at a higher level and how do we know if the pressure fails as we have no alarm system on the unit. Also I have no info on air changes per hour and whether these have been increased. We are also still waiting to see the validation reports which Christine requested after the meeting on Wednesday.

The decision that needs to be made is whether we can accept this ventilation in the short term but we do not have all the info we require to make this decision as yet.
Further particle counts are being done this morning and I will update you after that. I agree 4pm on a Friday is not a good time for a meeting.
Kind Regards
Teresa
Dr Teresa Inkster
Consultant Microbiologist and Infection Control Doctor
Dept of Microbiology
Lister Building
Glasgow Royal Infirmary
Direct dial : [redacted]

From: Walsh, Tom [redacted]
Sent: 03 July 2015 08:31
To: Inkster Teresa (NHS GREATER GLASGOW & CLYDE - SGA20); Peters Christine (NHS GREATER GLASGOW & CLYDE - SGA20)
Cc: pamela.joannidis[redacted]
Subject: FW: Ventilation BMT Unit

Hi Christine, Teresa

Please let me know of any updates/ results for the BMT.

4pm feels a bit late for a meeting if there is a possibility of moving back to the Beatson (hopefully not required)

Thanks

Tom

From: Campbell, Myra
Sent: 02 July 2015 15:54
To: Jenkins, Gary; Jones, Brian; Peters, Christine; Inkster, Teresa (NHSmail); Powrie, Ian; Moir, Peter; Walsh, Tom; Barmanroy, Jackie; Joannidis, Pamela; Parker, Anne; Irvine, David; McArdle, Agnes; McLaughlin, Marie; Meehan, Laura; Loudon, David
Subject: Ventilation BMT Unit

Tomorrows meeting will be held in 4th floor meeting room WS4-033 at 4pm.

Ian , could you please inform David Hall and David Alexander.

FW: BMT Move to QEUH

Inkster Teresa (NHS GREATER GLASGOW & CLYDE)

Fri 30/10/2015 10:48

To: brian.jones@[redacted]

Cc: Isobel.Neil@[redacted]

Importance: High

Dear Brian- I am very concerned about this email I have received.

I have had no involvement with the adult BMT following the recommendation to move them back to GGH. I have seen no revised plans for the unit, I have no idea of the spec of the new unit and I am unaware of any validation reports or air testing results.

Now I have an email informing me I am 'leading' on this. Once again I have no information and no handover.

Kind Regards
Teresa

Dr Teresa Inkster
Consultant Microbiologist and Infection Control Doctor
Dept of Microbiology
Queen Elizabeth University Hospital
Glasgow
Direct dial : [redacted]

From: Williams, Craig [redacted]
Sent: 30 October 2015 10:44
To: Mccolgan Melanie (NHS GREATER GLASGOW & CLYDE); Inkster Teresa (NHS GREATER GLASGOW & CLYDE)
Subject: RE: BMT Move to QEUH

Dear Melanie

Dr Teresa Inkster as ICD for regional services will be leading on this, unfortunately neither of us can attend on Monday but if you could contact Teresa directly for her availability for future meetings

Best wishes

Craig

Prof Craig Williams
Lead ICD NHSGGC

From: McColgan, Melanie
Sent: 28 October 2015 13:20
To: Williams, Craig; Hunter, William; Freel, Joanne
Cc: Campbell, Myra
Subject: BMT Move to QEUH

Dear all
I understand the wards have been/are to be handed back today? We are keen to progress what needs to happen now and how quickly to enable us to firm up a timescale to move back to QEUH. Should we aim to meet in the next few days?
Kind regards
Melanie

General Manager

Specialist Oncology and Clinical Haematology
NHS Greater Glasgow and Clyde
[redacted]

FW: Transfer of BMT back to QEUH

Inkster Teresa (NHS GREATER GLASGOW & CLYDE)

Fri 06/11/2015 13:39

To: Isobel.Neil@[redacted] brian[redacted]
Cruickshank Anne (NHS GREATER GLASGOW & CLYDE - SGA20) [redacted]

Importance: High

Dear all,

See below. I am very concerned about this. Tom Walsh phoned me today and asked me to attend this meeting because I am the ICD for Regional. It would appear from the email thread below that the unit has been handed back over to the users. When I asked him who had been involved with the redesign/validation from the ICT he told me no-one had. When I questioned what specification the unit has been built to he was unable to tell me. In addition he is unaware of any air testing taking place. I have had no email response from either Tom or Craig with regards to the information I have requested.

It is clear from the SHFN 30 document that the ICT is required to be involved with this process from start to finish. This was one of the concerns I raised in my interview with David Stewart. I find it incredulous that the ICM and lead ICD do not share my concerns .

If I am to attend this meeting I will be asking for all the info previously requested , I will be asking for the input of both John Hood and Brian as local experts on ventilation and BMT and finally I will be requesting input from HFS regarding suitability of the design .

I would appreciate the opportunity to discuss this further with you .

Kind Regards
Teresa

Dr Teresa Inkster
Consultant Microbiologist and Infection Control Doctor
Dept of Microbiology
Queen Elizabeth University Hospital
Glasgow
Direct dial : [redacted]

From: Walsh, Tom [redacted]
Sent: 06 November 2015 12:27
To: Mccolgan Melanie (NHS GREATER GLASGOW & CLYDE); Williams Craig (NHS GREATER GLASGOW & CLYDE)
Cc: Jenkins Gary (NHS GREATER GLASGOW & CLYDE); Inkster Teresa (NHS GREATER GLASGOW & CLYDE)
Subject: RE: Transfer of BMT back to QEUH

Hi Melanie

Apologies, I'm just back from leave. I have contacted Dr Inkster who has now agreed to attend the meetings as the ICD covering the unit.

Dr Inkster has a number of questions around the remedial works undertaken and hopefully these can be addressed at the first meeting.

KR

Tom

From: McColgan, Melanie
Sent: 06 November 2015 12:13
To: Williams, Craig; Walsh, Tom
Cc: Jenkins, Gary
Subject: Transfer of BMT back to QEUH

Hi A50002331

Really very keen to progress this given the ward was actually handed back to NHS GG&C on 28th October. I am still waiting for confirmation regarding who from Microbiology will support this and therefore, have been unable to set up our group to plan for the transfer. I understand this was being discussed yesterday and therefore, would be grateful if you could advise who I should link with,
Kind regards
Melanie

General Manager
Specialist Oncology and Clinical Haematology
NHS Greater Glasgow and Clyde
[redacted]

Dick, Carol

From: Campbell, Myra
Sent: 10 November 2015 13:33
To: Dick, Carol
Subject: FW: BMT Unit
Attachments: QEUH Ward 4B Upgrade Works Report Oct 2015.pdf

Hi Carol

Please see below.

Regards ,

Myra

From: Moir, Peter
Sent: 10 November 2015 11:58
To: Campbell, Myra
Subject: RE: BMT Unit

Myra

Hopefully the attached report summarises the works and the tests to validate operation.

I have a paper copy available if anyone requires and happy to meet up and discuss.

This information is also with Estates on the Zutec system in electronic format.

Confirm, no air sampling (particulate) has been undertaken as not a requirement of Brookfield contract, this normally by ICT.

Ward was handed over to FM/Estates for deep clean on 29th October 2015.

Regards

Peter

From: Campbell, Myra
Sent: 10 November 2015 11:43
To: Moir, Peter
Subject: FW: BMT Unit
Importance: High

Hi Peter, can you answer the questions below ? Thanks , Myra

From: Dick, Carol
Sent: 10 November 2015 11:42
To: Campbell, Myra
Cc: Marshall, Julie
Subject: BMT Unit
Importance: High

Hi Myra

Please find a list of questions asked by Teresa Inkster in advance of the meeting re Transfer of BMT back To QEUH meeting on Thursday.

Melanie asks if you can either obtain answers or invite someone who can advise please.

1. *What remedial work has taken place and who has signed this off?*
2. *What is the actual specification of the unit?*
3. *What validation has taken place?*
4. *Has there been any air sampling performed and what are the results?*

The meeting is at 1pm on Thursday - yet to get a venue and send out an e-mail.

Regards.

Carol

Carol Dick
PA to Melanie McColgan, General Manager
Specialist Oncology Services and Clinical Haematology
Maureen Grant - Lead Nurse
Specialist Oncology Services
Beatson West of Scotland Cancer Centre
Gartnavel General Hospital
1053 Great Western Road
Glasgow G12 0YN
[redacted]

Fw: Adult BMT move

Inkster, Teresa [redacted]
Fri 20/05/2022 11:01
To: Inkster, Teresa [redacted]

From: Williams, Craig [redacted]
Sent: 10 November 2015 15:09
To: Inkster Teresa (NHS GREATER GLASGOW & CLYDE) [redacted] Pritchard, Lynn [redacted]
Subject: Adult BMT move

Dear Both

Just a note to confirm our discussions this afternoon in terms of progresing the Adult BMT move.

We will, at the meeting:

1) Seek clarity from estatres/Brookfield colleaugues around what specification the rooms are built to, what engineering tests have been done and their interpretation of these tests.

2) Agree a program of microbiological testing reflecting HFS advice that no national guidance exists for this. This should include which tests,the extent and timeframe of testing, interpretative criteria and actions/timelines in the event of problems with testing.

3) Discuss the ongoing building works and dust management precautions in the context of the adult BMT move

Best wishes

Craig

Prof Craig Williams
Consultant Microbiologist Royal Hospital for Children, Glasgow
Lead Infection Control Doctor, NHSGGC
Professor of HAI, UWS

[redacted]
w. www.uws.ac.uk/hai

FW: BMT

Inkster Teresa (NHS GREATER GLASGOW & CLYDE)

Wed 11/11/2015 11:46

To: brian.jones@[redacted] John.Hood@[redacted]

See below. I am becoming increasingly frustrated. There is actually little point to tomorrows meeting as we are back at the beginning again with this . Will be interested to see Garys response.

Kind Regards
Teresa

Dr Teresa Inkster
Consultant Microbiologist and Infection Control Doctor
Dept of Microbiology
Queen Elizabeth University Hospital
Glasgow
Direct dial : [redacted]

From: Williams, Craig [redacted]
Sent: 11 November 2015 11:46
To: Inkster Teresa (NHS GREATER GLASGOW & CLYDE); Jenkins Gary (NHS GREATER GLASGOW & CLYDE)
Subject: Re: BMT

Dear Teresa

Gary may have the documents that you are looking for. I have copied him in to the reply. There has been no discussion with HPS as it was thought that HFS was the appropriate body and estates colleaugues would contact them as appropriate. The role of HFS in the absence of clear national guidance could probably be discussed at the meeting.

Best wishes

Craig

Sent from my BlackBerry 10 smartphone on the EE network.

From: Inkster Teresa (NHS GREATER GLASGOW & CLYDE)
Sent: Tuesday, 10 November 2015 4:41 PM
To: Williams, Craig
Cc: Jones, Brian; Hood, John
Subject: BMT

Dear Craig,

Williams, Craig

From: Peter Hoffman [redacted]
Sent: 23 July 2015 16:34
To: Williams, Craig
Subject: RE: BMT specification

Dear Craig,

Comments on the proposal

The proposal refers to a 5-10 pascal "differential pressure". It does not specify a) differential between which two areas and) the direction of that differential. The differential should be between the patient room and the corridor and the patient room should be at positive pressure to the corridor. This should be firmly established. (I have come across situations where the value of the pressure differential was being measured precisely; that it was in the wrong direction did not seem to matter).

Room ceiling. I understand that an MF ceiling is a suspended solid, sealed ceiling. This would prevent the majority of air leaks and is acceptable. Please confirm I have understood the realities of an "MF ceiling".

Ensuite ceiling – it is proposed to keep the existing tiled ceiling but silicon seal around the tiles. This is a low QA approach – the tiles will get removed if access to services above are needed and the sealant will be replaced with low assurance of an adequate seal - the people doing it will probably not understand the significance. It would be better to have the same as the main room ceiling.

The lighting diffusers used are "IP" (ingress protection) rated so will be a barrier to airflow. They will be silicon sealed in – suspect this is as good as can be expected.

The air handling unit (AHU) is to be upgraded – general principals only, precise details not given. There seems no need to change the AHU filters and terminal HEPA filters. No problem to do this but be aware that, if they are, the setup will be operating at its very best when it is first activated and the normal range of performance will be below this to varying extents.

Filter blockage is assessed using the pressure differential across the filter. How will this be monitored? Ideally it would be measured electronically and fed in to a building management system ("BMS") which would alarm when a filter is approaching its maximum pressure differential value. Details of the proposed approach would help.

The use of mechanical micromanometer gauges (generically called magnahelic) to monitor room-corridor pressures is proposed. These would need to be read and recorded regularly e.g. once a shift or daily. If magnahelic are used, they should have a scale both above and below zero (e.g. -30 to +30 pascals). A better approach may be to use electronic micromanometers such that there is a local display but also an audible alarm at the nurses' station (not via the BMS – it may be a day or two before this is acted on) when out of specified range. This would not need the reading & recording that a magnahelic would and should be considered. Electronic micromanometers should have a short (5 minute?) alarm delay such that the do not sound every time a door is opened (the pressure would go to zero), but only when there is a real problem.

I am not sure there is a need to silicon seal the hatches in the ceiling. As such sealing is unlikely to be reliably maintained, the ventilation should be capable of keeping the rooms reliably positive pressure provided the hatches are well-fitting.

Has it been confirmed that patient room windows are sealed? Which windows elsewhere in the whole unit are sealed?

Commissioning & validation

Taking AHU swabs is pointless.

How will the gauges be "calibrated" If this just adjusting the zero point with the doors open, it is not calibration.

Pressures ward corridor to non-ward areas – Is this a protected area? How is it protected? Is this intended to say this area is safe for patients? Not sure what's going on here.

There should be witnessed observation of smoke flow through a variety of gaps in each room – pipe and cable entry points, around the room door etc. The smoke should flow outwards to all adjacent areas.

That is all that immediately occurs to me looking through the document. The document is rather basic so maybe I have assumed things where that assumption was not the same on the part of the project team or contractors.

It would be good to get this seen by someone in HPS. I can advise but have no remit to approve.

Regards,
Peter

From: Williams, Craig [redacted]
Sent: 23 July 2015 11:05
To: Peter Hoffman
Subject: BMT specification

Dear Peter

Many thanks again for your help with this. As discussed I have attached a specification for the rebuild of the BMT unit. The unit will house patients undergoing bone marrow transplantation and with acute leukeamia. The team will have access to pressurised lobbied side rooms, built to HBN0401 elsewhere in the hospital should their use be necessary.

Best wishes

Craig

Prof Craig Williams
Consultant Microbiologist Royal Hospital for Children, Glasgow
Lead Infection Control Doctor, NHSGGC
Professor of HAI, UWS

t. [redacted]
w. www.uws.ac.uk/hai

****

Fw: BMT Move

Inkster, Teresa [redacted]
Fri 20/05/2022 11:08
To: Inkster, Teresa [redacted]

From: Walsh, Tom [redacted]
Sent: 13 November 2015 08:39
To: Inkster Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]; McColgan, Melanie [redacted]
Cc: Jenkins Gary (NHS GREATER GLASGOW & CLYDE) [redacted]; Williams Craig (NHS GREATER GLASGOW & CLYDE) [redacted]
Subject: RE: BMT Move

Thanks Teresa

From: Inkster Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]
Sent: 13 November 2015 08:33
To: Walsh, Tom; McColgan, Melanie
Cc: Jenkins, Gary; Williams, Craig
Subject: RE: BMT Move

Thanks Tom.

Craig did indeed update me about the response from HFS but this was with regards to air sampling.

I have some additional queries regarding the specification that was sent to Peter Hoffman and also the validation reports which I saw for the first time at yesterdays meeting.

Kind Regards
Teresa

Dr Teresa Inkster
Consultant Microbiologist and Infection Control Doctor
Dept of Microbiology
Queen Elizabeth University Hospital
Glasgow
Direct dial : [redacted]

From: Walsh, Tom [redacted]
Sent: 12 November 2015 14:21
To: Mccolgan Melanie (NHS GREATER GLASGOW & CLYDE)
Cc: Inkster Teresa (NHS GREATER GLASGOW & CLYDE); Jenkins Gary (NHS GREATER GLASGOW & CLYDE); Williams Craig (NHS GREATER GLASGOW & CLYDE)
Subject: RE: BMT Move

Dear Melanie/ Gary

I don't see any problem whatsoever with this if that is what Dr Inkster feels appropriate. Any additional assurance or advice can only be helpful.

We had already contacted HFS and Prof Williams has updated Dr Inkster with their response.

I'm unsure what, if any, advice or information HPS could offer as this is I understand it, a specialist area for HFS.

KR

Tom

From: McColgan, Melanie
Sent: 12 November 2015 14:00
To: Walsh, Tom; Williams, Craig
Cc: Inkster, Teresa (NHSmail); Jenkins, Gary
Subject: BMT Move

Dear Tom/Craig
We met today to discuss and plan the move back to QEUH. Teresa has requested permission to contact HFS and HPS to clarify outstanding questions, I presume that there would be no issue with this?
Regards
Melanie

Options Appraisal: National Adult Stem Cell Transplant Programme
Held on 8 February 2017 in BWOSCC

BENEFITS CRITERIA

No	Description	Definition
A.	Improves the patient journey	Services should be delivered on as few sites as possible to minimise the need for patient and carer travel. The site(s) should be easily accessible with good patient/carer facilities.
B.	Staffing	The extent to which there is adequate safe staffing, both within the unit's staff complement and within other services, e.g. Hospital at Night/resident on-call support.
C.	Meets published/recognised environmental standards	The extent to which the option satisfies both SGHD guidelines on Infection Control and other technical standards (SHTM, HSE, etc). This will take into account the ability to manage the risk associated with not meeting the standards, and any need for derogations.
D.	Meets published/recognised service standards	The service will meet standards set by JACIE and within the NSD service level agreement, and meets BSH Level 3. This includes immediate 24/7 access to the full range of acute services required to support patients who undergo stem cell transplant, including ITU-level critical care services and specialist support and review by other clinical teams.
E.	Minimises service disruption	The extent to which clinical services can be maintained during any required construction and/or implementation phase.
F.	Strategic fit	Links to national, regional and local clinical strategies for delivering cancer services, but with specific reference to wider GGC discussions on future location of BWOSCC and the configuration of haematology services.
G.	Timescale to deliver	Self-explanatory. There is a clinical urgency to make a decision on the location of the service.
H.	Long-term sustainability	The extent to which the facility improves the current and future capacity to deliver appropriate services to the population of Scotland, in line with ongoing planned expansion.

AGREED CHANGES

Prior to completing the benefits matrix, there had been two separate criteria identified for *Clinical Adjacencies* and *Meets Service Standards.*

No	Description	Definition
A.	Delivers clinical co-dependencies and adjacencies	Having immediate 24/7 access to the full range of acute services required to support patients who undergo stem cell transplant, including ITU-level critical care services and specialist review.
E.	Meets published/recognised service standards	The service will meet standards set by JACIE and within the NSD service level agreement, and meets BSH Level 3.

While completing the Benefits Matrix to agree the weighting to be given to each criteria, however, the group agreed that the content of point A was encompassed within the service standards, particularly JACIE, referenced in point E, and that these two criteria should be amalgamated under *Meets Service Standards.*

VERSION CONTROL

No	Comments
1.0	Prepared in advance of session
2.0	Updated to reflected discussion among session participants: Myra Campbell, Dr Teresa Inkster, David Loudon, Melanie McColgan, Dr Grant McQuaker, Dr Anne Parker.
2.1	Minor amendments. Circulated by email to group 08.02.17

In terms of further air sampling I will leave Teresa to comment in detail. I would however point out that the Infection Control Team don't undertake air sampling (nor do we have the equipment to do so). This would need to be agreed with colleagues in Diagnostics and I would suggest that clarity is still required on what is being sampled and what standards are being applied.

Kr

Tom

From: McColgan, Melanie
Sent: 03 March 2017 09:46
To: Inkster, Teresa (NHSmail)
Cc: Walsh, Tom; McNamee, Sandra; Loudon, David
Subject: RE:

Hi
I am hoping this makes it a bit clearer? I have left the RHC section in as need David to advise re spec,
Thanks
M

From: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]
Sent: 02 March 2017 09:44
To: McColgan, Melanie
Cc: Walsh, Tom; McNamee, Sandra; Loudon, David
Subject: Re:

Thanks Melanie,

Please find attached comments from Tom, Sandra and myself.

Our understanding of the process was that the groups function was to rank the options for consideration at board level rather than reach a definitive conclusion/recommendation.

We ask that all comments be considered but our particular concern is deviation from the the national standards (SHTM) and our agreed 'Role of the IPCT in capital projects' SOP.

Kind regards
Teresa, Tom, Sandra

Dr Teresa Inkster
Lead Infection Control Doctor NHSGGC
Training Programme Director Medical Microbiology
Dept of Microbiology
Queen Elizabeth University Hospital
Glasgow
Direct dial : [redacted]

From: McColgan, Melanie [redacted]
Sent: 01 March 2017 10:10
To: McQuaker, Grant; Irvine, David; Campbell Myra (NHS GREATER GLASGOW & CLYDE); Walsh Thomas (NHS GREATER GLASGOW & CLYDE); Mcnamee Sandra (NHS GREATER GLASGOW & CLYDE); INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE); Powrie Ian (NHS GREATER GLASGOW & CLYDE)
Cc: Johns Marjorie (NHS GREATER GLASGOW & CLYDE); Scott, Lyndsey
Subject:

Dear all
Can you let me have comments on attached asap –need by 12md Friday 3/3 at latest please.
Thanks
Melanie

Fw: FW:

Inkster, Teresa [redacted]
Fri 20/05/2022 18:08
To: Inkster, Teresa [redacted]

From: Inkster, Teresa [redacted]
Sent: 24 July 2020 09:43
To: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]
Subject: FW:

From: Walsh, Tom
Sent: 05 March 2017 17:48
To: Inkster, Teresa [redacted]
Subject: Re:

Difficult, although I thought the recommendations were clear that service needs were being prioritised over IC concerns.

Not sure if anything more can be said other than repeating this?

T

Sent from my BlackBerry 10 smartphone.

From: Inkster, Teresa
Sent: Sunday, 5 March 2017 17:20
To: Walsh, Tom
Subject: Fw:

FYI - not sure how to respond.

Sent from my BlackBerry 10 smartphone on the EE network.

From: Armstrong, Jennifer [redacted]
Sent: Sunday, 5 March 2017 2:33 PM
To: Inkster, Teresa
Subject: Fw:

Teresa
I am meeting Melanie and Gary tomorrow morning at 8.30am. I note the paper which they have given me in advance and the issues with all of the options. I note the group came to the conclusion about temporary relocation to QUEH ward 4b with some provisos. Is this something you can support? J
Sent from my BlackBerry 10 smartphone on the EE network.

From: McColgan, Melanie [redacted]
Sent: Friday, 3 March 2017 16:17
To: Jenkins, Gary; Loudon, David; Armstrong, Jennifer; Johns, Marjorie
Subject:

Dear all

Please see attached draft paper for Monday's meeting, there is one point made by the ICT that I have been unable to clarify in relation to the statement regarding RHC on page 12 :

This is factually incorrect. Paediatric BMT rooms have anterooms and positive pressure of 10PA. They are being upgraded to have 10 air changes and HEPA filtration so are superior to ward 4B

I think David is clarifying this,

Regards

Melanie

General Manager
Specialist Oncology and Clinical Haematology
NHS Greater Glasgow and Clyde
[redacted]

RE: BMT options appraisal

LOCKHART, Michael (NHS NATIONAL SERVICES SCOTLAND)

Wed 15/03/2017 22:35

To:INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]

Hi Teresa,
I have been at various meetings last couple of days –I passed onto Jacqui and Annette –presume all resolved ok?
Best
michael

From: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)
Sent: 13 March 2017 19:41
To: LOCKHART, Michael (NHS NATIONAL SERVICES SCOTLAND)
Subject: BMT options appraisal
Importance: High

Dear Michael ,

Please see attached an options appraisal that has been undertaken by NHSGGC in relation to the adult BMT.

Dr Armstrong, Medical Director has requested an opinion from HPS.

You will see from the recommendation that the proposal is to move BMT patients back to the QEUH ward and from the final paragraph that;

'This recommendation is made on the basis that service delivery considerations require prioritisation over the Infection Control and Prevention Teams concerns on meeting national standards and HPS recommendations'

The key questions are ;

1) If the ward was to move back are the risk mitigation measures listed appropriate/sufficient?

2) Are the proposed air sampling parameters and frequency appropriate - see SBAR I have written in the appendix

3) Would HPS support the decision by GGC to move the patients back to QEUH if the above were implemented.

Appreciate these are not easy questions. As always there is a bit of time urgency!

I am around tomorrow if you need to discuss any aspects further - [redacted]

Kind regards

Teresa

Dr Teresa Inkster
Lead Infection Control Doctor NHSGGC

Training Programme Director Medical Microbiology
Dept of Microbiology
Queen Elizabeth University Hospital
Glasgow
Direct dial : [redacted]

RE: 4B meeting

Peters, Christine [redacted]
Wed 17/02/2021 13:31
To: Inkster, Teresa [redacted]
Dreadful

From: Inkster, Teresa
Sent: 17 February 2021 13:31
To: Peters, Christine [redacted]
Subject: Fw: 4B meeting

From: Peters, Christine [redacted]
Sent: 01 December 2017 15:30
To: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]
Subject: FW: 4B meeting

From: Devine, Sandra
Sent: 01 December 2017 15:24
To: Peters, Christine
Cc: Green, Rachel (NHSmail); Pritchard, Lynn
Subject: RE: 4B meeting

Hi
Had another look – I can't find it but I'm sure Billy or Ian will have it.
However, meantime, I can confirm that Brian, myself and Tom signed this SCRIBE off with estates colleagues.
Sandra

Sandra Devine
Associate Nurse Director
Infection Prevention & Control
[redacted]

From: Peters, Christine
Sent: 01 December 2017 14:05
To: Devine, Sandra
Cc: Green, Rachel (NHSmail); Pritchard, Lynn
Subject: RE: 4B meeting

HI Sandra this HAISCRIBE has Teresa's name on it dated 19/06/17. There must be a more upto date version as I understand Brian was going to sign off after the meetings in September.

Regards,

Christine
Dr Christine Peters

Consultant Microbiologist
Queen Elizabeth University Hospital,
GGC
[redacted]

From: Devine, Sandra
Sent: 01 December 2017 13:00
To: Peters, Christine
Cc: Green, Rachel (NHSmail); Pritchard, Lynn
Subject: RE: 4B meeting

Hi Christine
This is what I can find but please bear in mind that this information could have changed numerous times since then, although I think the HPS document should be the same (although it was out for comment). This is also mixed up somewhat in that the initial 4b works were complete the testing was done as agreed, the patients moved back in and then they encountered the problem with the heating units. My understanding is that as the heating units are fixed the plan is to repeat the validation of the rooms before patients are moved back in – I believe this is ongoing. This is a local issue now so my information is limited so apologies if this is not what you are looking for.

I suppose on the up side at least the patients in the side of the ward that is open are all in positively pressured rooms which they wouldn't have been in before.

Sandra
Sandra Devine
Associate Nurse Director
Infection Prevention & Control
[redacted]

From: Peters, Christine
Sent: 01 December 2017 11:45
To: Devine, Sandra
Cc: Green, Rachel (NHSmail)
Subject: RE: 4B meeting

Thank you ,much appreciated, I know you are very busy,
Regards,

Christine
Dr Christine Peters
Consultant Microbiologist
Queen Elizabeth University Hospital,
GGC
[redacted]

From: Devine, Sandra
Sent: 01 December 2017 11:41
To: Peters, Christine
Cc: Green, Rachel (NHSmail)
Subject: RE: 4B meeting

Hi Christine
I'm looking for the minutes of the meeting from October for you and the HPS SBAR (as you know Pauline has been off for some months and I'm not as organised as she is). My understanding is that this is a separate issue and that these works are complete, however I guess the problems with the heating units may have been a knock on effect.

As soon as I have some time today I will look again.
Sandra

Sandra Devine
Associate Nurse Director
Infection Prevention & Control
[redacted]

From: Peters, Christine
Sent: 01 December 2017 11:30
To: Devine, Sandra
Cc: Green, Rachel (NHSmail)
Subject: 4B meeting

Good morning Sandra,

Please may I have copies of the HAISCRIBE and air testing and patient movement schedule agreed with HPS with regard to 4B prior to this afternoons meeting?

This will enable a fact based discussing this afternoon with regard to ongoing and initially unscheduled work.

Regards,

Christine

Dr Christine Peters
Consultant Microbiologist
Queen Elizabeth University Hospital,
GGC
[redacted]

RE: PICU Ventilation Verification

Peters, Christine <[redacted]
Wed 10/07/2019 17:28

To: Devine, Sandra [redacted] Balfour, Alison [redacted] ;INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]

Hi Sandra ,

Thanks , Alison is on for IC till Friday . I will be on from Friday afternoon. We are working closely together to ensure there is no information gaps while Teresa is off, so please do let us know what the next stage will be re PICU ventilation so we can best contribute to the actions going forward.

I believe Pepi discussed with you the fact that the HAISCRIBE which was being used yesterday on PICU to get positive pressure in a four bedded bay was quoted as being signed off by Teresa, however this could not be the case as Teresa has not seen the PICU validation as it was carried out on Saturday. This is reminiscent of the 4B HAISCRIBEs that had Teresa's name on them when she was off sick. I am sure this is a breach of due process and would recommend that the process is once more looked into to ensure this does not happen again.

Kr
Christine

From: Devine, Sandra
Sent: 10 July 2019 16:53
To: Peters, Christine
Subject: RE: PICU Ventilation Verification

Hi Christine
Thanks for cc me into this. I have referred this to the Directorate Management Team.
Kind regards
Sandra

Sandra Devine
Acting Infection Control Manager
NHS Greater Glasgow & Clyde
[redacted]

From: Peters, Christine
Sent: 09 July 2019 15:47
To: Conner, Darryl James [redacted] Valyraki, Kalliopi [redacted]; Inkster, Teresa (NHSmail) [redacted] Balfour, Alison [redacted]; Hood, John [redacted]; Rolls, Gael [redacted]; Johnson, Angela [redacted]
Cc: Connelly, Karen [redacted] Gallacher, Alan [redacted] Purdon, Colin [redacted]; Ian McKenzie <[redacted] Guthrie, James [redacted] Devine, Sandra [redacted]
Subject: RE: PICU Ventilation Verification

FW: HAISCRIBES

Peters, Christine [redacted]
Fri 22/04/2022 12:32
To: Inkster, Teresa [redacted]

From: Peters, Christine
Sent: 22 April 2022 12:28
To: Bagrade, Linda [redacted]
Cc: Macleod, Mairi [redacted]; Devine, Sandra [redacted]
Subject: RE: HAISCRIBES

Thank you for your response Linda,
As this was an important governance issue with IPC previously raised with the Oversight Board and measures were to be taken to avoid repetition I think it is important for IPC SMT to have sight of it.

Kr

Christine

Dr Christine Peters
Clinical Lead
Consultant Microbiologist
QEUH
[redacted]

From: Bagrade, Linda
Sent: 22 April 2022 12:22
To: Peters, Christine [redacted]
Cc: Macleod, Mairi [redacted] Devine, Sandra [redacted]
Subject: RE: HAISCRIBES

Hi Christine,

IPCT does not own HAISCRIBE documents therefore we cannot remove any information unless it comes to us for a review in which case we do and will continue to ensure the information within document is correct and current.

We have forwarded this request to the Estates management team and they are looking into this case. The best way to raise this issue if it happens again would be to inform estates management team directly.

Kind regards,

Linda

From: Peters, Christine
Sent: 20 April 2022 14:00
To: Bagrade, Linda [redacted]
Cc: Macleod, Mairi [redacted]
Subject: HAISCRIBES

Hi Linda,

I hope you had a pleasant Easter.

Teresa has raised a concern with me regarding the fact that her name is on an HAISCRIBE document regarding TMT maintenance that she was not involved with. This has occurred previously on at least two occasions, both times I raised it as a governance issue.

She notes :

I am concerned that my name is on this scribe updated in 2021. You will be aware that this is not the first time my name has been on scribes that I did not sign off. It looks like they have updated one I was involved with in 2019 last year - this should have been update with the relevant IPC members and the names changed. The continued mention of my name in relation to this document would suggest I agree with the decision not to maintain TMTs, a decision I was not involved with and one I would not endorse given the risks to the water system of no ongoing maintenance of these.

Therefore I would be grateful if you could raise with IPC colleagues and request that Teresa's name (and indeed anyone not currently with IPC remit or involvement with HAISCRIBES) is removed from any scribes post 1st September 2019, or relevant date for others. Even if these are renewals current members of the IPCT need to review, ensure relevancy and sign off.

Thanks very much in anticipation,

Kr

Christine

Dr Christine Peters
Clinical Lead
Consultant Microbiologist
QEUH
[redacted]

Fw: TMT maintenance

Inkster, Teresa [redacted]
Tue 19/04/2022 15:21
To: Peters, Christine [redacted]

HI Christine, I was copied into this email trail earlier re scribes for TMT maintenance in medium and high risk areas. I have emailed Darren back to say I am no longer an ICD and copied in Linda.

I am concerned that my name is on this scribe updated in 2021. You will be aware that this is not the first time my name has been on scribes that I did not sign off. It looks like they have updated one I was involved with in 2019 last year - this should have been update with the relevant IPC members and the names changed. The continued mention of my name in relation to this document would suggest I agree with the decision not to maintain TMTs, a decision I was not involved with and one I would not endorse given the risks to the water system of no ongoing maintenance of these.

Would be grateful if you could raise with IPC colleagues and request that my name is removed from any scribes post 1st September 2019. Even if these are renewals current members of the IPCT need to review, ensure relevancy and sign off.

kr
Teresa

From: Hopkins, Darren [redacted]
Sent: 19 April 2022 12:35
To: Pritchard, Lynn [redacted]; Bowskill, Gillian [redacted];
Inkster, Teresa [redacted]
Subject: TMT maintenance

Hi all,

We are starting TMT servicing again and wanted to double check IC are still happy with the Scribe (reviewed july 21) for these works?
Happy to discuss if any changes required.

Regards,
Darren

Department of Health

In-patient care

Health Building Note 04-01: Adult in-patient facilities

A50002331

DH INFORMATION READER BOX

Policy	**Estates**
HR / Workforce	Commissioning
Management	IM & T
Planning /	Finance
Clinical	Social Care / Partnership Working

Document Purpose	Best Practice Guidance
Gateway Reference	[redacted]
Title	HBN 04-01 - Adult in-patient facilities (2nd edition)
Author	DH Estates and Facilities Division
Publication Date	Dec 2009
Target Audience	PCT CEs, NHS Trust CEs, SHA CEs, Care Trust CEs, Foundation Trust CEs , Medical Directors, Directors of Nursing, PCT Chairs, NHS Trust Board Chairs, Special HA CEs, Directors of Finance
Circulation List	
Description	Health Building Note 04-01 provides best practice guidance on the planning and design of in-patient facilities for adults. It describes bed and sanitary facilities, patient support spaces, stores, utilities, administration areas and staff facilities.
Cross Ref	HBN 04-01 Adult in-patient facilities (July 2008 edition)
Superseded Docs	HBN 04-01 Adult in-patient facilities (July 2008 edition)
Action Required	N/A
Timing	**N/A**
Contact Details	Sue Taylor Estates and Facilities Division Quarry House, Quarry Hill Leeds LS2 7UE [redacted] http://www.spaceforhealth.nhs.uk
For Recipient's Use	

In-patient care
Health Building Note 04-01: Adult in-patient facilities

Delivering Same Sex Accommodation – Review of Health Building Note Guidance

The Department of Health's Delivering Same-Sex Accommodation (DSSA) programme aims to all but eliminate mixed-sex accommodation from hospitals in England by 2010. Although DSSA is primarily an operational issue, the design and layout of healthcare facilities can help support the provision of same-sex accommodation. With this in mind, the Department's Health Building Note (HBN) series of publications has been reviewed against DSSA requirements.

Amendments have been made to this document at **paragraph 3.41**.

This review makes particular reference to the letter (PL/CNO/2009/2) from the Chief Nursing Officer and Director General NHS Finance, Performance and Operations at:

www.dh.gov.uk/en/Publicationsandstatistics/Lettersandcirculars/Professionalletters/Chiefnursingofficerletters/DH_098894

Full details of the DSSA programme are at:

www.dh.gov.uk/en/Healthcare/Samesexaccommodation/index.htm

ISBN 978-1-907275-03-6

First published 2008; second edition 2009

Preface

About Health Building Notes

Health Building Notes give "best practice" guidance on the design and planning of new healthcare buildings and on the adaptation/extension of existing facilities.

They provide information to support the briefing and design processes for individual projects in the NHS building programme.

Restructuring of the Health Building Note suite

Healthcare delivery is constantly changing, and so too are the boundaries between primary, secondary and tertiary care. The focus now is on delivering healthcare closer to people's homes.

The traditional division of Health Building Notes into discrete books of information based on hospital departments is therefore no longer appropriate.

Instead, the new Health Building Note framework (shown below) is based on the patient's experience across the spectrum of care from home to healthcare setting and back, using the national service frameworks (NSFs) as a model. This structure better reflects current policy and service delivery.

New Health Building Note structure

The Health Building Notes have been organised into a suite of 17 core subjects.

Care-group-based Health Building Notes will provide information about a specific care group or pathway but will cross-refer to Health Building Notes on **generic (clinical) activities** or **support systems** as appropriate.

Core subjects will be subdivided into specific topics and classified by a two-digit suffix (-01, -02 etc), and may be further subdivided into Supplements A, B etc.

All Health Building Notes are supported by the overarching Health Building Note 00 in which the key areas of design and building are dealt with.

Example

The Health Building Note on accommodation for adult in-patients will be represented as follows:

> "Health Building Note 04-01: Adult in-patient facilities"

The supplement to Health Building Note 04-01 on isolation facilities will be represented as follows:

> "Health Building Note 04-01: Supplement A – Isolation facilities in acute settings"

New Health Building Note number and series title	Type of Health Building Note
Health Building Note 00 – Core elements	Support-system-based
Health Building Note 01 – Cardiac care	Care-group-based
Health Building Note 02 – Cancer care	Care-group-based
Health Building Note 03 – Mental health	Care-group-based
Health Building Note 04 – In-patient care	Generic-activity-based
Health Building Note 05 – Older people	Care-group-based
Health Building Note 06 – Diagnostics	Generic-activity-based
Health Building Note 07 – Renal care	Care-group-based
Health Building Note 08 – Long-term conditions/long-stay care	Care-group-based
Health Building Note 09 – Children, young people and maternity services	Care-group-based
Health Building Note 10 – Surgery	Generic-activity-based
Health Building Note 11 – Community care	Generic-activity-based
Health Building Note 12 – Out-patient care	Generic-activity-based
Health Building Note 13 – Decontamination	Support-system-based
Health Building Note 14 – Medicines management	Support-system-based
Health Building Note 15 – Emergency care	Care-group-based
Health Building Note 16 – Pathology	Support-system-based

Other resources in the DH Estates and Facilities knowledge series

Health Technical Memoranda

Health Technical Memoranda give comprehensive advice and guidance on the design, installation and operation of specialised building and engineering technology used in the delivery of healthcare (for example medical gas pipeline systems, and ventilation systems).

They are applicable to new and existing sites, and are for use at various stages during the inception, design, construction, refurbishment and maintenance of a building.

All Health Building Notes should be read in conjunction with the relevant parts of the Health Technical Memorandum series.

Health Technical Memorandum Building Component series

All Health Building Notes refer to Health Technical Memorandum Building Component documents for specifications and design guidance on building components for healthcare buildings. All Health Building Notes should therefore be read in conjunction with the relevant parts of the Health Technical Memorandum Building Component series.

Activity DataBase (ADB)

The Activity DataBase (ADB) data and software assists project teams with the briefing and design of the healthcare environment. Data is based on guidance given in the Health Building Notes, Health Technical Memoranda and Health Technical Memorandum Building Component series.

1. Room data sheets provide an activity-based approach to building design and include data on personnel, planning relationships, environmental considerations, design character, space requirements and graphical layouts.
2. Schedules of equipment/components are included for each room, which may be grouped into ergonomically arranged assemblies.
3. Schedules of equipment can also be obtained at department and project level.
4. Fully loaded drawings may be produced from the database.
5. Reference data is supplied with ADB that may be adapted and modified to suit the users' project-specific needs.

For further information please refer to the Space for Health website: www.nhs.uk/spaceforhealth.

How to obtain publications

- To find out about publications that are finalised and currently being published, look under "Publications" on the Space for Health website at: www.nhs.uk/spaceforhealth.
  NOTE that users should also check this site for latest versions of all publications, including Health Building Notes, and for any amendments to publications.
- Hard copies of published documents are also available from Space for Health.

For further information, contact Jock Graham [redacted] email: jock.graham[redacted]

Note

The new Health Building Notes have been progressively rolled out from spring 2007 onwards.

The sequence of numbering within each subject area does not necessarily indicate the order in which the Health Building Notes will be published/printed. However, the overall structure/number format will be maintained as described.

To find out how to access information on published documents, see the "How to obtain publications" section.

Acknowledgements

The Department of Health would like to acknowledge the help and advice kindly given by all the contributors to this guidance, including directors of nursing, infection control specialists, healthcare planners and nursing representatives from a variety of NHS trusts.

The Department of Health also wishes to express thanks to those who contributed to the en-suite shower room research project:

Armitage Venesta

Leaderflush Shapland

Ophardt Products

Hillingdon Hospital NHS Trust

Significant changes since the 1997 edition of this guidance

Health Building Note 4 (1997) 'In-patient accommodation: Options for choice' provided an evidence-based approach to the planning of facilities, which was based on providing a minimum of 50% single-bed rooms. In this respect the new edition has not changed. Further evidence has been gathered on the benefits of single-bed rooms and, in addition, an ergonomic study has established how much space is needed around the hospital bed for various tasks. The results have shown that the provision of a minimum clear space around the bed is essential in achieving an efficient and effective environment. The full report is entitled 'Ward layouts with single rooms for space and flexibility' (DH, 2005).

In addition, a study has been carried out to determine a space-efficient layout for an en-suite shower room for a single-bed room that meets the needs of the majority of patients. The study resulted in two new layouts for an en-suite shower room, both of which are referred to in this guidance.

In 2001, as part of the consumerism agenda to deliver the NHS Plan, the Departmental Cost Allowance Guides (DCAGs) were reviewed. The review concluded that an additional 2.5 m^2 per bed should be added to the schedules of accommodation for single-bed rooms and multi-bed rooms.

Since the 1997 edition the following changes have been made:

1. Single-bed rooms. The size of single-bed rooms has increased from 21 m^2 to 23.5 m^2 as a result of the review of DCAGs, which added 2.5 m^2 to each bed space.
2. Multi-bed rooms. The size of multi-bed rooms has increased from 60 m^2 to 72.5 m^2 as a result of:
    a. the 2001 review of DCAGs, which added 2.5 m^2 to each bed space;
    b. the impact of the Disability Discrimination Act, which requires that sanitary facilities should be provided for independent users and those requiring assistance from staff. As a result the assisted shower room, which now includes a WC as well as a shower and wash-hand basin, has increased in area from 4.5 m^2 to 6.5 m^2. This has increased the overall dimensions of the multi-bed room.
3. Space increase around the bed. The minimum recommended clear space around the bed is now 3600 mm (width) × 3700 mm (depth). This can be achieved within the new space allowances for single-bed rooms and multi-bed rooms.
4. En-suite sanitary facilities for single-bed rooms. The recommended new en-suite shower room layouts for a single-bed room are the same dimensions as in previous guidance but they are more flexible in terms of use and accessibility. They are suitable for ambulant and semi-ambulant patients, the majority of independent wheelchair users, and patients requiring assistance from staff.
5. Isolation suites. Single-bed rooms provide effective isolation for many patients. In some cases, however, a greater degree of isolation may be required. Health Building Note 4 Supplement 1 – 'Isolation facilities in acute settings' gives detailed guidance on isolation suites (bedroom, en-suite sanitary facilities, and lobby).
6. Dirty utility rooms. Ideally, a dirty utility room should serve no more than 15 beds. This reduces travel distances for staff, making better use of nursing time and reducing the risk of spillage and cross-contamination. A second dirty utility room on a ward is also helpful during outbreaks of illness or infectious diseases. Dirty utility rooms in previous guidance served 24 to 30 beds.
7. Schedules of accommodation. The previous Health Building Note was based on a modular approach to planning. The schedules of accommodation were presented in modules for eight-bed clusters. This guidance is based on 24 beds, which provides a typical example of an average-sized ward. Where smaller or larger wards are required, design teams can adapt the guidance to suit local clinical need.

Summary of changes in space requirements for a single-bed room since 1997

Area	HBN 04 1997 (m^2)	Healthcare Capital Investment (Consumerism) (m^2)	Difference (m^2)	Schedules of Accommodation 2003 (m^2)	HBN 04-01 2009 (m^2)	Difference (m^2)
Single-bed room	13.5	16.0		16.0	19.0	
Family and clinical support area	3.0	3.0		3.0	included above	
Sub-total	16.5	19.0	+ 2.5	19.0	19.0	0.0
En-suite shower room	4.5	4.5	0.0	4.5	4.5	0.0
Total single-bed room	**21.0**	**23.5**	**+ 2.5**	**23.5**	**23.5**	**0.0**

Summary of changes in space requirements for a multi-bed room since 1997

Area	HBN 04 1997 (m^2)	Healthcare Capital Investment (Consumerism) (m^2)	Difference (m^2)	Schedules of Accommodation 2003 (m^2)	HBN 04-01 2009 (m^2)	Difference (m^2)
4-bed room	48.0	58.0		58.0	64.0	
Clinical support area	3.0	3.0		3.0	included above	
Sub-total	51.0	61.0	+ 10.0	61.0	64.0	+ 3.0
En-suite assisted shower & wash	4.5	4.5	0.0	4.5	not included	– 4.5
En-suite assisted WC/ wash	4.5	4.5	0.0	4.5	not included	– 4.5
Assisted shower room (en-suite)	not included	not included		not included	6.5	+ 6.5
Semi-ambulant WC without luggage space (en-suite)	not included	not included		not included	2.0	+ 2.0
Total 4-bed room	**60.0**	**70.0**	**+ 10.0**	**70.0**	**72.5**	**+ 2.5**

Executive summary

This Health Building Note provides best practice guidance on the planning and design of in-patient facilities for adults. The accommodation described includes:

- bed and sanitary facilities;
- patient support facilities;
- storage facilities;
- utility facilities;
- administration area and staff facilities.

The recommended space standards for bed areas are applicable to in-patient rooms in any setting, including acute, day surgery and community facilities.

The schedules of accommodation for this Health Building Note are based on a 24-bed ward, with options for 50%, 80% and 100% single-bed rooms.

This best practice guidance essentially applies to new-build facilities. However, the principles are equally valid, and should be applied, when existing accommodation is being upgraded or new accommodation is being constructed within an existing building that may previously have been used for other purposes.

The document gives guidance on general and specific design considerations in patient and support areas. It also covers general functional design requirements and engineering services.

Example room layouts are provided in the appendices along with a comprehensive list of references.

Contents

1 Introduction

1.1 This Health Building Note, which replaces Health Building Note 4 (1997 and 2008 editions), provides guidance on the planning and design of in-patient facilities for adults.

1.2 The space standards for bed areas are applicable to in-patient rooms in any setting, including acute (critical care at levels 1 and 0[1]), day surgery and community facilities.

1.3 The schedules of accommodation for this Health Building Note are based on a 24-bed ward, with options for 50%, 80% and 100% single-bed rooms. The 24-bed ward is provided only as an example of a typical ward, although the 50% option is the recommended minimum for single-room accommodation. Planning teams should determine the number of beds per ward and the percentage of single-bed rooms based on local clinical need.

Policy background

Impact of the 2006 White Paper on in-patient accommodation

1.4 The 2006 White Paper 'Our health, our care, our say: a new direction for community services' (DH 2006) signalled a shift of care into community settings. This includes activity that can be safely and effectively provided outside the acute hospital. In-patient accommodation remains largely in acute settings, particularly for complex cases or where major surgery requiring general anaesthesia is required. However, in-patient accommodation may also be provided in community settings for those patients with less complex conditions. Planning teams will need to consider the number of in-patient beds required and where they may be most appropriately located.

Patient expectations and choice

1.5 Patients will have higher expectations of the environment in which they are to be treated and more say about how and where healthcare is provided, as reflected in 'Creating a Patient-led NHS' (DH 2005). The provision of high-quality facilities, with the option of a single-bed room, is likely to be an influencing factor on patient choice in the near future.

1.6 A key element that should be addressed in all patient accommodation is that of privacy and dignity. 'The Essence of Care' (DH 2001) identified several benchmarks of good practice, focusing on the issue of respect for the individual so that:

- patients feel that they matter all of the time;
- patients experience care in an environment that actively encompasses individual values, beliefs and personal relationships;
- patients' personal space is actively promoted by all staff;
- communication between patients takes place in a manner that respects their individuality;
- the care of patients actively promotes their privacy and dignity and respects their modesty, including gender segregation; and
- patients can access an area that safely provides privacy.

1.7 See also 'Privacy and dignity – a report by the Chief Nursing Officer into mixed sex accommodation in hospitals' (DH 2007).

Prevention of healthcare-associated infection

1.8 Planning teams should note the contents of the Health Act 2006: Code of practice for the

1 Levels of critical care as described in 'Comprehensive critical care' (DH 2000):
Level 1 Patients at risk of their condition deteriorating, or those recently relocated from higher levels of care, whose needs can be met on an acute ward with additional advice and support from the critical care team.
Level 0 Patients whose needs can be met through normal care in an acute hospital.
For higher levels of critical care see Health Building Note 57 – 'Facilities for critical care'

prevention and control of healthcare associated infections (DH 2008). This code of practice sets out criteria by which managers of NHS organisations are to ensure that patients are cared for in a clean environment and where the risk of healthcare-associated infections is kept as low as possible. The document contains a comprehensive list of the Department's guidance on the prevention of healthcare-associated infection. See www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_081927.

Scale of provision

1.9 The number of patients admitted to hospital each year depends on local workload patterns. The number of bed spaces required will be calculated from factors such as:

- data on number of admissions, number of refused admissions, number of premature discharges, bed occupancy and length of stay;
- local admissions policy;
- future developments influencing demand for acute services, for example increasing day case surgery rates, improved chronic disease management, and the potential for more care at home;
- availability of beds in other settings, for example community hospitals.

Evidence base for this guidance

1.10 Since the previous editions of this guidance (1997 and 2008), considerable work has been carried out to establish how much space is needed around a bed for patient and staff safety, accessibility and clinical need. The full report on this work, which comprised literature reviews, ergonomic studies and mock-up trials, is published in 'Ward layouts with single rooms and space for flexibility' (DH 2005).

1.11 In addition, with the need for accessibility to en-suite sanitary facilities and the implications for increasing space, an evidence-based study has been carried out to design an en-suite shower room that will meet the needs of the majority of patients without increasing current space standards. The result of this work is available through the UKHOs' "Space for Health" website at www.nhs.gov.uk/spaceforhealth.

2 General functional and design considerations

Location and departmental relationships

2.1 Historically, in-patient accommodation has been the core of the hospital. Although current trends in the delivery of health services have eliminated in-patient care for some patients who previously would have been admitted, in-patient accommodation still accounts for a significant proportion of space in a hospital.

2.2 Patients who are admitted are often acutely ill and in need of observation. One of the primary goals of designers, therefore, is to minimise the distance between patient rooms and staff workstations, and the distances between all patient rooms.

2.3 Traditionally, in-patient accommodation has been located either above the diagnostic and treatment floors of a hospital or adjacent to them. Critical care beds are prioritised to be closest to surgical or medical interventions, whereas rehabilitation and long-stay beds can be significantly further away from the core clinical services. Beds can be organised horizontally over large floor areas or stacked into towers. A recent tendency in the UK has been to put beds into multi-storey wings that are separate from diagnostic and treatment facilities. This allows more consistent planning of in-patient accommodation, increases flexibility in the way that beds can be organised, and enables maintenance and refurbishment to be carried out more easily.

2.4 The location of wards needs to ensure privacy, particularly at night. Ground-floor locations should be considered only where the adjacent environment is free of hospital traffic and publicly accessible areas. Views outside, together with access to sunshine or direct daylight, have been shown to benefit a patient's recovery. The orientation and aspect of in-patient accommodation should be prioritised when developing a hospital masterplan.

2.5 The ability to isolate components of in-patient accommodation is important for infection control, particularly during outbreaks of infectious illness. It is also important in the event of a fire or other emergency, when patients will generally be evacuated to a safe space on the same floor.

2.6 The ability to combine clusters of beds will allow for different needs over time. Support facilities can be more flexibly located.

2.7 Because in-patient accommodation is such a large component of the hospital, its departmental relationships are mostly dependent on the number and location of access points, lifts, and distance from diagnostic and treatment facilities. Small, discrete and specialist wards such as oncology will require direct access to their own specialist diagnostic and treatment centre within the whole hospital or within the same floor.

Key features of a desirable environment

2.8 Studies (Malkin J, 1992 and Scher P, 1996) have shown that the following features are necessary to provide a desirable in-patient environment:

- Space for:
  - clinical activity at the bedside
  - clinical activity elsewhere
  - storage/display of patients' possessions
  - storage of bulky equipment
  - staff support and training
  - social support of patient
- Suitability of:
  - services and supplies at the bedside for clinical activity
  - access to and within area for physically and sensory impaired people
  - services to enable personal communication by patient
  - services to enable direct admin/clinical communication from the bedside

  - a reassuring, stress reducing, environment
  - a safe and hazard free facility
- Privacy:
  - during clerking and clinical discussions between patient and staff
  - during clinical treatment
  - for bodily functions and personal care
  - for personal discussions and telephone calls
  - for staff communications
  - for staff rest and beverage breaks
- Choice, control, comfort:
  - to be alone or in company, including visitors
  - of temperature, ventilation, lighting and sound
  - of diversion, outlook, entertainment
  - with access to beverages for patients and relatives
  - with local storage of personal belongings of staff
  - with access to the outside world.

Space requirements

2.9 The provision of sufficient space in clinical areas, particularly for each bed space, is one of the most important considerations in the planning and design of in-patient accommodation. Ergonomic studies have established that most activities carried out at the bedside can be accommodated within the dimensions 3600 mm (width) × 3700 mm (depth). This represents the clear bed space and does not include space for fixed storage, preparation and worktops. Space requirements are discussed more fully in Chapter 3.

Sanitary facilities

2.10 For infection control purposes, in-patients, clinical staff and visitors should be provided with separate sanitary facilities, which should be clearly labelled. Facilities for visitors and non-clinical staff should be located close to the ward reception and waiting area. Sanitary facilities for clinical staff may be provided in association with staff changing and rest room areas. Where staff changing and rest rooms are located away from the ward, a designated WC for clinical staff should be provided. Sanitary facilities for in-patients should be located en-suite to bed areas.

2.11 All single-bed rooms and multi-bed rooms should have en-suite sanitary facilities. The increasing acuity of illness of in-patients means that a great proportion of patients may require assistance during their hospital stay. For greatest flexibility of use, all sanitary facilities in in-patient areas should be accessible and manageable by people with physical or sensory disabilities with or without assistance.

2.12 As part of the revision of this Health Building Note the Department of Health commissioned research into the size and layout of en-suite shower rooms to identify a space-efficient design that would, as far as possible, meet the needs of the majority of patients. It was acknowledged during the research that some aspects of ambulant/semi-ambulant/independent wheelchair access and assisted use are not compatible. For example, the provision of a hand-rinse basin next to the WC for independent wheelchair users would have conflicted with access for patients requiring assistance. As the number of patients requiring assistance is likely to be greater than the number of independent wheelchair users in in-patient accommodation, the primary concern should be to provide space and facilities for people requiring assistance. Certain limitations on independent access are therefore considered acceptable within a healthcare setting.

2.13 The new layout for an en-suite shower room forms the basis for the guidance and example layouts in this Health Building Note. There should also be access to a fully assisted bathroom or shower room where shower trolleys may be used. This could be shared between wards and is listed as essential complementary accommodation in the schedules of accommodation. Alternative layouts for en-suite sanitary facilities are described in Health Building Note 00-02 – 'Sanitary spaces'.

2.14 The research project to develop the new en-suite shower room design is described on the Space for Health website at www.nhs.gov.uk/spaceforhealth.

Hand hygiene

2.15 Antibacterial hand-rub dispensers should be provided at the ward entrance.

2.16 Each single-bed room should contain a clinical wash-hand basin. The basin should be located to be highly visible to staff entering and leaving the room

and convenient for them to use. The use of sensor taps may be appropriate to reduce the risk of infection. Multi-bed rooms should contain two clinical wash-hand basins, one close to the entrance to the room and the other placed in a convenient position for staff working at the other end of the room. The multi-bed room layout in Appendix 1 indicates the possible location of clinical wash-hand basins.

2.17 For further guidance on clinical wash-hand basins refer to HTM 64 – 'Sanitary assemblies' and Health Building Note 00-03 – 'Clinical and clinical support spaces'.

Isolation facilities

2.18 Single-bed rooms provide an effective facility for isolating patients with a variety of infections, such as MRSA. However, in some circumstances it may be necessary to provide a higher level of isolation, particularly for those patients with airborne diseases or for immuno-suppressed patients who may be at risk of infection from others. In these cases, an isolation suite – which includes an entrance lobby, bedroom and en-suite sanitary facilities – will be required. This is listed as optional in the schedule of accommodation for this Health Building Note. The need for and number of isolation suites should be decided locally and in consultation with local Health Protection Agency staff.

2.19 Isolation suites are described in paragraph 3.29.

Cleaning services

2.20 Recent research ('An integrated approach to hospital cleaning', DH 2007) indicates that a microfibre system for day-to-day cleaning in combination with periodic steam cleaning is an effective approach to cleaning in-patient facilities. The guidance in this Health Building Note is based on this approach. If other cleaning systems are to be adopted, design teams should give careful consideration to the facilities required in each case.

2.21 In terms of facilities, a microfibre system requires:

- space for storing the microfibre cleaning trolley and clean microfibre cloths and mops (the cleaners' room, see paragraph 3.57);
- space for holding dirty microfibre cloths (the disposal hold, see paragraph 3.59);
- laundry facilities for washing and drying used microfibre cloths.

2.22 The laundering of microfibre cloths and mops requires special conditions and dedicated facilities. The laundry process should be carefully managed. Project teams should decide locally whether laundry facilities are provided in-house or contracted out. More information on the laundering of microfibre cloths is contained in the research and development report, available through the Space for Health website at www.nhs.gov.uk/spaceforhealth.

2.23 A supply of disposable cleaning materials should also be stored for clinical staff to use when cleaning staff are not available. These may be held separately in the dirty utility room.

2.24 This Health Building Note assumes that steam cleaning equipment for periodic deep cleaning will be stored centrally and brought to the ward as required. Storage space for this equipment on the ward is not required.

Decontamination of equipment

2.25 The effective decontamination of medical devices is essential in reducing the risks to patients from HCAI (see the Health Act 2006: Code of practice for the prevention and control of healthcare associated infections). Facilities for decontaminating medical devices should be provided centrally.

2.26 Reference should be made to advice and guidance in HTM 01-01 – 'Decontamination of reusable medical devices' (DH 2007). Further information can be obtained from the Medicines and Healthcare products Regulatory Agency (MHRA) – see www.mhra.gov.uk/Safetyinformation/Generalsafetyinformationandadvice/Technicalinformation/Decontaminationandinfectioncontrol/CON019632.

2.27 Reference should also be made to Health Building Note 13 – 'Sterile services department' and Health Facilities Note 30 – 'Infection control in the built environment'.

Ward size

2.28 The schedule of accommodation for this Health Building Note is based on a ward of 24 beds.

2.29 The 24-bed ward has been selected as an example only, chiefly because this size is common throughout NHS hospitals. It also supports the assumption that an eight-bed cohort is the preferred workforce planning unit, with one

clinician and one support worker caring for each cohort, although this may vary according to the dependency level of patients in a cohort. Wards may be larger or smaller than the 24-bed example. The number of beds in each ward should be determined locally.

Observation and communication

2.30 Clinical staff should be able to observe and communicate easily with patients. Some clinicians may feel that single-bed rooms make observation more difficult, whereas others find that engagement with patients improves in a single-room environment because they are able to complete a whole episode of care privately without being disturbed by others.

2.31 Careful design can support good observation. For example, glazed walls or very large windows between rooms and corridors will enable staff to observe patients and, equally importantly, patients to see staff. Views into busy internal spaces such as circulation areas can provide a distraction for patients and are just as important as views of the outside world. Patients should have the means to obscure windows if required. For example, integral Venetian blinds can be lowered and closed to provide privacy.

2.32 In addition to observation through windows, the use of electronic surveillance equipment such as cameras may be considered. However, in order to guard against the potential invasion of privacy, patients must be able to choose whether cameras in their bedroom are switched on or off. In particular, the dignity and safety of patients with mental health conditions and patients who may be in a state of confusion should be carefully considered.

2.33 Use of a two-way speech facility as part of the help call system can be reassuring for patients and can reduce journey times for staff.

2.34 Two-way speech facilities can be made significantly more effective by including an option to enable staff to key in and out of rooms (staff presence). Smart technology allows such systems to be automated so that each member of staff wears a radio frequency identification (RFID) tag that remotely indicates their presence. This function allows staff to locate, and communicate with, each other more effectively. These facilities are particularly relevant in wards with a high

Figure 1 An example of good observation into a single-bed room

percentage of single rooms. Call systems should operate on a "follow the light" principle whereby over-door lights and discrete indicator units mounted at strategic positions (staff rest rooms etc) guide staff to the call origin. In addition this can be supplemented by the use of Wi-Fi/IP technology, which can be interfaced with other site communication facilities (for example single staff handset, which combines phone, pager, cardiac and help call facilities).

Clinical administration

2.35 Advances in IT are enabling clinicians to move away from traditional paper-based patient records towards more flexible computer-based systems. Electronic patient records (EPR) and picture archiving and communication systems (PACS) mean that a significant amount of direct clinical administration can now take place at the bedside using a computer.

2.36 Wireless and infra-red technologies provide an alternative to networked computers in fixed locations. They enable EPRs to be accessed from laptops and other mobile and hand-held devices that can move with staff between clinical spaces. Where computers are fixed in bed areas, design teams should ensure that patients will not be disturbed by the light from VDUs or by staff entering data at night-time.

2.37 This Health Building Note describes two locations for clinical administration close to the patient:

- in bedrooms: a clinical support zone with space for recording clinical data. In multi-bed rooms, one clinical support zone serving all four beds is sufficient;
- touchdown base: a workstation located close to patients but not within single rooms or multi-bed rooms. This is where EPRs can be accessed and updated. The touchdown base is at standing height with a perching stool. There should be a number of touchdown bases throughout the ward, which may be located in a variety of ways:
  - a dedicated touchdown base immediately outside each bedroom; or
  - a touchdown base shared between a pair of bedrooms; or
  - a touchdown base serving a small cluster of bedrooms.

2.38 This Health Building Note assumes that there is no central staff base, as staff will be working locally throughout the ward unit. It is recognised, however, that this is only one design solution and

Figure 2 Working at a touchdown base

that planning teams may wish to include a central staff base. For guidance on staff communication bases, refer to Health Building Note 00-03 – 'Clinical and clinical support spaces'.

2.39 The greeting of patients and visitors, and general administration, will be carried out at the ward reception desk by clerical staff. Depending on the layout of wards, the reception desk could be shared between two or more wards.

2.40 Pre-admission and post-discharge correspondence, private telephone calls and patient handover meetings may take place in the office/meeting room.

2.41 See Chapter 3 for detailed descriptions of clinical administration spaces.

Moving and handling patients

2.42 Patient moving/handling tasks are associated with the greatest proportion of musculoskeletal disorders in the health services (HSE 2001). One way of avoiding such injury is to move patients by use of a hoist, which requires sufficient space around the bed for staff to perform these tasks.

2.43 If mobile hoists are to be used, design teams should ensure that there is sufficient space within the ward to store them. Other devices for transferring patients will also need to be stored.

2.44 If ceiling-mounted hoists are preferred, design teams will need to consider the potential conflict with medical service units and patient entertainment systems. Consideration should also be given to the "parking" of the hoist sling when not in use. Where ceiling-mounted hoists are installed, there will still be a need for some mobile hoists, for example for lifting patients who may have fallen beyond the reach of the ceiling track. Design teams will need to consider adequate storage space for these.

2.45 The use of ceiling-mounted hoists in isolation suites requires careful consideration. See paragraph 3.31.

2.46 In multi-bed rooms, the hoisting of patients around the bed space may compromise their privacy and dignity. The use of hoists should be restricted to bed-to-chair/trolley/wheelchair transfers only.

2.47 The decision on the extent of lifting equipment provided will depend on several factors including the patient profile, and should be decided locally.

2.48 For further guidance on the space required for moving and handling patients see 'Ward layouts with single rooms and space for flexibility'.

Separate treatment room

2.49 In a ward of 100% single-bed rooms the provision of a separate treatment room is optional, as procedures that cannot be undertaken at the patient's bedside will take place in the appropriate departments. Wards with a combination of single-bed rooms and multi-bed rooms will require a separate treatment room. For further guidance see paragraph 3.35.

Supplies, storage and disposal

2.50 Supplies, storage and disposal are whole-hospital issues. An increasing number of UK hospitals have adopted a "just-in-time" supplies system, which involves a large centralised store on each site where all non-specialised clinical supplies are kept for regular distribution on a "top-up" basis to the different departments when required. Local policy will influence how much storage space is needed within acute wards.

2.51 Two options for delivering and storing clean supplies and consumables are:

- **Option 1: Local clean utility room**

  Each ward contains a clean utility room, which is restocked regularly from the hospital's central stores and pharmacy. Clinical supplies for individual bedrooms are held on supplies trolleys, which are topped up in the clean utility room and then parked in the clinical support area of each bedroom. Medicines are stored and prepared in the clean utility room. See Figure 3.

- **Option 2: Shared clean supply room plus local medicine store/preparation room**

  Clinical supplies are stored in a clean supply room serving a number of wards. Clinical supplies trolleys are restocked here and then returned to patient bedrooms where they are parked in the clinical support area. Medicines are stored and prepared separately in the ward's medicine store/preparation room. See Figure 4.

2.52 The schedules of accommodation for this Health Building Note are based on Option 2, that is, the provision of a shared clean supply room (essential complementary accommodation) and a local medicine store/preparation room. The provision of

Figure 3 Central store and clean utility room

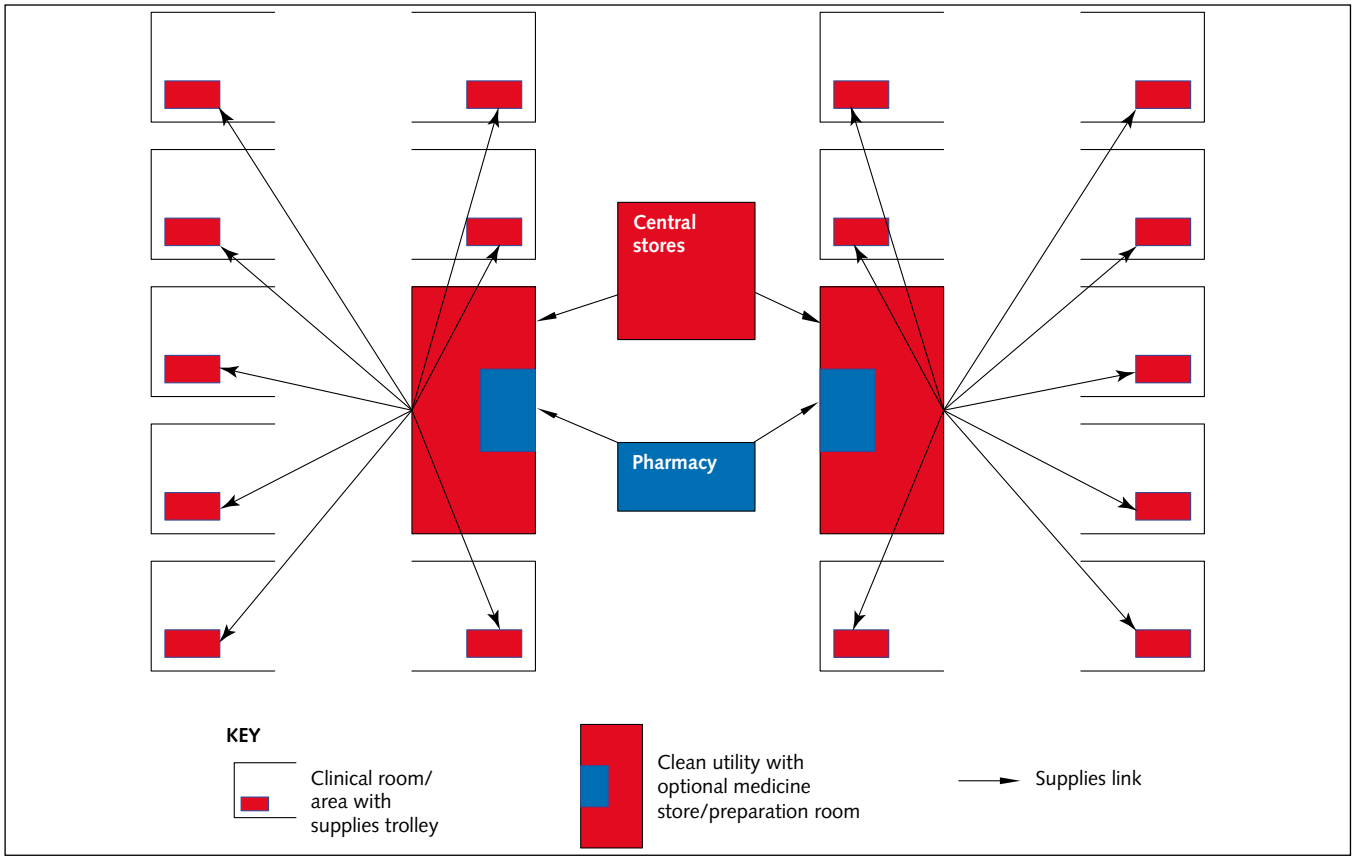
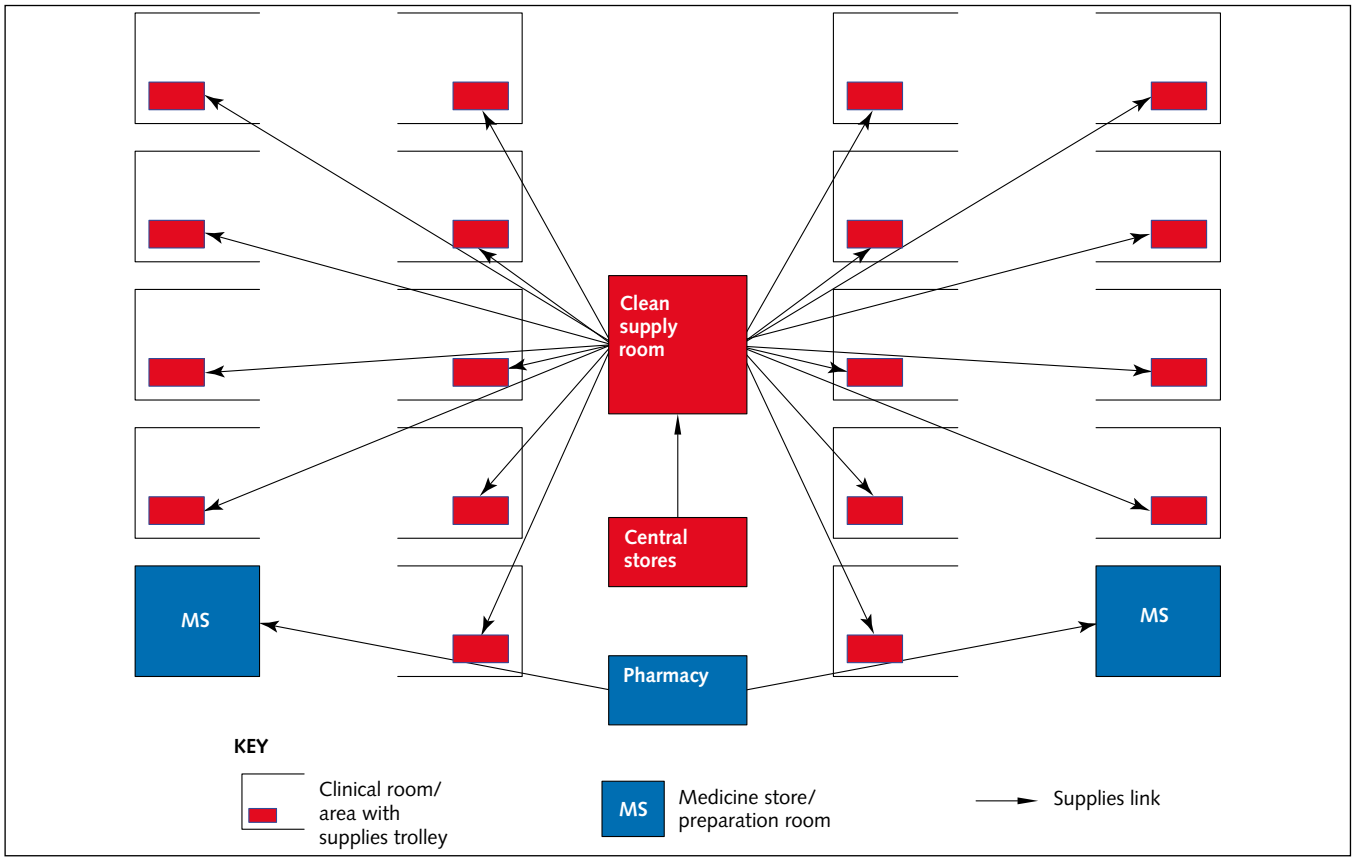


Figure 4 Clean supply room and medicine store/preparation room



a clean utility room instead of a clean supply room and medicine store/preparation room is optional.

2.53 Items for disposal will be placed in the disposal hold. Some items will be held temporarily in the dirty utility room before being transferred to the disposal room.

2.54 For further guidance refer to Health Technical Memorandum 71 – 'Materials management and modular storage'. Design teams should ensure that supplies policies and storage systems are agreed early in the design process, as they can have a significant impact on planning and room areas. See also paragraphs 3.49 and 3.54.

Dirty utility room

2.55 Ideally, a dirty utility room should serve no more than 15 beds. This reduces travel distances for staff, making better use of nursing time and reducing the risk of spillages and cross-contamination. A second dirty utility room on a ward is also helpful during outbreaks of illness or infectious diseases. The schedules of accommodation for this Health Building Note include two dirty utility rooms per 24-bed ward.

Education and training facilities

2.56 Education is important in acute wards, and appropriate facilities should be provided. Trainee clinical staff will form a proportion of staff working in acute areas. While some teaching takes place in the clinical area on a one-to-one basis or in small groups, the teaching of large groups can be an imposition on the function of the area. A seminar room, which may be shared with other wards, should be provided as essential complementary accommodation. See paragraph 3.80 for design requirements.

Lighting

2.57 Scientific evidence indicates that daylight has beneficial effects on patients (Rubin & Owens 1996), visitors and staff. It has been shown to reduce psychological problems and improve patient outcomes, and increase morale and reduce sickness levels amongst staff. An external view is also beneficial, even if limited. Windows with no significant view are preferable to no natural light at all.

2.58 All bed areas should receive natural daylight. Where artificial lighting is provided in spaces where patients are examined or treated, it should enable changes in skin tone and colour to be clearly defined and easily identified. The quality of lighting will need to be considered if video consultation is likely to take place. Lighting is also important for effective cleaning of corners and edges that can harbour dust. Adjustable task lighting should be provided at the bedhead for patients who wish to read.

2.59 Ceiling-mounted fixed luminaires should not be sited immediately above positions where people lie on a bed, couch or trolley to avoid glare. This applies to all spaces where people are consulted, examined and treated.

2.60 Refer to paragraph 4.54 for more detailed guidance.

Views from windows

2.61 Wherever possible, beds should be positioned to enable patients to have a view of the outside world, which might include landscaped gardens or a courtyard with good-quality natural planting. Sill heights of windows should be low enough to allow seated people to see outside. Views out over flat roofs and roof-top plantrooms should be avoided.

2.62 The means for patients to control curtains or blinds for privacy should be included (motorised curtains are an option for non-ambulant patients). For further guidance refer to Health Technical Memorandum 55 – 'Windows'.

Courtyards

2.63 Well-proportioned courtyards enable rooms to receive natural daylight and ventilation in addition to providing a stimulating outlook from bedrooms, day spaces and staff areas. Layout and planting can help to preserve privacy in surrounding rooms. Courtyards may also provide a suitable location for artwork.

2.64 It is desirable to provide access to courtyards wherever possible, and thresholds should be designed to facilitate access. Short lengths of handrail should be provided at strategic points around the courtyard for patients who need support. Seating should also be provided. Access for maintenance and cleaning should be sited so that patients and staff are not disturbed. Adequate water points, power points and lighting, if necessary, should be provided in all courtyards..

Courtyard, York Hospital (reproduced with the permission of the King's Fund Enhancing the Healing Environment Programme, and York Hospitals NHS Trust)

Art

2.65 There is sufficient evidence to demonstrate that appropriate art and decor reduces the physical and emotional stress of patients and staff. It can also be used to assist wayfinding. Art should be integrated into a scheme rather than added as an afterthought.

2.66 Art need not be limited to pictures on a wall. It may also include murals, prints, photographs, sculptures, decorative tiles, ceramics and textile hangings. Works of art by local artists and craftspeople may lend a special identity to the facility.

2.67 Artworks should be easy to clean and as dust-free as possible. Design teams should seek the advice of the infection control team.

2.68 For further guidance refer to 'The art of good health – A practical handbook' and 'The art of good health – Using visual arts in healthcare'.

Environmental control

2.69 As noise is such a significant issue for patients, design that separates busy activity areas and patient bed spaces and the use of sound-absorbing materials should be adopted. Partitions between areas for confidential discussions should also be sufficient to prevent overhearing.

Telephone, TV and radio facilities

2.70 It is beneficial for patients to have convenient access to telephone, TV and radio facilities. Planning teams should identify suitable systems to meet local requirements.

Finishes

2.71 The choice of finishes should form an integral part of the design process and be co-ordinated within the overall design scheme. The selection of colours and reflectances can have a significant impact on the lighting within the room and will need to be coordinated with the lighting design. Finishes

should be functional and compatible with the need for comfort, cleanliness and safety. Cleaning regimens should be considered when materials are selected. The advice of the infection control team should be sought throughout the project.

Floors

2.72 Flooring should be smooth, easily cleanable and wear-resistant. There should be coved skirtings, which allow easy cleaning and avoid microbial colonisation. The material used for skirtings should be integral with, and have properties similar to, the floor finish. In areas where frequent wet cleaning methods are employed, the flooring material should be unaffected by disinfectants.

2.73 Carpets should not be used in clinical areas. Short-pile carpets may be considered for use in offices and staff rest rooms, but not the reception area. Carpets are extremely difficult to keep clean and need to be meticulously maintained.

2.74 All flooring should be slip-resistant. Design teams might also consider the use of impact-absorbing floor finishes, which will reduce the severity of injury should a patient fall.

2.75 For further guidance on flooring refer to Health Technical Memorandum 61 – 'Flooring' and 'Safer surfaces to walk on – reducing the risk of slipping' (CIRIA 2006).

Walls

2.76 Wall finishes should be durable and able to withstand wet cleaning and the accidental impact of trolleys and mobile equipment. Especially vulnerable points should have additional protection. Smooth paint surfaces are the easiest for cleaning – eggshell or vinyl silk emulsion. A matte finish is not recommended.

2.77 Walls in kitchen, shower and toilet areas should be easily cleanable. The advice of the infection control team should be sought.

2.78 For guidance on handrails on walls in circulation areas, refer to Health Building Note 00-04 – 'Circulation and communication spaces'.

Ceilings

2.79 Adequate ceiling heights in clinical areas are crucial. The underside of a finished ceiling in bedded areas should be at least 2700 mm from the floor. There may be a difficulty in complying with ceiling heights throughout the hospital in the case of refurbishments, but within a new-build this difficulty should be overcome.

2.80 Care should be taken when calculating the correct position and weight-bearing factors for hoists and other lifting equipment, lighting, patient entertainment and data management systems.

2.81 The use of acoustic ceiling materials in corridors and public spaces such as waiting areas may be helpful in reducing noise levels.

2.82 The design team, infection control officer and facilities manager should work together to ensure that the choice of ceiling and the maintenance routines are satisfactory. Service access panels should be avoided in bedrooms wherever possible.

2.83 For further guidance refer to Health Technical Memorandum 60 – 'Ceilings'.

Doors and frames

2.84 Materials used for doors and frames should be able to withstand frequent impact from mobile equipment and should be easily cleanable. All double-swing doors should incorporate appropriate glass vision panels; however, privacy, safety and other considerations may require the panels on bedroom doors to be capable of being obscured, possibly with integral blinds.

2.85 Where necessary it should be possible to secure doors in the open position. In the case of fire doors, this should only be by means of an approved or recognised product linked to the fire alarm and detection system, which is designed to fail to safety. Magnetic door retainers should not restrict the movement of traffic.

2.86 Reference should be made to Health Technical Memorandum 55 – 'Internal doorsets', Health Building Note 00-04 – 'Circulation and communication spaces' and Health Technical Memorandum 05-01 – 'Managing healthcare fire safety'.

Windows

2.87 Guidance on types of window and on the safety aspects is available in Health Technical Memorandum 55 – 'Windows'.

2.88 In addition to the guidance and various statutory requirements, the following issues require consideration:

- daylight and natural ventilation;

- safety;
- attenuation against noise;
- user comfort;
- energy conservation;
- solar control;
- the prevention of glare; and
- the provision of a visual link with the outside world balanced with the need to obscure the views into some areas from the outside.

2.89 Windows in single-bed rooms should be openable but with safety restrictions. They should be double-glazed as a minimum to provide thermal and sound insulation.

2.90 It should be possible for cleaners to gain easy access to the inside and outside of windows.

Maintenance and cleaning

2.91 Materials and finishes should be selected to minimise maintenance and be compatible with their intended function. Building elements that require frequent redecoration or are difficult to service or clean should be avoided. Special design consideration should be given to entrances, corners, partitions, counters and other elements that may be subjected to heavy use. Wall coverings should be chosen with cleaning in mind.

Wayfinding

2.92 The use of colour and art to identify particular routes and rooms can help to reduce the number of signs required. Certain doors, for example fire exit doors, will require conventional labelling. Where signs are used they should not detract from the overall ambience, and should be simple yet sufficiently explicit to be understood without confusing.

2.93 Reference should be made to 'Wayfinding: Effective wayfinding and signing systems. Guidance for healthcare facilities'.

Security

2.94 There are a number of security issues to be considered in the planning and design of in-patient accommodation: natural and mechanical surveillance (CCTV), natural ventilation and the night-time cooling of spaces, lighting, wayfinding, access control, security of property and assets, security of drugs, and the protection of NHS staff against violence. The Local Security Management Specialist (LSMS) will be able to identify security risks and offer advice on measures that can be implemented to reduce them.

2.95 Where entryphone/intercom systems and CCTV are installed, they should be linked to the reception desk and appropriate touchdown bases to control access through the main entrance. The LSMS should be consulted on the installation of all access control systems.

Fire safety

2.96 It is important to establish during the design stage those aspects of fire safety strategy that affect the design, configuration and structure of in-patient accommodation. The design team should discuss and verify their proposals with the Trust Fire Officer and the Building Control Authority or Approved Inspector, and ensure that the design team and all other design staff are fully acquainted with the fire safety strategy for the design in terms of operation (staff responsibilities, equipment provision, and building and engineering layouts). For further guidance refer to Health Technical Memorandum 05-01 – 'Managing healthcare fire safety'.

Compliance with statutory and other requirements

2.97 This Health Building Note takes account, as far as possible, of all statutory and other requirements and guidance in force or available at the time of publication. The following is intended only as a brief summary of compliance requirements.

People with accessibility difficulties (Disability Discrimination Act 1995)

2.98 Authorities should comply with the provisions of the Disability Discrimination Act (1995) and the Building Regulations Approved Document M 'Access to and use of buildings' (ODPM 2003). See also BS 8300:2001 'Design of buildings and their approaches to meet the needs of disabled people – Code of Practice'. Design teams should also refer to Health Building Note 00-02 – 'Sanitary spaces', Health Building Note 00-03 – 'Clinical and clinical support spaces', and Health Building Note 00-04 – 'Circulation and communication spaces', as these set out the standards required specifically for healthcare

premises and are in some cases more demanding than other more general guidance. Reference should also be made to 'Wayfinding: Effective wayfinding and signing systems. Guidance for healthcare facilities'.

Manual Handling Operations Regulations 1992

2.99 Manual handling and health and safety regulations relate to lifting and turning patients and moving heavy equipment. Planning and design teams should take these into account when designing facilities. Refer also to paragraph 2.42.

The Construction (Design and Management) Regulations 2007

2.100 These regulations, and the related Approved Code of Practice, focus attention on health and safety planning and management throughout construction projects, from design concept onwards. Designers have a duty to eliminate hazards and reduce risks. Planning teams have a duty to provide project-specific health and safety information needed to identify hazards and risks.

Safety regulations

2.101 For health and safety regulations see Health Technical Memorandum 00 – 'Policies and principles'.

Environmental Protection Act 1990

2.102 See Health Technical Memorandum 07 – 'Environment and sustainability'.

3 Specific functional and design requirements

Functional relationships

3.1 A 24-bed ward may function as a stand-alone unit within which beds are grouped into two or more clusters. Alternatively, depending on the layout of in-patient floors, some bed clusters may be configured to be shared between wards to provide flexibility. See Figure 5.

3.2 Each bed cluster will be serviced by staff and support facilities, therefore access to supplies and means of disposal should ideally be local to each cluster. It is recommended that rooms be serviced by trolley, like hotels, so that staff do not need to walk far from their bed cluster unless they require access to a shared facility, for example the medicine store/preparation room. The preferred option will be to stock each room for linen, clinical consumables and disposable items, and rely on "just-in-time" and "top-up" supplies.

3.3 The reception desk will be at the entrance to a ward, together with a waiting area and facilities for visitors. The entrance to accommodation is usually controlled by staff via intercom.

3.4 Regeneration kitchens should not be situated centrally within a ward, although the food trolley bay will need to be located between the clusters.

3.5 Ward layouts will depend on local conditions and overall bed numbers.

Description of room spaces

BED AND SANITARY FACILITIES

Bed spaces

3.6 The number of activities taking place at the bedside is increasing. The period that a patient spends in hospital is shortening, and is limited to active interventions for diagnosis, treatment and immediate recovery. The level of acuity and dependence of patients once interventions begin until discharge is relatively high; movement by staff around the patient may be considerable, and there is likely to be an increasing but intermittent use of equipment and aids at the bedside. The activities and the patient's response to interventions are recorded, increasingly on computer-held databases. Relatives and visitors are encouraged to be more involved in patient care and support.

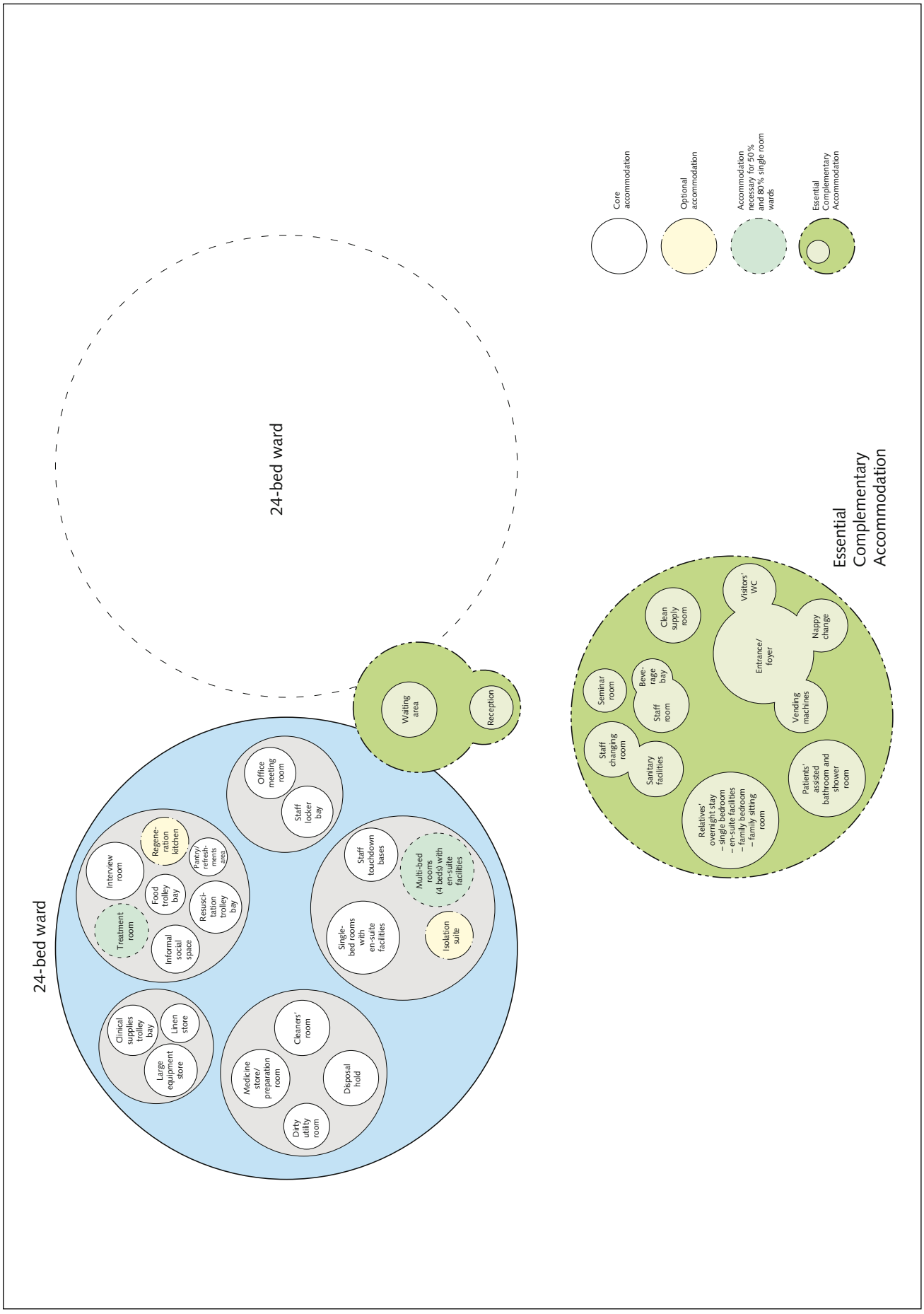
3.7 There are three distinct categories of direct activity that take place:

- clinical treatment and care:
  - admission, with the intimate discussion of personal matters;
  - specific medical and nursing interventions and observation;
  - rehabilitation;
  - informing, discussing, listening and advising both patients and relatives;
- personal care and maintenance:
  - sleeping and resting;
  - eating, drinking, washing and toileting;
  - entertainment/diversion, reading, watching the television;
  - receiving visitors;
- support activities:
  - preparation of clinical procedures;
  - maintaining records;
  - holding stores;
  - communicating;
  - developing staff skills.

3.8 The example layout for a single-bed room in Appendix 1 shows the zones to enable these activities to take place around a bed space.

3.9 The bed space should allow procedures to be carried out from either side of the bed with adequate circulation space so that medical emergency teams and equipment can gain access to

Figure 5 Functional relationships



the patient. There should be adequate space for moveable furniture and unobstructed access for wheelchairs, as well as space to accommodate overnight visitors.

3.10 The alternative to a single-bed room is a multi-bed room, in which the different activity zones move to a greater or lesser degree further away from the bedside, and may be shared to support all the beds in the multi-bed room. The preferred maximum number of beds in a multi-bed room is four. This enables the potential for better gender separation and improved privacy within a 24-bed ward comprising six four-bed rooms. It also gives each patient a corner as a "home base" and a neighbour on one side only.

3.11 All single- and multi-bed rooms should be provided with en-suite sanitary facilities and, whether in a single- or a multi-bed room, all bed spaces should be provided with:

- furniture:
  - a variable-height bed;
  - a bedside locker, with a lockable compartment for storing medication;
  - an overbed table;
  - an easy chair;
  - a bedhead luminaire;
- a co-ordinated bedhead services arrangement incorporating:
  - electrical socket-outlets;
  - luminaire control switch;
  - oxygen, medical air and vacuum outlets (refer to Health Technical Memorandum 02-01 – 'Medical gas pipeline systems');
- a patient services system (which may be incorporated into the bedhead services panel) including:
  - help call button, including two-way speech facilities (consideration might also be given to alternative call systems, such as blow devices, for patients who cannot use their hands);
  - reassurance light;
  - luminaire switch;

Kidderminster Treatment Centre (Photographer: David Whyte, Copyright: MAAP Architects Ltd)

- patient entertainment facilities including:
  - radio;
  - TV;
  - telephone;
  - headset outlet.
- Additionally, in single rooms:
  - space for storing clothes and shoes;
  - space for a relative's overnight stay bed;
  - a small refrigerator for a patient's personal use (optional).
- Facilities for staff:
  - space for clinical administration, including data outlet;
  - a clinical wash-hand basin, plus antibacterial hand-rub dispensers;
  - storage for a day's supply of linen and surgical goods/supplies.

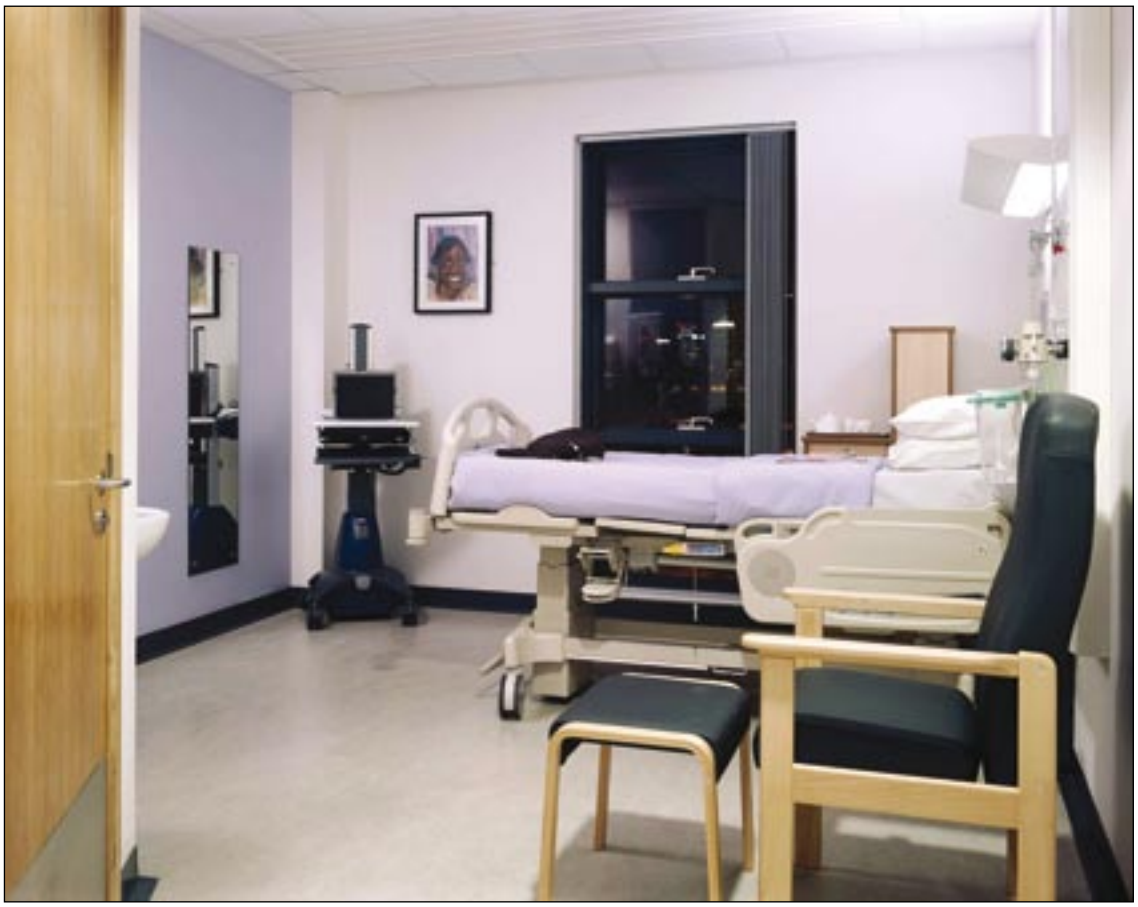
These provisions are necessary as the basis of a desirable environment.

3.12 In multi-bed rooms each bed space should be separated to provide a degree of privacy. If curtains are used they should be shadow-proof and flame-retardant. When full-height curtains are drawn, the bed space should still be well illuminated and ventilated. Curtains may be disposable. Highly-patterned curtains should be avoided, as they can cause visual disturbances in patients who are confused or heavily sedated.

3.13 Each four-bed room should include two clinical wash-hand basins for staff use. These should be located to be highly visible and convenient for staff to use, both on entering and leaving the room and when moving from one patient to another. A clinical support zone with space for a computer and storage for a day's supply of linen and clinical goods is required for each multi-bed bay. A single workstation will suffice for a group of beds.

3.14 Design teams should decide in consultation with the local fire authority whether multi-bed rooms should or should not be fitted with doors for fire safety reasons, for example to limit the spread of smoke. The infection control team should also be consulted on the use of doors in multi-bed rooms.

Brent Emergency Care and Diagnostic Centre, North West London Hospitals NHS Trust (Photographer: Lisa Payne)



Newham Gateway Surgical Centre, Newham University Hospitals NHS Trust

Design for four-bed room. MAS Project, Sherwood Forest Hospitals NHS Foundation Trust
(Swanke Hayden Connell Architects on behalf of Skanska Central Nottinghamshire Joint Venture)

3.15 Each multi-bed room should have easy access to informal social space, as the majority of patients, although highly dependent, are encouraged out of bed.

3.16 Example layouts of single and multi-bed rooms are contained in Appendix 1.

Sanitary facilities

Single room en-suite shower room

3.17 Each single-bed room should have an en-suite WC, shower and wash basin.

3.18 For detailed guidance on this en-suite and alternative designs for sanitary facilities, refer to Health Building Note 00-02 – 'Sanitary spaces'.

Multi-bed room sanitary facilities

3.19 A multi-bed room should have en-suite sanitary facilities, which can be accessed by patients without the need for them to travel or cross circulation routes. It is convenient to provide an assisted shower room (with WC, shower and wash-hand basin) and a separate ambulant WC (with hand-rinse basin), both en-suite to the bed area. Thus one person showering does not prevent others from using the WC. However, privacy and dignity should be ensured by the provision of appropriate security devices, locks etc. En-suite doors should not open directly onto immediate bed areas.

3.20 Appendix 1 provides an example layout for multi-bed room sanitary facilities. For detailed guidance on sanitary facilities for multi-bed rooms, refer to Health Building Note 00-02 – 'Sanitary spaces'.

General

3.21 Design teams should consider motion sensors for lighting in sanitary facilities. This may help to avoid the problem of fragile patients using sanitary facilities in the dark. An electronic sensor for the WC flush is also a project option.

3.22 The wet shower area of the compartment should be separated by a curtain from the remainder, which should serve as the drying area. There should not be a step between the wet and dry areas, but there is a requirement for sufficient slope of the floor to the outlet, so as to assure proper drainage and prevent spillage of water into the dry areas. The floor surface should be slip-resistant. The gradient of the floor of the wet area should ensure effective drainage to the waste outlet to prevent ponding.

3.23 The cord of the help call system should be easily identifiable, accessible from the wet area, and should descend far enough to be within the reach of a patient who has fallen or collapsed.

3.24 Ventilation should preclude excessive heat, humidity and odours.

3.25 For more detailed guidance on sanitary facilities, refer to Health Building Note 00-02 – 'Sanitary spaces'.

Assisted bathroom or shower room (Essential complementary accommodation)

3.26 In addition to en-suite facilities, an assisted bathroom or shower room is required, although this may be shared with other wards.

3.27 Patients using an assisted bathroom or shower room may arrive in a wheelchair or on a shower trolley. Staff assist the patient in bathing/showering and associated activities, and may also give treatments. In bathrooms a variable-height peninsular bath is essential. In both bathrooms and shower rooms there should be sufficient space to accommodate three staff, and to permit the manoeuvring of support equipment such as a hoist. The room should also contain a WC and wash basin.

3.28 For more detailed guidance refer to Health Building Note 00-02 – 'Sanitary spaces'.

Isolation suite (Optional accommodation)

3.29 An isolation suite comprises a single-bed room, en-suite shower room and a ventilated lobby.

3.30 For detailed guidance on isolation suites and example layouts see Health Building Note 4 Supplement 1 – 'Isolation facilities in acute settings'.

3.31 If it is proposed to install a ceiling hoist track system between an isolation room and en-suite shower room, the design should not compromise the airflow pattern between the two rooms. The design of the isolation suite works on the principle of supplying air from the lobby at high level to the bedroom and removing it at low level via a transfer grille in the en-suite door. This ensures good mixing of the air in the bedroom, with a consequent dilution of possible contaminants. The wall area above the outward-opening door that is penetrated by the track and suspension system should not therefore allow unrestricted airflow between the bedroom and en-suite at high level.

Suitably profiled filler boards and the use of brush seals will ensure an adequate resistance to flow and prevent short-circuiting.

Touchdown bases

3.32 In addition to workstations in bedrooms, space is required close to patients, but not within bedrooms, for clinical administration. The touchdown base provides a place for accessing and updating EPRs and other computer work.

3.33 For detailed guidance on touchdown bases see Health Building Note 00-03 – 'Clinical and clinical support spaces'.

PATIENT SUPPORT FACILITIES

3.34 A variety of support facilities are required for patients. For example, where multi-bed rooms are used there should also be separate rooms for treatment and for one-to-one discussions, interviews or education.

Treatment room

3.35 In wards with multi-bed bays, a treatment room will be required where clinical procedures can be carried out in private. In wards with 100% single rooms, the provision of a treatment room is optional.

3.36 Patients using the treatment room may be ambulant, in a wheelchair, on a trolley or on a bed; the door width should be sufficient to permit their passage.

3.37 Refer to Health Building Note 00-03 – 'Clinical and clinical support spaces' for detailed guidance.

Interview room

3.38 Discussions with patients and relatives may be carried out in an interview room. The room may also be used by staff for staff interviews, appraisal and counselling. Good acoustic privacy is required; refer to Health Technical Memorandum 08-01 – 'Acoustics'. Visual privacy should also be ensured through the use of blinds or curtains at the windows. Glazed panels in doors should be capable of being obscured, preferably with integrated blinds.

3.39 The designer should aim to create an environment that is cheerful, comfortable and warm. Appropriate lighting and decorative textures such as pictures and plants can help to provide a pleasant atmosphere. Finishes and furniture will have an important influence on the room. Easy chairs and coffee tables should be provided. It is important that rooms in which patients will be sitting are free from draughts.

3.40 Refer to Health Building Note 00-03 – 'Clinical and clinical support spaces' for detailed guidance.

Informal social space

3.41 For patients – whether in single-bed rooms or multi-bed bays – open yet intimate areas recognisably intended for casual meeting and talking may be all that is required to enable patients who wish to socialise without the provision of dedicated day rooms. Planning decisions should take account of patient culture and preferences in terms of privacy, modesty and same-sex accommodation. Where day rooms are provided they should be as inviting as possible, with hotel-style or domestic furnishing. It should be possible for patients to control environmental features such as lighting.

Pantry/refreshments area

3.42 The pantry/refreshments area should be equipped with facilities for:

a. the preparation of beverages and light snacks;

b. the filling of patients' water jugs;

c. storage of dry goods, and a limited amount of crockery and cutlery;

d. refrigeration of perishable food.

3.43 An industrial-grade mechanical dishwasher is required in order to meet the rinse cycle temperatures required for infection control purposes. Separate facilities for washing-up and wash-handing are required. Crockery and cutlery used for main meals is returned to the central washing-up service. There should be adequate storage for jugs.

3.44 For further guidance refer to Health Building Note 00-03 – 'Clinical and clinical support spaces'.

Regeneration kitchen (Optional accommodation)

3.45 A regeneration kitchen will be required where the local catering policy requires food to be delivered to a department for regeneration and then distributed to a number of wards. The design of the regeneration kitchen should be determined by the catering contractor.

Parking bay: food trolley

3.46 A bay is required for parking the food trolley while meals are distributed to patients.

Resuscitation trolley bay

3.47 Emergency equipment – such as the resuscitation trolley, which includes a defibrillator, medical gas cylinder and portable suction machine – should be parked in a bay where it is accessible from the bedrooms, but should not obstruct circulation areas.

STORAGE SPACES

3.48 Store rooms are a costly means of providing storage, as they require internal circulation space. Storage in relatively shallow cupboards or doored alcoves opening directly from circulation areas may be more convenient and cheaper. The latter is particularly useful for goods for which stocks are maintained by an exchange trolley service. Cupboards in corridors may need to be recessed so that the doors, when open, do not obstruct movement in the corridor.

Clean supply room (Essential complementary accommodation)

3.49 This room provides storage for sterile supplies and consumables for a number of wards. Supplies trolleys are brought here for restocking. For detailed guidance on the clean supply room see Health Building Note 00-03 – 'Clinical and clinical support spaces'.

Clinical supplies trolley

3.50 Clean and sterile goods for daily use will be held on trolleys, at the point of use in bedrooms.

Large equipment store

3.51 This store is required for bulky items of equipment, bed accessories and therapy aids. Open shelving, hanging rails and hooks as well as free-standing space for heavy equipment such as hoists and weighing machines is required. Sockets may be useful for equipment that needs charging. Disposable items delivered in bulk packages to the clinical area will require storage.

3.52 Design teams may decide that more than one large equipment store is required. A number of local stores adjacent to single-bed rooms or multi-bed rooms might be more efficient.

Linen store

3.53 For infection control purposes, clean linen should be kept in a closed store rather than on open trolleys. Local policy will determine whether linen is stored in single-bed rooms or in a central store.

UTILITIES

Medicine store/preparation room

Large equipment store

3.54 The medicine store/preparation room is required for the storage and preparation of all the medicines to be used on the ward. This will include controlled drugs, medicines requiring refrigeration, and consumables such as syringes and needles. Rechargeable syringe drivers and infusers may be stored here. For detailed guidance refer to Health Building Note 00-03 – 'Clinical and clinical support spaces'.

bedpans etc. Such equipment may generate significant noise levels, and care should be taken to eliminate this. Colour-coded disposal bags for the bagging of waste materials should be kept here.

3.56 For detailed guidance refer to Health Building Note 00-03 – 'Clinical and clinical support spaces'.

Cleaners' room

3.57 The cleaners' room is the base from which domestic service staff provide the immediate day-to-day cleaning service.

3.58 For detailed guidance refer to Health Building Note 00-03 – 'Clinical and clinical support spaces'.

Disposal hold

3.59 The disposal hold is the temporary storage point for all items of supplies and equipment which have to be removed for cleaning, reprocessing or destruction, for example clinical and non-clinical waste and sterile services department items.

3.60 The waste disposal of used items should be consistent with the current hospital policy for the disposal of clinical waste.

3.61 For detailed guidance refer to Health Building Note 00-03 – 'Clinical and clinical support spaces'.

Switchgear cupboard

3.62 A departmental switchcupboard housing the main isolators and distribution switchgear should be:

a. accessible directly from the circulation area (access space may be part of the circulation area);

b. sited away from water services;

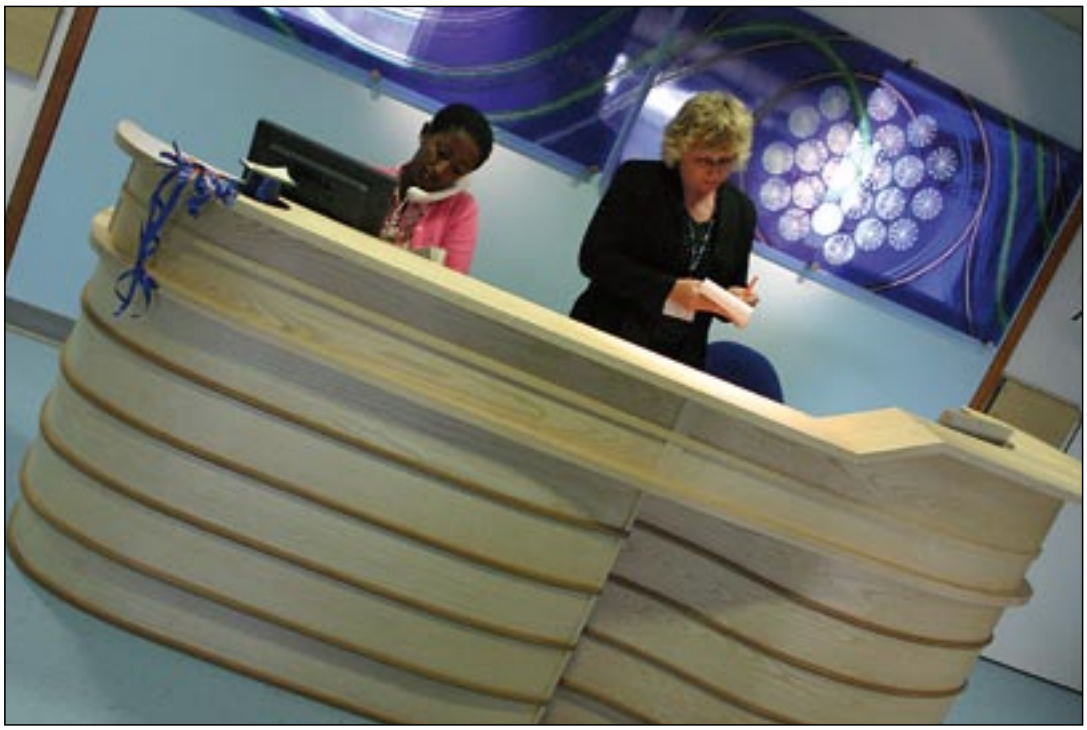
c. lockable.

3.63 Where possible, the cupboard should be sited within the department. There should be clear and safe access for maintenance staff, and care should be taken to ensure that safety is not compromised, during maintenance, from passing traffic or the opening of adjacent doors.

ADMINISTRATION AREAS AND STAFF FACILITIES

Reception and waiting area (Essential complementary accommodation)

3.64 The reception desk should be in a prominent position at the entrance to the ward. The counter needs to be stepped so that a person in a wheelchair can see and speak easily to the receptionist. The desk requires sufficient working space for a receptionist and one other who will welcome patients, relatives and staff, and undertake the local clerical and administrative duties. The reception



Reception desk at East Somerset NHS Trust (Reproduced with the permission of the King's Fund Enhancing the Healing Environment Programme, and East Somerset NHS Trust)

desk and waiting area may be shared between wards.

3.65 The reception desk will be linked by computer to all areas. Space is required for a computer terminal and associated equipment, including a printer. The reception desk should be designed to allow natural surveillance of all entrances and waiting areas and, where possible, corridors leading to treatment rooms. CCTV should be installed in all reception and waiting areas.

3.66 A seated area should be provided near the reception desk for patients, relatives and visitors waiting to be received. Access to visitors' WCs, nappy change facilities and vending machines is required. The waiting area may also serve as additional informal day space for patients.

Office/meeting room

3.67 This office is a multi-purpose office, but is likely to be used principally by clinical staff to complete notes on discharged patients, hold patient handover meetings, undertake telephone calls and for staff discussions.

3.68 It should be located close to bed areas and sized to accommodate two computer workstations, a table and eight to ten people. A cupboard or shelves for storing a limited amount of stationery should be provided.

3.69 There is no separate medical staff or ward manager's office.

Staff locker bay

3.70 Staff will require local lockers to hold small personal belongings while on duty. It may be convenient to locate lockers within or adjacent to the staff room/beverage bay where provided.

3.71 In wards that contain the staff changing facilities, staff will have easy access to the lockers in the changing rooms and a separate locker bay will not be necessary.

Staff WC

3.72 A WC is required for clinical staff working on the ward. In wards that contain the staff changing facilities, staff will have easy access to sanitary facilities and a separate WC will not be necessary.

Staff changing room (Essential complementary accommodation)

3.73 Facilities are required for staff changing, clothes storage, showers and sanitary facilities. These facilities may be shared between several wards. Estimates of the amount of changing space and locker provision should take into account the numbers of full-time and part-time staff, including trainees and students.

3.74 Separate changing rooms for males and females are needed, each with their own shower rooms, WCs, shaving point, power points for hair dryers and a large, well-illuminated mirror with a shelf. The sanitary and shower facilities should be self-contained, full-height rooms to provide maximum privacy. The provision of cubicle partitions is not an acceptable alternative.

3.75 Access control should be fitted to all staff changing and sanitary facilities.

3.76 Refer to Health Building Note 00-03 – 'Clinical and clinical support spaces'.

Staff rest room (Essential complementary accommodation)

3.77 Rest room facilities are required where staff can relax and take beverages. These may be shared between several wards. Rest rooms should have windows and a pleasant outlook and be comfortably furnished.

3.78 The rest room should include a beverage bay with facilities for preparing beverages for staff, for washing and storing crockery and cutlery, for storing a limited quantity of dry goods, and for the refrigerated storage of milk etc.

3.79 Refer to Health Building Note 00-03 – 'Clinical and clinical support spaces'.

Seminar room (Essential complementary accommodation)

3.80 It is assumed that a designated education centre with conference facilities for multi-disciplinary use will be available on site.

4 General engineering principles

Introduction

4.1 This chapter provides general guidance on the engineering, technical and environmental aspects of healthcare building design. Specific guidance in relation to in-patient facilities for adults is shown in **bold**.

4.2 Consultation should take place at project and design team level to ensure understanding of key issues, healthcare delivery and the appropriate standards for healthcare engineering services.

4.3 Designers should ensure that they read this publication as a whole, since further engineering guidance may be outlined in and cross-referenced within other sections.

4.4 The Health Technical Memorandum series is supported by an overarching publication, 'Policies and Principles – Best Practice Guidance for Healthcare Engineering' (Health Technical Memorandum 00), which covers the following issues:

a. overview of engineering services guidance;

b. statutory and legislative requirements;

c. professional support;

d. operational policy;

e. training and workforce development;

f. emergency procedures and contingency planning;

g. training, information and communications;

h. maintenance;

j. engineering services.

4.5 Guidance on specific types of engineering services can be found within the Health Technical Memorandum '0' series of documents as follows:

a. Decontamination (Health Technical Memorandum 01);

b. Medical gases (Health Technical Memorandum 02);

c. Ventilation systems (Health Technical Memorandum 03;

d. Water systems (Health Technical Memorandum 04;

e. Fire safety (Health Technical Memorandum 05);

f. Electrical services (Health Technical Memorandum 06);

g. Environment and sustainability (Health Technical Memorandum 07);

h Specialist services (Health Technical Memorandum 08);

j. other existing HTM 2000 series guidance documents.

Space requirements for services and plant

4.6 A high level of availability of engineering plant and services is critical to the ability of the facility to function safely and efficiently. It is therefore essential that the building design should incorporate adequate space for the full range of building services and the requirements for installation and maintenance of plant, ductwork, pipework and cabling.

4.7 Space for plant and services should provide:

a. easy and safe means of access;

b. secure accommodation protected from unauthorised access;

c. adequate space around the plant services to permit inspection maintenance and replacement.

4.8 Guidance on spatial requirements for engineering plant and services is contained in Health Technical Memorandum 00 – 'Policies and principles – best practice guidance for healthcare engineering'. Further useful information regarding the provision

of space for plant is contained in BSRIA Technical Note TN 9/92, and for building services distribution systems in BSRIA Technical Note TN 10/92.

4.9 With the exception of drainage and some heating pipework, engineering services should not be brought from the above-ceiling space of a floor below. Service distribution to a particular area should be contained within service spaces on that floor.

4.10 Plantrooms, particularly for air-conditioning and ventilation, should be located as close as possible to the areas they serve, thus minimising the amount of space necessary to accommodate large ducts.

4.11 Care should be taken to ensure that noise and structure-borne vibration cannot be transmitted beyond the plantroom. Further guidance on acoustics and vibration can be found in Health Technical Memorandum 08-01 – 'Acoustics'.

Decontamination

4.12 Decontamination is the combination of processes (including cleaning, disinfection and sterilization) used to render a re-usable item safe for further use on patients and handling by staff. The effective decontamination of re-usable surgical instruments is essential in minimising the risk of transmission of infectious agents. Further guidance is set out in Health Technical Memorandum 01-01 – 'Decontamination of reusable medical devices' (Parts A and B plus guidance for specific facilities).

Mechanical services

Piped medical gases

4.13 Piped medical gases should be designed in accordance with the requirements of Health Technical Memorandum 02-01 – 'Medical gas pipeline systems'.

Heating

4.14 General space heating requirements may be met by a variety of systems including radiators and radiant panels, or within the air-conditioning system. Designers should ensure that the most appropriate method is employed with regard to the healthcare environment being provided.

4.15 Where heat emitters are used, the surface temperature should not exceed 43ºC. Exposed heating pipework, accessible to touch, should be encased and/or insulated. Further information is given in Health Guidance Note '"Safe" hot water and surface temperatures'. Particular care should be taken when providing systems within mental health facilities.

4.16 Care should be taken to ensure that heat emitters do not adversely affect the local temperature conditions of adjacent storage and preparation areas.

4.17 Where used, radiators should be located under windows or against exposed walls. There should be space between the top of the radiator and the windowsill to prevent curtains reducing the output. There should be adequate space underneath to allow cleaning equipment to be used.

4.18 Where appropriate, heating controls should be provided to modulate heating circuit flow temperatures in accordance with external temperature. Radiators or radiant panels may also be used to offset building fabric heat losses in mechanically ventilated spaces. The system should be designed to ensure that the heating and ventilation systems operate in a coordinated manner and do not cause the space to overheat. Heat emitters in single-bed rooms should be provided with controls so that patients can adjust the room temperature.

4.19 Ceiling-mounted heating panels can operate at higher surface temperatures than 43ºC as long as the surface is not easily accessible. Heating panels should preferably run around the perimeter of the building. Panels should not be located over beds, patient trolley positions, or in other locations where they might radiate directly onto a patient or member of staff for a prolonged period.

4.20 Ceiling panels should be selected to aesthetically match the adjacent ceiling, and should be sealed to the adjacent ceiling by means of a gasket of similar.

Ventilation

4.21 For areas where it is absolutely necessary to install mechanical ventilation, ventilation systems should be designed in accordance with the requirements of Health Technical Memorandum 03-01 – 'Specialised ventilation for healthcare premises'.

4.22 Air movement induced by mechanical ventilation should be from clean to dirty areas, where these areas can be defined. The design should allow for adequate flow of air into any spaces having only mechanical extract ventilation, via transfer grilles in

doors or walls. However, such arrangements should avoid the introduction of untempered air and should not prejudice fire safety or privacy.

4.23 Local exhaust ventilation (LEV) will be required where exposure (by inhalation) to substances hazardous to health cannot be controlled by other means. The Health and Safety Executive publishes guidance notes, updated annually, on occupational exposure limits (Guidance Note EH40 – 'Occupational Exposure Limits') for the control of exposure by inhalation of substances hazardous to health. The limits specified form part of the requirements of compliance with the Control of Substances Hazardous to Health Regulations 2002 (COSHH).

4.24 Further guidance on the design of LEV systems may be found in Health Technical Memorandum 03-01.

Hot and cold water systems

4.25 Hot and cold water storage and distribution systems should be designed in accordance with the requirements of Health Technical Memorandum 04-01 – 'The control of *Legionella*, hygiene, "safe" hot water, cold water and drinking water systems'.

4.26 Exposed hot-water pipework, accessible to touch, should be encased or insulated. Special care should be taken when facilities are being provided for older, confused or mental health patients.

Building management systems

4.27 All engineering plant and equipment associated with the internal environment should, where possible, be controlled, monitored and regulated by a building management system (BMS) in accordance with the provisions of Health Technical Memorandum 2005 – 'Building management systems'.

4.28 Requirements for the monitoring and control of plant and systems are also covered in the Health Technical Memorandum that relates to the particular plant or system.

Internal drainage

4.29 A system of soil and waste drainage including anti-siphon and ventilation pipework should be provided in accordance with BS EN 12056.

4.30 Where plastic pipework materials are used, suitable intumescent collars should be fitted when breaching fire compartments, and acoustic wrapping should be applied where drainage runs above wards and other sensitive areas.

4.31 The gradient of branch drains should be uniform and adequate to convey the maximum discharge to the stack without blockage. Practical considerations such as available angles of bends, junctions and their assembly, as well as space constraints, will normally limit the gradient to about 1:50 (20 mm/m).

4.32 For larger pipes, for example 100 mm in diameter, the gradient may be less, but this will require high-quality workmanship if an adequate self-cleaning flow is to be maintained. **Bedpan washers or macerators should discharge with a short branch to a vertical stack or horizontal drain. The waste pipe should not be installed above or close to heating or hot-water mains. If a bedpan washer or macerator discharges to a 100 mm drain, frequently used large-volume appliances should be situated upstream of its connection to provide additional flushing.**

4.33 Provision for inspection, rodding and maintenance should ensure "full bore" access and be located outside user accommodation. The location of manholes within the building should be avoided.

4.34 To prevent the ingress of bacteria, waste outlets from distillation plant and refrigerators should be connected outside of the department, should not be directly connected to the drainage system, and should discharge via a trapped tundish or gully.

4.35 Drainage/waste systems from air-conditioning units should be installed to prevent Legionnaires' disease and other bacteria back-feeding.

Acoustics

4.36 Consideration should be given at the earliest opportunity to the requirements for privacy and the impact of any intrusive noise that may affect the function of the healthcare facility. Guidance in relation to functional relationships is given in Health Technical Memorandum 08-01 'Acoustics'.

Fire safety

4.37 Fire safety standards in healthcare premises need to be high owing to the vulnerability of occupants. The policy in respect of fire safety is set out in Health Technical Memorandum 05-01 – 'Managing healthcare fire safety'. The design team should satisfy itself that the design meets the

objectives of this guidance or provide a fire-engineered solution that achieves similar objectives.

4.38 It is important to establish during the design stage those aspects of fire strategy that may affect the planning of a project. At appropriate stages of the design process, the appropriate design team members should discuss their proposals with the relevant Building Control/Approved Inspector, and ensure that the project team and all other planning staff are fully acquainted with the fire strategy for the design. This will include operational aspects (staff responsibilities etc), equipment provision, and building and engineering layouts.

Fire detection and control systems

4.39 Fire detection, alarm and control systems are an integral part of the overall fire plan for a building. Close coordination between the architect and design engineer is essential to ensure that compartmentation, high-risk processes, dangerous goods and other fire-related risk issues are fully understood and embraced in the fire management solution.

4.40 For guidance see the 'Firecode' suite of documents (Health Technical Memorandum 05).

Electrical services

General

4.41 Electrical installations should comply with the current edition of BS 7671 IEE Wiring Regulations together with Guidance Note 7 (Special Locations) and Health Technical Memorandum 06-01 – 'Electrical services supply and distribution'. See also 'Medical Electrical Installation Guidance Notes' (MEIGaN; MHRA).

4.42 Prior to final design, a full assessment should be made of the risk, function, occupation, equipment and resilience requirements for the area. This will influence the extent and location of services, the availability of alternative electrical supply distribution and the need for local standby supplies if appropriate.

Electromagnetic compatibility

4.43 Care should be taken to avoid mains-borne and electrical radio frequency interference affecting diagnostic and monitoring equipment, computers or other sensitive electronic equipment. Guidance on the avoidance and abatement of electrical interference is given in Health Technical Memorandum 06-01 – 'Electrical services supply and distribution'.

Main intake switchgear and distribution boards

4.44 The main electrical supply should be part of the whole site/building network, and should provide adequate capacity for both normal and all assessed business-critical needs.

4.45 Main intake and distribution equipment should be sited away from patient areas and areas where access would disrupt normal communication routes.

4.46 Careful consideration should also be given to the impact from flooding, pipework leaks and mechanical damage.

Emergency electrical supplies

4.47 Emergency electrical provision should comply with the requirements of Health Technical Memorandum 06-01.

Small power distribution systems

4.48 Depending upon the capacity of the emergency generator installation and risk assessment (see paragraphs 4.44–4.46), it may be appropriate to provide separate essential and non-essential small power distribution systems.

4.49 Adequate provision should be made in circulation areas, for example corridors and lobbies, to allow the use of domestic cleaning equipment having flexible cords up to 9 m long.

Lighting systems

4.50 Lighting services, including lighting controls, should comply with CIBSE 'Code for Lighting'; Guide LG2: 'Hospitals and Health Care Buildings'; and Guide F: 'Energy Efficiency in Buildings'.

4.51 In areas where VDUs are in use, lighting should be designed to comply with the guidance given in CIBSE Guide 7: 'Office lighting'.

4.52 To achieve energy efficiency, lighting systems should be designed to:

a. maximise use of natural daylight;

b. avoid unnecessarily high levels of illumination;

c. incorporate efficient luminaires, control gear and lamps;

d. incorporate effective controls.

4.53 Lighting and the appearance of luminaires should be coordinated with architectural design. In particular there should be collaboration to ensure that decorative finishes are compatible with the colour-rendering properties of lamps and that the spectral distribution of the light source is not adversely affected. See also 'Lighting and colour for hospital design – a report on an NHS funded research project' (Dalke et al, 2004). Refer to CIBSE 'Code for Lighting' for minimum recommended daylight factors.

4.54 Light switches should be provided in easily accessible positions and at appropriate locations in corridors and general circulation areas. In areas with multiple luminaires, switches should permit the selection of luminaires appropriate to the area requiring illumination.

4.55 Where local circumstances permit, the provision of time switches or occupancy controls using infrared, acoustic or ultrasonic detectors should be encouraged. Additionally, low-energy or ultra-low-energy lighting should be considered as the primary lighting source.

4.56 Safety escape lighting should be provided on primary escape routes in accordance with the provisions of Health Technical Memorandum 06-01, Health Technical Memorandum 05-02 – 'Firecode' and the CIBSE Lighting Guide LG2 – 'Hospitals and Health Care Buildings'.

4.57 It is essential that fluorescent lighting in all areas where medicines or containers are processed, including stores, is derived from lamps having suitable colour-rendering characteristics.

Help call systems

4.58 Help call systems should comply with the requirements of Health Technical Memorandum 08-03 – 'Bedhead services'.

4.59 Patient/staff call points should be provided in all spaces where a patient/attendee may be left alone temporarily – for example consulting, examination and treatment rooms and WCs.

4.60 Staff emergency call points are for a member of staff to call for assistance from another member of staff. They should be provided in all spaces where staff consult, examine and treat attendees/patients. Call facilities may also be provided on hand-held devices.

4.61 The help call systems may be hard-wired or secure wireless or secure radio systems.

4.62 Where considered necessary, staff crash call points may be specifically provided for members of staff to call the crash team. This is not required as a standard installation, and needs to be specified for individual rooms where the patient is at high risk of suffering a cardiac arrest.

4.63 A visual and audible indication of the operation of each system should be provided to give responding staff unambiguous identification of the call source, with a repeater unit in a suitable location.

Security

4.64 Measures should be incorporated in the design of all NHS buildings to help protect the safety of staff, patients and visitors and the security of the premises. Security systems will require a local risk assessment and crime prevention survey to be carried out for both daytime and out of hours, to include swipe cards, smart cards, CCTV and other available technological solutions. The project team should discuss security with the local police crime prevention officer and the trust's nominated local security management specialist (LSMS) at an early stage in the design process.

4.65 See the Directions to NHS Bodies on Security Management Measures 2004 (Amendment) Directions 2006 and 'A Professional Approach to Managing Security in the NHS' (NHS Security Management Service, 2003).

4.66 The local fire officer and LSMS should be consulted concurrently to avoid the possibility of the demands of security and fire safety conflicting.

IT and telephone wiring systems

4.67 The IT and telephone infrastructure within the facility may be determined by existing systems within the building. However, where possible, a structured wiring system as described in Heath Guidance Note 'Structured cabling for IT systems' should be provided. This will permit a unified approach to the provision of cabling for:

a. voice systems;

b. data systems;

c. imaging systems;

d. alarm systems.

4.68 While this "universal" cabling system is initially more expensive than separate voice and data systems, the long-term cost of ownership may prove beneficial.

4.69 In determining the nature of the IT system to be provided, it is necessary to identify:

a. areas to be served;

b. whether structured cabling will be used;

c. what density of outlets is to be provided (not fewer than two per workstation);

d. whether wiring will be on a "flood" or "as required" basis.

Bedhead services and entertainment systems

4.70 Allowance should be made for the introduction of television and radio systems in waiting areas, to create a relaxing atmosphere, staff rest areas, and in locations where it would be beneficial in masking sound transfer.

4.71 Other services should be provided in accordance with Health Technical Memorandum 08-03 'Bedhead services'.

Pneumatic tube transport systems

4.72 If a new pneumatic tube system is to be installed, significant investigation needs to be undertaken to ensure that the system will meet the needs of the whole or that part of the hospital site. For further guidance on the design of pneumatic tube systems, see Health Technical Memorandum 2009.

Lifts

4.73 Lifts may be required in order to comply with the requirements of the DDA or Part M of the Building Regulations. For further guidance on the design of lift installations, see HTM 2024.

Controlled Drugs storage

4.74 Controlled Drugs cupboards within wards or clinical areas should be fitted with a red lamp indicating when the cupboard is unlocked. A repeater lamp should be sited outside the doorway of the room in which the cupboard is located. If appropriate, a secondary repeater should be taken to a permanently staffed station.

4.75 The normal power supply for each cupboard should be backed up by a small integral battery to cover the short period between mains failure and the generator becoming available.

4.76 To assist in keeping their contents secure, controlled drugs cupboards should be fitted with a seven-lever mortice lock designed to meet BS 3621.

Sustainability and energy efficiency

4.77 The environment in which people live and work has a key influence on their health. Environmental considerations should therefore be taken into account when building or adapting facilities. The minimising of environmental impact by ensuring that energy is only used necessarily and efficiently is considered in this guidance with respect to:

a. natural daylighting;

b. natural ventilation;

c. night set-back;

d. building regulations;

e. heat recovery;

f. water conservation;

g. minimising solar gain.

4.78 Efforts should be made to maximise the use of natural lighting. Passive solar design (PSD) should be employed to ensure that, as far as possible, areas such as wards, recovery units and offices are located where they can benefit from natural daylight, while other areas, for example stores, WCs and utility rooms, are located towards the core of the facility.

4.79 Areas where glare may be a problem, for example rooms where VDUs are routinely used, should similarly be located away from direct natural daylight.

4.80 Natural ventilation of rooms should be employed wherever possible and appropriate. Design should incorporate measures for minimising solar heat gains, which, if controlled, will avoid the need for mechanical ventilation. Measures to minimise the need for cooling should include locating temperature-sensitive accommodation away from south-facing fascias, shading windows, and using reflecting glass where appropriate and cost-effective.

4.81 Energy-using systems including heating, ventilation, cooling and lighting should be controlled to minimise consumption. Consideration may be given to utilising the thermal properties of the building when the facility is not in

use, for example at night or weekends, where circumstances permit.

4.82 Energy recovery systems should be employed when possible, and particularly on ventilation systems.

4.83 For further guidance on energy efficiency, see Health Technical Memorandum 07-02 – 'Encode: making energy work in healthcare'.

Commissioning and maintenance

4.84 It is important that, on completion of an installation and prior to hand-over, the performance of engineering services and equipment is fully commissioned to validate their function and achievement of performance.

4.85 The final acceptable performance details should be recorded and, together with full manufacturers' details, made available to users and the maintenance organisation before the facilities are handed over.

4.86 Once the facilities are operational, the overall performance should again be further performance tested when full operational conditions are achieved. This will check that the interface between systems has not been compromised and that the systems operate to the designed criteria.

4.87 Risk management, operational procedures and contingency plans should be fully evaluated with staff to ensure that, in the event of an emergency, procedures can be put in place to maximise the safety of patients, staff and visitors. Opportunities should be taken to practise these procedures when it is safe to do so, in order that staff remain fully conversant with what is required of them and can fully appreciate the issues involved.

5 Cost information

Introduction

5.1 For all types of health building, it is important that building costs and revenue expenditure are best-value and consistent with acceptable standards. In applying this guidance, the need for economy should always be of prime concern. Where appropriate, space should be shared between similar activities taking place at different times. However, this solution should not be detrimental to the proper functioning of the spaces involved, nor to the needs of users.

Departmental Cost Allowance Guides

5.2 Departmental Cost Allowance Guides (DCAGs) related to this Health Building Note are officially notified in 'Quarterly Briefing', published by the Department of Health (see www.dh.gov.uk). For a full listing of all DCAGs see 'Healthcare Capital Investment' on the Space for Health website at www.nhs.uk/spaceforhealth.

5.3 The attention of the project team is drawn to the Capital Investment Manual (CIM – Business Case Guide; www.dh.gov.uk). This aims to reduce planning work and to encourage the production of sound business case support of both capital and revenue expenditure. Capital works estimates should be based, wherever applicable, on industry norms, such as DCAGs plus a percentage to cover on-costs.

5.4 The DCAGs for this Health Building Note reflect the total building, engineering and accommodation requirements for adult in-patient facilities located on an acute hospital site, where common services are shared. Costs are based on a typical two-storey new-build unit on a greenfield site with no planning constraints.

5.5 DCAGs are exclusive of VAT, building and planning fees and all local authority charges, and are based on a location factor of 1.00.

On-costs

5.6 An allowance for on-costs (such as communication space, external works, external engineering services and abnormals) should be added to the DCAGs. Abnormals will largely be determined by site characteristics (such as an inner-city location or poor ground conditions) and by the condition or type of any building to be refurbished.

5.7 Project teams should assess all likely on-cost implications of individual sites and schemes at the earliest opportunity.

Locational factors

5.8 Locational factor adjustments should be applied to works costs (that is, DCAGs plus established on-costs) to take account of local market conditions. For further information, see 'Quarterly Briefing' (www.dh.gov.uk).

Schedules of accommodation

5.9 The schedules of accommodation show a notional whole department, which highlights the scope for sharing accommodation. The examples are not to be taken as ideal provision for any particular project.

5.10 The examples are as follows:

- Example 1: 24-bed ward, 50% single-bed rooms;
- Example 2: 24-bed ward, 80% single-bed rooms;
- Example 3: 24-bed ward, 100% single-bed rooms.

5.11 The schedules of accommodation for this document may be updated from time to time. For the latest version check the latest version of this publication on the Space for Health website at www.nhs.uk/spaceforhealth.

Dimensions and areas

5.12 The critical dimensions of an area are determined by the spatial requirements of any activities to be carried out within it. Space requirements for various generic activities appear in Health Building Notes 00-02 – 'Sanitary spaces', 00-03 – 'Clinical and clinical support spaces' and 00-04 – 'Circulation and communication spaces'.

5.13 Planning teams should have data available at the earliest stages of a project to enable the approximate assessment of sizes involved. Areas used for the purpose of establishing cost allowances are listed in the schedules of accommodation. These areas do not represent recommended sizes and should not be regarded as specific individual entitlements.

5.14 The efficient planning of a building may necessitate a variation to the areas given. For example, in the refurbishment/conversion of older property:

- rooms tend to be larger than the areas given;
- some rooms may be too small or in the wrong location for efficient use;
- circulation space tends to form a larger than normal proportion of the total area.

Circulation spaces

5.15 All internal corridors, small vertical ducts, spaces occupied by partitions/walls and other space for circulation, are costed in the DCAGs. Provision is also made for a 5% planning zone and 3% engineering zone adjacent to the external walls.

5.16 Circulation figures included in the DCAGs are those anticipated for new-build facilities. Where constraints are encountered, for example in refurbishment/conversion of older types of property, this figure may increase.

Communication spaces

5.17 Hospital "streets", staircases and lifts (linking spaces) are not included in the DCAGs. Costs related to these elements, along with a suitable space allowance, should be made in the on-costs.

Land costs

5.18 DCAGs are exclusive of all land costs and associated fees. However, costs associated with land costs should be included in business case submissions (as detailed in the Capital Investment Manual) and may therefore have an important impact on the overall cost viability of a scheme.

Engineering services

5.19 The following engineering services are included in the cost allowances (see Chapter 4 and Activity DataBase for further information). Primary engineering services are assumed to be conveniently available at the boundary of the department.

5.20 Mechanical services:

- heating – low-pressure hot water system;
- ventilation – mechanical supply to, and extraction from, clinical areas, and other areas requiring mechanical ventilation such as WCs and showers (excludes ventilation plant, such as air handling units or extract fans);
- cold water – central supply to service points including drinking water (excludes storage tanks);
- hot water – supply from a central system (excludes storage and generation);
- piped medical gases – oxygen, nitrous oxide and medical air (400 kPa).

5.21 Electrical services:

- departmental distribution boards;
- general lighting, as required by task;
- examination lighting (examination lamps);
- staff location system;
- help call systems;
- emergency luminaires, as appropriate;
- socket-outlets and other power outlets for fixed and portable equipment;
- supplementary equipotential earth bonding;
- uninterruptible power supply (UPS) and equipment;
- fire, security, and Controlled Drug cupboard alarm systems;
- TV/radio wireways;
- telephone internal cabling distribution and outlets (excludes handsets);
- data wireways;
- building management system.

5.22 Equipment (Group 1):

- Controlled Drugs cupboards;
- dishwasher;
- impulse clocks.

Example schedules of accommodation for Health Building Note 04-01 - 'Adult in-patient facilities'

Version 3, published June 2010

New system of separate allowances for circulation, communication and engineering space applied

ADB code	Room name/function	Unit area allowanc	Example 1: 24-bed ward, 50% sing bed rooms Quantity	Example 1 Total area	Example 2: 24-bed ward, 83% sing bed rooms Quantity	Example 2 Total area	Example 3: 24-bed ward, 100% sing bed rooms Quantity	Example 3 Total area	Paragraph referenc	Notes
	Clinical spaces									
	Bedroom & sanitary spaces									
B0305	Single-bed room	19.0	12	228.0	20	380.0	24	456.0	Para 3.6-3.16, Appendix 1	
V1645	Shower room: en-suite: chamfered	4.5	12	54.0	20	90.0	24	108.0	Para 3.17	
B0405	Multi-bed room: 4 beds	64.0	3	192.0	1	64.0			Para 3.6-3.16, Appendix 1	
V1121	WC: semi-ambulant: in-patient	2.0	3	6.0	1	2.0			Para 3.19, Appendix A	Area reduced from 2.5 as excludes luggage space.
V1635	Shower room: assisted: in-patient	6.5	3	19.5	1	6.5			Para 3.19	Area reduced from 8 as assisted bathroom provided.
V1736	Bathroom: assisted	15.0	1	15.0	1	15.0	1	15.0	Para 3.26	
	Support facilities									
M0330	Office/meeting room: 10 places (including 2 workstations)	16.0	1	16.0	1	16.0	1	16.0	Para 2.40, 3.67	1 per 24 beds.
T0151	Touchdown base	2.0	6	12.0	6	12.0	6	12.0	Para 2.37, 3.32	1 per 4 beds.
X0145	Treatment room: double-sided couch access	16.0	1	16.0	1	16.0			Para 2.49, 3.35	1 per 24 beds if multi-bed bays used.
M0724	Interview room: 4 places (including 1 wheelchair place)	8.0	1	8.0	1	8.0	1	8.0	Para 3.38	1 per 24 beds.
M0731	Breakout space: patients	6.0	3	18.0	3	18.0	3	18.0	Para 3.41	1 per 8 beds.
P0627	Ward pantry	12.0	1	12.0	1	12.0	1	12.0	Para 3.42	1 per 24 beds. Larger than pantry/refreshment area as includes larger fri machine and additional storage.
G0180	Parking bay for resuscitation equipment	2.0	1	2.0	1	2.0	1	2.0	Para 3.4, 3.46	1 per 24 beds.
G0180	Parking bay for food trolley	2.0	1	2.0	1	2.0	1	2.0	Para 3.47	1 per 24 beds.
G0180	Parking bay for mobile hoist	2.0	1	2.0	1	2.0	1	2.0	none	1 per 24 beds.
	Ward storage allowance			18.0		18.0		18.0	Para 3.51	0.75 sqm per bed.
W1584	*Clinical equipment store*									
W1585	*General store*									
W1594	*Linen store*									
T0540	Medicine store/preparation room	8.0	1	8.0	1	8.0	1	8.0	Para 2.51, 3.54	1 per 24 beds.
Y0331	Dirty utility room for bedpan processing	12.0	2	24.0	2	24.0	2	24.0	Para 2.55, 3.55	1 per 12 beds.
Y1510	Cleaners' room	8.0	1	8.0	1	8.0	1	8.0	Para 2.20, 3.57	1 per 24 beds.
	Staff spaces									
	Staff support									
V0653	Locker bay: 12 small lockers	1.5	2	3.0	2	3.0	2	3.0	Para 3.7	1 per 12 beds.
V1010	WC: ambulant	2.0	1	2.0	1	2.0	1	2.0	Para 3.72	1 per 24 beds.
	Net internal area (NIA)			**665.5**		**708.5**		**714.0**		
	Circulation allowance		25.0%	166.4	27.5%	194.8	31.0%	221.3		
	Communication allowance		10.0%	66.6	10.0%	70.9	10.0%	71.4		
	Engineering space allowance		25.0%	166.4	27.0%	191.3	28.0%	199.9		
	Gross internal area (GIA)			**1064.8**		**1165.5**		**1206.7**		

	Essential complementary accommodation									
	Entrance and reception									
J0232	Reception (size based on number of places)	5.5	2	11.0	2	11.0	2	11.0	Para 3.3, 3.64	2 places per 24 beds.
	Waiting area (size based on number of places)	1.7	6	10.2	6	10.2	6	10.2	Para 3.3, 3.64	1 per 4 beds. Allowance includes more than one type of ADB room. For d area allowance see HBN 00-03.
J1152	*Waiting area*									
J1413	*Children's play area*									
V1121	WC: semi-ambulant	2.5	1	2.5	1	2.5	1	2.5	Para 3.66	1 per 24 beds.
V0922	WC: independent wheelchair	4.5	0.5	2.3	0.5	2.3	0.5	2.3	Para 3.66	1 per 48 beds.
	Additional clinical spaces									
W1475	Clean supply room allowance			8.0		8.0		8.0	Para 2.51, 3.49	0.34 sqm per bed.
Y0642 or Y0646	Disposal hold allowance			6.0		6.0		6.0	Para 3.59	0.25 sqm per bed.
	Staff support									
D0434	Staff rest and mini kitchen (size based on number of seats)	1.8	3	5.4	3	5.4	3	5.4	Para 3.77	3 for 8 staff (maximum staff on shift). Space allowance should be combin neighbouring wards to create a viable staff rest room. For d see HBN 00-03.
H1304	Seminar room: 24 places (including 1 wheelchair place)	32.0	0.4	12.0	0.4	12.0	0.4	12.0	Para 2.56, 3.80	1 per 64 beds.
	Communal changing area (size based on number of lockers)	1.4	18	25.2	18	25.2	18	25.2	Para 3.73	Twice number of lockers as staff on shift plus 10% contingency (rounded allowance should be combined with neighbouring departmer and female changing rooms. Allowance include For details of unit area allowance s
V0554	*Staff communal changing room*									
V0725	*Semi-ambulant changing room*									
V1321	*Shower room: ambulant*									
V0667	*Uniform exchange*									
V1010	WC: ambulant	2.0	1	2.0	1	2.0	1	2.0	Para 3.73	1 for up to 20 lockers.
	Net internal area (NIA)			**84.6**		**84.6**		**84.6**		
	Optional accommodation									
V1131	Nappy changing room	5.0	1	5.0					Para 3.66	Optional addition to waiting space.
P0808	Vending machine	3.0	1	3.0					Para 3.66	Optional addition to waiting space.
G0510	Lobby to isolation room	5.0	1	5.0					Para 3.29	
B0308	Isolation room	19.0	1	19.0					Para 3.29	In lieu of standard single-bed room provision.
T0535	Clean utility room	16.0	1	16.0					Para 2.51	Alternative to clean supply and medicine store/preparation room.
V1635	Shower room: assisted	8.0	1	8.0					Para 3.26	Alternative to assisted bathroom in wards with multi-bed bays.
M0727	Sitting room: 7 places (including 1 wheelchair place)	12.0	1	12.0					Para 3.41	Alternative to patient breakout space.
NA	Regeneration kitchen								Para 3.45	Project specific. Requirements by catering contractor.

Note 1	**Relationship of schedule to ADB room names** The ADB room codes listed may not carry a title, in ADB, identical to the room function in the schedules. Use of the appropriate ADB room code will, however, result in the correct room being accessed
Note 2	**Relationship of schedule to ADB for scalable rooms (i.e. those for which a recommended room size in ADB does not exist)** ADB room code relates to one example size of this space and does not reflect space requirements of these schedules. Projects will scale up/down according to schedule.
Note 3	**Essential complementary accommodation** Accommodation to which the department needs access but may be shared with nearby departments.
Note 4	**Optional accommodation** Accommodation which is not expected in all departments, but, dependent on local policy, may be needed in addition to or instead of the rooms listed in the schedule.
Note 5	**Circulation allowance** The circulation allowance is based upon the study and calculations contained within 'Ward layouts with single rooms and space for flexibility' (DH, May 2005).
Note 6	**Engineering space allowance** For the purposes of calculating the engineering space allowances it has been assumed that each ward is located on an acute (multi-purpose) hospital site with a GIA of 25,000 sqm. For larger or smaller facilities, or where there needs to be largely dedicated enginee allowances will vary, generally downwards as GIA increases.
Note 7	**Status of defined metrics** All of the defined metrics (calculations for quantifying spaces) in the notes column have been included as a reasonable basis for initial briefing. They are not intended as and should not be considered requirements.

Appendix 1 – Example bedroom layouts

Introduction

Single-bed room

The layout for a single-bed room in this appendix is an example only. Its purpose is to illustrate how the different elements of the room – bed space, en-suite, clinical support zone, and family zone – can be brought together. Other configurations are possible.

In the design of the example layout, the following issues have been considered:

- clear space around the bed (3600 mm × 3700 mm);
- position of the en-suite shower room;
- bedroom door width into the room;
- location of the clinical wash-hand basin;
- provision of support facilities including space for a fold-down divan;
- sightlines from the corridor (at the doorway).

It is assumed that conventional bedhead services are used, although the use of ceiling- or wall-mounted pendant fittings is possible.

The en-suite – comprising WC, washbasin and shower – is shown with a chamfered profile. For a rectangular layout, refer to Health Building Note 00-02 – 'Sanitary spaces'.

The location of the en-suite can have a significant impact on the bedroom in terms of floor area, views to and from the bed, and support facilities such as the touchdown base. Four layouts, each showing a different location for the en-suite, have been included for illustrative purposes.

Multi-bed room

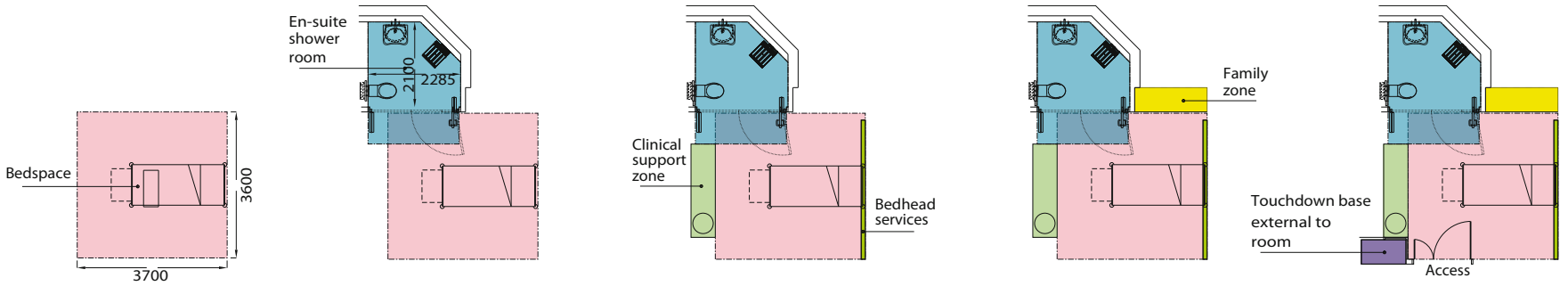
The layout for a multi-bed room is an example only. It shows a four-bed room with an assisted shower room and a second semi-ambulant WC, both en-suite. Full details of these en-suite facilities are contained in Health Building Note 00-02 – 'Sanitary spaces'.

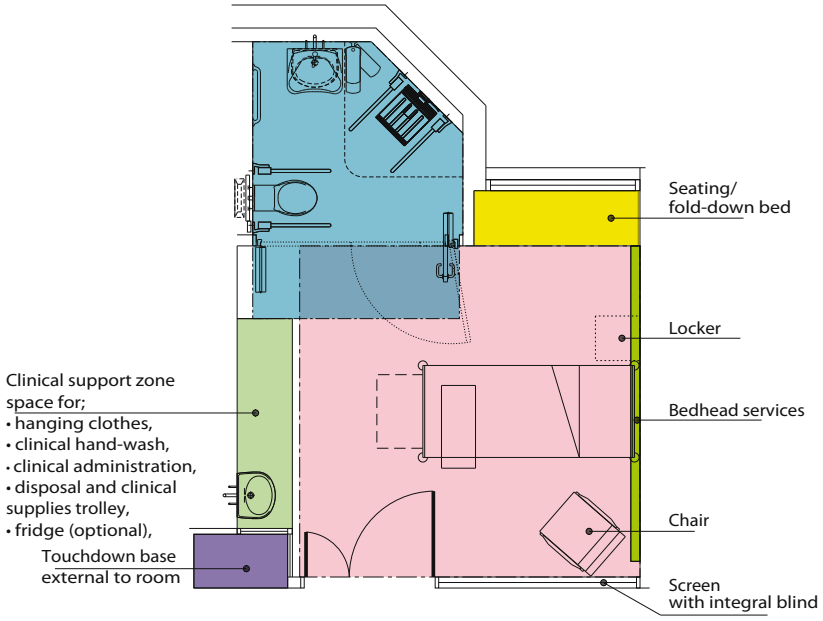
An en-suite with fully opening wall cannot be used in this layout because of the loss of privacy in a multiple-occupancy room. Each en-suite has an outward-opening single-leaf door.

The two en-suites are located inboard, forming a recess at the entrance to the bed areas, providing some privacy to the bed areas.

Two clinical wash-hand basins are located centrally, one next to the room entrance and the other on the outside wall. There is room for one clinical support zone.

Example layout for a single-bed room





Bedspace
This is the clear space required for access around the bed for:
- moving and handling of patients
- patient transfers into and out of bed (including ceiling-mounted hoists)
- clinical activity including resuscitation
- bed making
- manoeuvring the bed in and out of the room
- manoeuvring equipment

Note: it does not include space for built-in or fixed furniture. It does include space for door swings.

En-suite shower room
The space required for the en-suite includes not only the enclosed area but also the temporary manoeuvring space for assisting a patient on both sides of the WC which overlaps the bed space.

Clinical support zone
This includes space for clinical support, hand-washing, clinical administration, storage and space for movable equipment such as supply or disposal trolleys.
Note: This space does not overlap the clear bed space.

Social (family) support zone
Space can be provided for overnight stay either as built-in furniture or space for demountable bed or recliner. This should not impede access to the bedside or into the room. The illustration shows one of the options. Alternatives include window seat and wall-mounted fold-down bed settee.

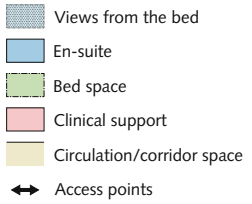
Touchdown base (nurses' workstation)
Clinical nursing stations or "touchdown" bases will be provided adjacent to individual rooms, paired rooms or clusters of rooms. These are best located near to room entrances so that it is possible to observe the patient from outside the room. The location of these workstations should not obstruct the primary circulation space and will be dependent on the location of the room entrance.

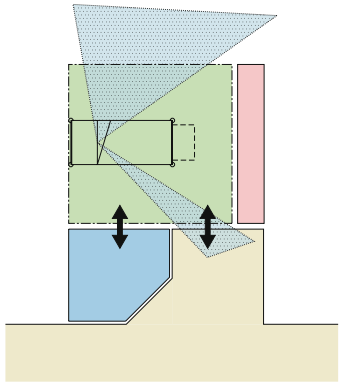
Note: This layout is not intended as a design solution but defines spatial requirements only

En-suite location

The location of the en-suite has a major influence on the subject room in terms of:

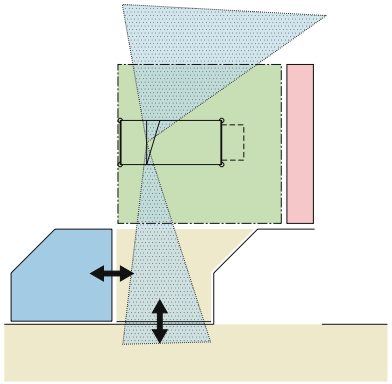
- Access points
- Support facilities including the nurse "touchdown" base
- Views to and from the bed
- Privacy
- Floor area





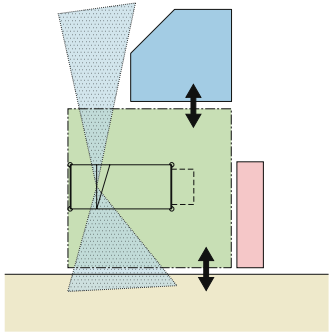
Internal en-suite

a) Access to en-suite and to the room are on the same side and this determines the minimum width of the room.
b) Views of the bed from the corridor are restricted.
c) External views are maximised.
d) Privacy for the patient is maximised especially for views into the en-suite.
e) There are two options for support services: external wall or partition wall.
f) Bed turning can be accommodated adjacent to the bedroom, which increases the circulation space but minimises corridor width.
g) The door position can be optimised to increase or decrease space within the room.
h) A nurse "touchdown" base can be accommodated adjacent to the bedroom door.



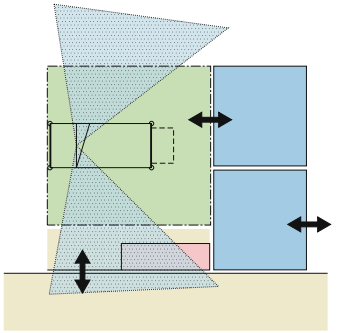
Internal adjacent en-suite

a) Access to en-suite and to the room are on the same side and this determines the minimum width of the room.
b) Views of the bed from the corridor are improved in comparison to the inboard option.
c) External views are maximised.
d) Privacy for the patient is reduced. Entry to the en-suite can be seen from the corridor.
e) There are two options for support services: external wall or partition wall.
f) To accommodate bed turning, either the corridor or the bedroom doors will need to be wider.
g) The bedroom door position is fixed.
h) Accommodating the nurse "touchdown" base is difficult without adding additional width to the corridor.



External en-suite

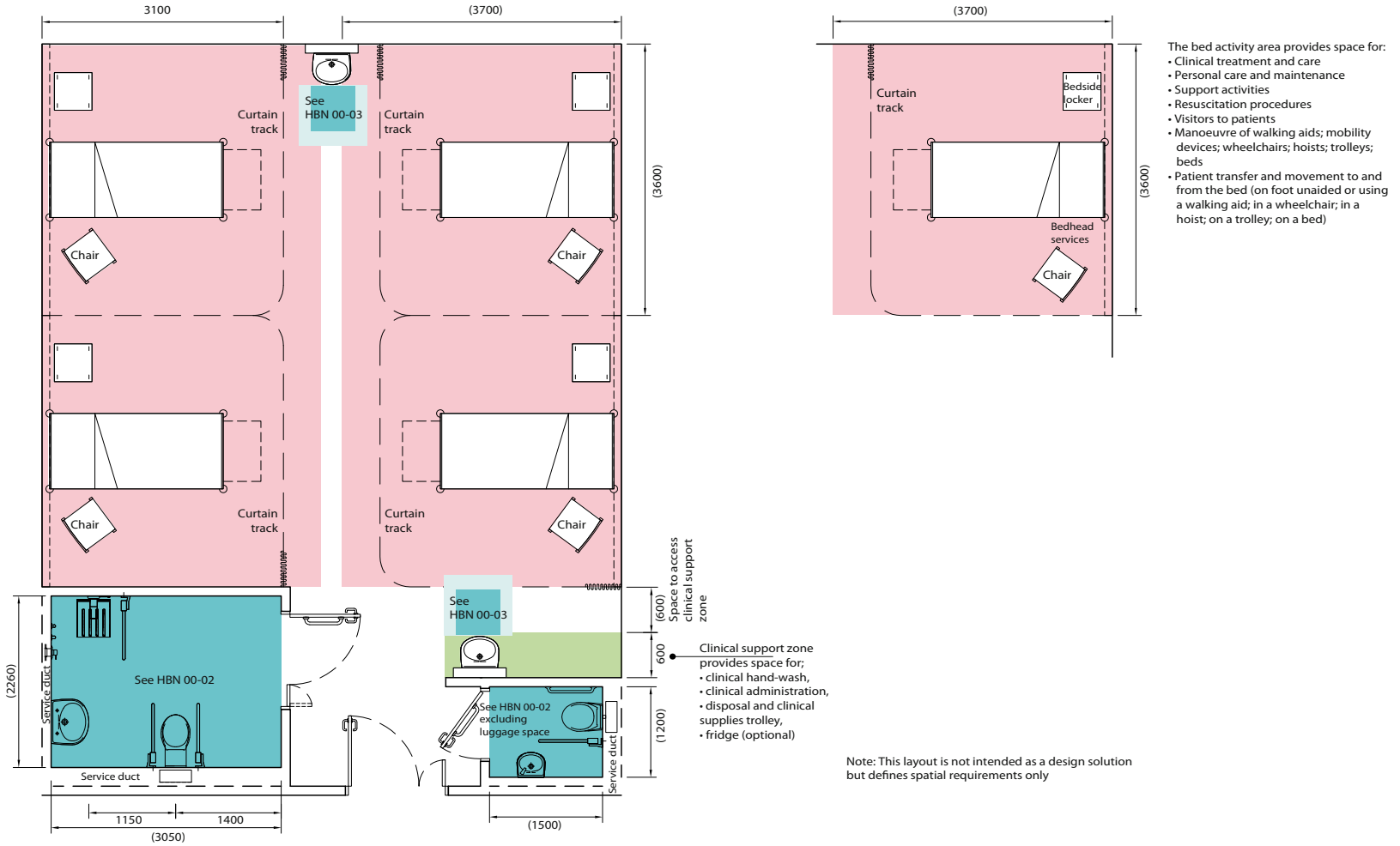
a) Access to room and en-suite are on opposite sides, which is less restrictive on room width.
b) View of the bed from the corridor is maximised.
c) External views are minimised.
d) Privacy for the patient is minimised and entry into the en-suite can be observed from the corridor.
e) There are three options for support services: part external wall, part corridor partitions and room partitions.
f) To accommodate bed turning, either the corridor or the bedroom doors will need to be wider.
g) The bedroom doors can be located flexibly on the corridor wall.
h) A nurse "touchdown base" can be accommodated adjacent to the bedroom door.



In-between en-suite

a) Interlocking en-suites increases overall width and depth of the room.
b) Views of the bed from the corridor are maximised.
c) External views are maximised.
d) Privacy for the patient is minimised and entry into the en-suite can be observed from the corridor.
e) There are two options for clinical support services: external wall or corridor partitions. This will be influenced by whether the en-suite is "nested" on the external or internal wall.
f) To accommodate bed turning, either the corridor or the bedroom doors will need to be wider.
g) The bedroom doors can be located flexibly on the corridor wall.
h) A nurse "touchdown" base can be accommodated adjacent to the bedroom door.

Example layout for a multi-bed room



NOTE: Whilst the evidence base for the layout of this multi-bed room (as set out in 'Ward layouts with single rooms for space and flexibility') was based on optimum space standards, there has been a move towards providing minimum space standards, therefore some dimensions may have been marginally reduced.

Appendix 2 – References

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QEUH Isolation Room Steering Group

Conner, Darryl James [redacted]

Wed 15/05/2019 14:44

To: Steele, Tom [redacted] INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted] alan.gallacher@[redacted] Connelly Karen (NHS GREATER GLASGOW & CLYDE) [redacted]

Cc: Dodd Susan (NHS GREATER GLASGOW & CLYDE) [redacted] Pritchard Lynn (NHS GREATER GLASGOW & CLYDE) [redacted] French, Sofie [redacted] Purdon Colin (NHS GREATER GLASGOW & CLYDE) [redacted] Powrie Ian (NHS GREATER GLASGOW & CLYDE) [redacted]; Clarkson, Kerr [redacted]; Guthrie James (NHS GREATER GLASGOW & CLYDE) [redacted]; Riddell Mark (NHS GREATER GLASGOW & CLYDE[redacted]

Hi All,

I am looking to initiate a monthly "Isolation Room Steering Group meeting" primarily for the QEUH at the request of Teresa and Tom to discuss all aspects of the QEUH campus's isolation room assets. The aim for topic of discussion would encompass:

1. Verification report analysis
2. Asset Familiarity- PPVL, PPIR, BMT, negative pressure facilities etc.
3. SOPs for remedial actions
4. HAI Scribe discussion with relation to associated remedial works
5. Annual verification schedules
6. Plant failure contingency plans
7. Future projects

If anyone would like to add other topics for discussion with regards to Isolation rooms, suggest any other contacts to invite to the meeting this would be greatly appreciated!
Once I get a feel for the numbers and overall content for the meeting, I will finalise a location and agenda for discussion. If there are no objections I would like to aim to have the first meeting for the last Friday this month which will be the 31st of May 2019 and all subsequent meetings on the last Friday of each month thereafter, this date is flexible pending over all availability.

Thanks
Best

Regards
Darryl

Darryl James Conner MIHEEM
Interim Site Manager Operational Estates (SMOE)
Queen Elizabeth University Hospital Campus,
Labs Bldg.
1345 Govan Rd
Glasgow
G51 4TF

Tel: [redacted]002331

Mob: [redacted]
Email: [redacted]

Re: Actions

INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)

Tue 25/06/2019 11:04

To:Conner Darryl (NHS GREATER GLASGOW & CLYDE) [redacted]; Peters Christine (NHS GREATER GLASGOW & CLYDE) </o=MAIL/ou=NHSFB01/CN=Recipients/CN=ZLGFFYKV>;

Hi Darryl

see below

QEUH

PPVL ICU Rooms 23,40,50
PPVL 4A renal, rooms 43,34

Interventional radiology (not interventional vascular theatres)
CCU pacing room
MRI
CT scanning
ED decontamination room
ICU 1-4
HDU 2,5,6

RHC

Cardiac cath
Interventional radiology
NICU
SCBU
Aseptic pharmacy

Thanks
Teresa

Dr Teresa Inkster
Lead Infection Control Doctor NHSGGC
National Training Programme Director Medical Microbiology
Dept of Microbiology
Queen Elizabeth University Hospital
Glasgow
Direct dial : [redacted]

m: Conner, Darryl James [redacted]
Sent: 25 June 2019 10:21
To: Peters Christine (NHS GREATER GLASGOW & CLYDE); INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)
Subject: RE: Actions

Hi,

Can you please send over the list of the requested outstanding verification reports and I will get them sent over to you for review.

Best

Regards
Darryl

Darryl James Conner MIHEEM
Interim Site Manager Operational Estates (SMOE)
Queen Elizabeth University Hospital Campus,
Labs Bldg.
1345 Govan Rd
Glasgow
G51 4TF

[redacted]

From: Peters, Christine
Sent: 25 June 2019 10:18
To: Conner, Darryl James [redacted] Inkster, Teresa (NHSmail)
[redacted]
Subject: RE: Actions

Thanks!

From: Conner, Darryl James
Sent: 24 June 2019 16:05
To: Peters, Christine; Inkster, Teresa (NHSmail)
Subject: RE: Actions

Hi Christine,

No problem, please see attached.

Regards
Darryl

Darryl James Conner MIHEEM
Interim Site Manager Operational Estates (SMOE)
Queen Elizabeth University Hospital Campus,
Labs Bldg.
1345 Govan Rd
Glasgow
G51 4TF

[redacted]

From: Peters, Christine
Sent: 24 June 2019 12:31
To: Conner, Darryl James [redacted] Inkster, Teresa (NHSmail)
[redacted]
Subject: Actions

Hi Darryl,

I wonder if you would be able to circulate the action points from the last meeting as the print copy is hard to read,

KR

Christine

Dr Christine Peters
Consultant Microbiologist
Queen Elizabeth University Hospital,
GGC
[redacted]

Board C&CG (M) 19/01
Minutes: 01 - 14

GREATER GLASGOW AND CLYDE NHS BOARD

**Minutes of a Meeting of the
Board Clinical & Care Governance Committee
held in the Boardroom, J B Russell House,
Corporate Headquarters, Gartnavel Royal Hospital,
1055 Great Western Road, Glasgow, G12 0XH
on Tuesday 5th March 2019 at 1.00pm**

PRESENT

Ms S Brimelow OBE - in the Chair

Dr D Lyons
Mr S Carr
Mr I Ritchie
Cllr Caroline Bamforth
Mrs A Thompson

IN ATTENDANCE

Ms J Grant	Chief Executive
Dr J Armstrong	Medical Director
Mr A Crawford	Head of Clinical Governance
Ms E Vanhegan	Head of Corporate Governance and Administration
Mr T Steele	Director of Estates and Facilities
Ms M Gardner	Chief Nurse, South Sector
Dr D Dodds	Chief Of Medicine, Regional Services
Ms S Devine	Interim General Manager for Infection Control Team
Dr T Inkster	Lead Clinician for Infection Control Team
Mrs G Mathew	Secretariat Manager

ACTION BY

01. APOLOGIES & WELCOME

Ms Brimelow welcomed everyone to the meeting and introductions were made.

Ms Brimelow noted that, due to other commitments, Mr Carr would only be in attendance for 1 hour.

Ms Brimelow welcomed Ms Morag Gardner, Chief Nurse, South Sector, who was in attendance on behalf of Dr Margaret McGuire.

Ms Brimelow welcomed Dr David Dodds, Chief of Medicine, Regional Services, who was in attendance to provide an update on Item 10 – Interventional Neuro-radiology.

Ms Brimelow also welcomed Dr Teresa Inkster, Lead Infection Control Doctor, and Ms Sandra Devine, Associate Nurse Director, Infection Prevention and Control, who were in attendance to provide an update on Item 6 – Recent Infection Incidents Update, and Item 9 – Report on Concerns raised regarding QEUH and

ACTION BY

RHC – Updated Position.

Apologies for absence were intimated on behalf of Professor Dame Anna Dominiczak, Dr Margaret McGuire, and Mrs Dorothy McErlean.

NOTED

02. DECLARATION(S) OF INTEREST(S)

No declaration(s) of interest(s) were raised in relation to any of the agenda items to be discussed.

NOTED

03. MINUTES

The Committee considered the minute of the meeting which took place on Tuesday 11th December 2018 [Paper No. CCG (M) 18/04]. On the motion of Mrs Thompson, seconded by Dr Lyons, the Committee approved the minute as an accurate record of the meeting, subject to the following amendment:

Page 2, Item 48 – Matters Arising from the Minutes – a) Rolling Action List – Minute 40 – HSMR Figures – the second last sentence of the paragraph should read "Dr Armstrong agreed to share the HIS response with the Committee once available".

Page 5, Item 50 – HEI Visit to Inverclyde Royal Hospital (IRH) – this should read "OPAH Visit to Inverclyde Royal Hospital (IRH).

APPROVED

04. MATTERS ARISING FROM THE MINUTES

a) Rolling Action List

The Committee reviewed the items detailed on the Rolling Action List [Paper No. 19/01] and the following updates were provided.

Minute 54 – Governance and Quality of Care

Dr Armstrong clarified that this item was in relation to the previous paper considered by the Committee at the meeting of 11th December 2018, in relation to assurance of the quality of surgical care. Ms Brimelow recommended the closure of this action, given that this was a matter for the Board. The Committee were content with this. **Secretary**

Minute 57 – Future reports to be linked/themed around Clinical Risk Register

The Committee were content to close this action. **Secretary**

ACTION BY

Other Matters Arising

Cowlairs Decontamination Unit
Ms Grant noted that a full review of the incident was underway. A report would be presented to the Acute Services Committee in due course.

PVC Procedure Packs
Dr Armstrong noted that this would be covered under the main report.

NOTED

05. OVERVIEW

Dr Armstrong provided an overview of topics not included on the agenda. Dr Armstrong advised the Committee of the HPS report on the water at Royal Hospital for Children (RHC) and the Queen Elizabeth University Hospital (QEUH), which was published on 22nd February 2019. Dr Armstrong advised that further information would be detailed within the main report under Item 9. Dr Armstrong noted the recent announcement by the Health Secretary, Jeane Freeman, of the appointment of two co-chairs to lead the independent external review of the QEUH, Dr Brian Montgomery, former Medical Director and Interim Chief Executive of NHS Fife; and Dr Andrew Fraser, Director of Public Health Science, NHS Health Scotland. An internal review by NHSGG&C had also commenced.

Ms Brimelow thanked Dr Armstrong for the update.

NOTED

06. RECENT INFECTION INCIDENTS UPDATE

The Committee considered a paper 'Recent Infection Incidents Update' [Paper No. 19/02], presented by Infection Prevention and Control Team, Dr Teresa Inkster, Lead Clinician for Infection Control Team and Ms Sandra Devine, Interim General Manager for Infection Control Team. The report asked the Committee to note the contents of the paper which provided an update on recent outbreaks or incidents which scored Amber or Red using the National Healthcare Infection Incident Assessment Tool. There had been four significant incidents/outbreaks across NHSGGC between December 2018 and February 2019. The paper summarised the incidents which had occurred and the actions taken to control them and prevent further infection.

Dr Teresa Inkster, Consultant Microbiologist, went on to provide an overview of each of the incidents.

Cryptococcus neoformans
Two cases were identified between [redacted] 2018 and [redacted] 2018. This was considered an exceptional infection episode and was therefore reported, managed and controlled as per Chapter 3 of the National Infection and Prevention Control Manual. The incident was downgraded to green on the 15th February.

There have been no further cases reported since 11th December 2018. Dr Inkster described a number of actions completed and the outcomes of each including a review of drugs given to patients by the aseptic pharmacy, a review of the plant

room on the roof of the adult hospital, professional clean of plant rooms, air sampling of ward areas, prescribing of antifungal prophylaxis medication, installation of HEPA air filters and samples of bird droppings obtained and sent for testing. A number of samples had revealed the presence of Cryptococcus albidus, but not Cryptococcus neoformans. The initial hypothesis suggested a plant room could have been a source, however air sampling results did not support this. A short life expert advisory group with input from UK experts was set up to explore a number of hypotheses as to the source of the Cryptococcus.

Ms Brimelow thanked Dr Inkster for the update and invited questions from Committee members.

In response to questions from Committee members in relation to the existing air filters, Dr Inkster advised that following the learning points from this incident, a review of air filters had been undertaken. She also confirmed that HEPA air filters were being installed in Wards 2a and 2b.

In response to questions from Committee members in relation to national recommendations and guidance about the use of HEPA air filters, Dr Inkster noted that HEPA air filters were recommended for patients undergoing bone marrow transplant and those with acute lymphoblastic leukaemia. These patients had been moved to the adult BMT unit. Dr Inkster noted that installation of HEPA filters had been extended to include conditions and treatment which compromised the immune system within the QEUH.

In response to questions from Committee members in relation to the fungus, Dr Inkster advised that whilst exposure to the fungus is common, infection following exposure was rare and usually in patients with severe immuno-compromised system.

Following discussion, Dr Inkster noted that the short life expert advisory group continued to explore all possible hypotheses to identify the source, however stressed that the safety of patients and the prevention of further infections remained the highest priority.

Mucoraceous Mould

Two cases of infection were identified within the QEUH ICU department on 18th January 2019 and results on January 21st confirmed them as Mucoraceous. Dr Inkster noted a number of actions undertaken to identify the source, including samples taken from a dialysis point in Room 23, review of near patient equipment, linen swabs taken, and air sampling. There were no further cases reported since 18th January 2019. There had been no source identified. This fungus is widespread in the environment generally.

Stenotrophamonas maltophilia

Four confirmed cases of S.maltophilia had been identified within the ITU/HDU at Royal Alexandra Hospital (RAH). Dr Inkster described a number of actions undertaken including a deep clean, twice daily enhanced cleaning, hard surface environmental swabbing carried out, screening of all patients in the unit, water outlets sampled pre and post flush, and an audit of hand hygiene. There had been no further cases since 22nd February.

Ms Brimelow invited questions from Committee members.

ACTION BY

In response to questions from Committee members regarding the hand hygiene audit, Ms Devine noted that the results of the audit highlighted improvements required in technique used. Hand hygiene audits were regularly undertaken in all areas, and the Hand Hygiene Coordinator conducted random audits across NHSGG&C. Dr Lyons was interested to note that the results of the hand hygiene audit conducted at RAH ITU/HDU were reported as two distinct categories: - opportunity and technique, however the routine hand hygiene audit results were not usually recorded in this way. **Ms Devine**

In response to questions from Committee members in relation to bank and agency staff and hand hygiene audits, Ms Devine assured the Committee that hand hygiene audits include a proportion of all staff groups present in the department at that time.

In response to questions from Committee members in relation to vacancies reported within the domestic teams, Mr Steele assured Committee members that work was underway with both HR and the Recruitment Team to improve the pace of the recruitment process.

Staphylococcus aureas Bacteraemia (SABs)

Seven confirmed cases and one possible case of an unusual strain of Staphylococcus aureaus Bacteraemia (SAB) had been identified within the Neonatal Intensive Care Unit at Princess Royal Maternity Hospital, and subsequently, the Royal Alexandra Hospital (RAH). Dr Inkster noted the actions underway to address this including a full terminal clean using hydrogen peroxide vapour, increased daily cleaning measures, hand hygiene audits, environmental screening, staff screening and weekly screening of all babies in all units. Dr Inkster also noted the communications process followed to inform parents of babies within the affected units.

Ms Brimelow invited questions from Committee members.

In response to questions from Committee members in relation to the hand hygiene audits carried out and the outcomes of these, Ms Devine agreed to share information with the Committee. **Ms Devine**

Ms Brimelow thanked Dr Inkster and Ms Devine for the assurance provided. The Committee would expect a further report from Ms Devine in relation to hand hygiene audits at the next Committee meeting.

NOTED

09. REPORT ON CONCERNS RAISED REGARDING QEUH AND RHC – UPDATED POSITION

The Committee considered the paper 'Report on Concerns raised regarding QEUH and RHC – Updated position' [Paper No. 19/05] authored by the Infection Control Management Team. The paper provided an overview of the progress being made in relation to a number of issues highlighted in the previous report of 5th December 2017 [Paper No.17/24]. Key areas of progress were noted including the inclusion of 34 rooms on the PPVL schedule; compliance with SHFN 30 HAI Scribe Programme and process for refurbishment; the 12 month capital plan for upgrade

of the ventilation system of Ward 2a at RHC; significant reduction in Central Line Associated Bacteraemia Infections (CLABSI) due to improvement work carried out since 2017; compliance with SHTM 04-01 Part B- operational Management testing for Legionella and HSE Legionnaires disease "Microbiological Monitoring" HSG 274; establishment of local water safety groups and testing including exception reporting and escalation; and review of ICD roles and responsibilities including development of ICD Job Description.

In response to questions from Committee members in relation to the issues associated with the Adult and Paediatric Bone Marrow units moving into the QEUH when the facility opened in 2015, Dr Armstrong set out that in the case of the Adult BMT, the unit had higher than optimal particle counts. As patient safety is paramount, patients were moved back to the Beatson while extensive refurbishment took place. Patients were not moved back until extensive air testing and engagement with clinical directors, clinicians, infection control and estates colleagues had been undertaken.

In response to questions from Committee members regarding the number of vacancies within the Estates Team, and the level of training and experience requirements, Mr Steele noted that extensive work was underway in partnership with universities, to develop expertise in required areas and create modern apprenticeship and management opportunities. Work was being progressed with HR and Recruitment colleagues to streamline the recruitment process.

Mr Ritchie asked Dr Inkster if she and her colleagues were content with the progress of actions taken to address their concerns. Dr Inkster replied that she and her colleagues were content with the good progress made on all of the areas.

The Committee were assured of the actions being undertaken to address the issues and to ensure the safety of patients. The Committee commended the efforts of the Medical Director who asked the Microbiologists to document all concerns in 2017 with all meeting and developing an action plan to address concerns directly. The Committee noted thanks to the various teams work to address these issues.

In summary, the Committee noted that progress had been made, were content that patient safety remained the top priority and were pleased to note that there had been no further water incidents in the last 6 months.

NOTED

10. UPDATE ON INTERVENTIONAL NEURO-RADIOLOGY REPORT

The Committee considered the paper 'Update on Interventional Neuro-radiology Report' [Paper No. 19/06] presented by the Medical Director, Dr Jennifer Armstrong. An action plan has been developed to address the recommendations following the external review of the INR service. Dr Armstrong introduced Dr David Dodds, Chief of Medicine, Regional Services. Dr Dodds provided an overview of the areas within the action plan to address the three areas of recommendation following the review including staff governance, establishment of a national service and national governance.

ACTION BY

Ms Brimelow thanked Dr Armstrong and Dr Dodds for the update and invited questions from Committee members.

In summary, the Committee noted the report, noted the tabled Action Plan, and would await further updates to the Committee as this work progressed.

NOTED

07. UPDATE ON RAPID ACCESS CLINIC FOR PAEDIATRIC DENTISTRY

In the absence of a written report, Ms Grant provided a verbal update to the Committee. Ms Grant noted the significant challenges for a number of specialties in relation to anaesthetic support. Ms Grant advised that 2 additional Paediatric Anaesthetists had been recruited, in addition to the 2 vacant posts, which had now been filled. Additional support from other NHS Board areas had also been received. The number of patients waiting over 12 weeks had been significantly reduced, and there were currently a total of 134 patients waiting longer than 12 weeks. Work was also being progressed to identify the underlying causes of the increase in numbers of children requiring treatment.

In summary, the Committee were content to note the recruitment of 2 additional Paediatric Anaesthetists, along with the recruitment of the 2 vacant posts and noted that there were currently 134 patients waiting over 12 weeks. The Committee were content that this issue would be considered by the Acute Services Committee as part of the overall waiting times report, and therefore recommended the closure of this item. **Secretary**

NOTED

08. HEI VISIT TO ROYAL ALEXANDRA HOSPITAL

The Committee considered the paper 'Unannounced Healthcare Associated Infection (HAI) Inspection RAH 4th – 6th Dec 18' [Paper No. 19/04[presented by the Chief Nurse, South Sector, Ms Morag Gardner, on behalf of the Director of Nursing. The paper highlighted the requirements and recommendations of the report, details the action plan and progress of improvements made.

Following the visit, there were 8 requirements and 1 recommendation made and the Board have completed and returned improvement action plans to address these. Ms Gardner noted that all requirements highlighted had been addressed, including the removal of the damaged clinical waste bin; replacement of the fridges for breast milk; removal of bladeless fans; cleanliness issues within Emergency Department rectified and continuity of domestic services being addressed by the Facilities Manager; review of all chairs and transport chairs for damage and added to cleaning schedule; immediate work carried out to replace damaged wooden surfaces within theatre areas; and immediate reorganisation of storage area within theatres to allow additional storage for sterile trays.

Ms Gardner described the positive feedback received following the visit including feedback received from patients; standard of equipment; cleanliness; hand hygiene; and use of personal protective equipment.

Ms Brimelow thanked Ms Gardner and Ms Devine for the update and invited questions from Committee members.

In response to questions from Committee members in relation to the current domestic staff capacity at RAH, Mr Steele advised the Committee that the issues related to access to areas in order to carry out cleaning. Committee members were disappointed to note a high volume of low level estates matters; however Mr Steele provided assurances that this was being addressed, along with a review of the cleaning processes.

In response to questions from Committee members in relation to a potential gap within the Emergency Department between 1.30pm and 4pm, Mr Steele assured the Committee that work was underway to address this.

In summary, the Committee were content to note the report and thanked Ms Gardner, Ms Devine and Mr Steele for the assurances provided.

NOTED

11. UPDATE ON HISTORICAL CHILD ABUSE INQUIRY

The Committee considered a paper 'Scottish Child Abuse Inquiry – Lennox Castle Hospital' [Paper No. 19/07] presented by the Head of Corporate Governance and Administration, Ms Elaine Vanhegan. The Inquiry commenced in October 2015, and in September 2018, NHSGG&C were notified that Lennox Castle Hospital would be included within the Inquiry. Ms Vanhegan described the 4 sections required in the response and noted that sections A & B had been submitted on 1st March 2019. Sections C & D require to be submitted by 31st May 2019 and work continued in partnership with the Central Legal Office and the Local Authority, to gather the information required.

Ms Brimelow thanked Ms Vanhegan for the update. In summary, the Committee were content to note the report, the progress made, and the submission of sections A & B.

NOTED

12. COMPLAINTS AND PATIENT EXPERIENCE FEEDBACK REPORT

The Committee considered a paper 'Patient Experience Report – Quarter 3 – 1st October to 31st December 2018' [Paper No. 19/08] presented by the Chief Nurse, South Sector on behalf of the Director of Nursing.

Complaints

Ms Gardner noted the areas included within the report including Acute, Partnerships and Prisons. She advised the Committee of the common complaint themes and highlighted that clinical treatment was the most common theme reported, followed by date of appointment; communication; and attitude of staff. Ms Gardner noted an increase in the number of complaints received related to prisons and across the Board area. She advised that a series of training sessions had been organised by Complaints colleagues to encourage early resolution of complaints.

ACTION BY

Ms Brimelow thanked Ms Gardner for the update and invited questions from Committee members.

In response to questions from Committee members in relation to the percentage of complaints related to interactions with staff, Ms Gardner advised that work was underway to include complaints and communications with patients as part of the induction process for new members of staff. Newly qualified nursing staff were being trained on how to respond to conflict; how to break down communication barriers; and the empowerment of staff to encourage early resolution.

Feedback

Ms Gardner provided an overview of the positive areas of note within patient feedback including examples of care and compassion and access. She also noted the negative feedback received in relation to attitude and behaviours. Ms Gardner noted that in addition to the induction programme as mentioned, a positive behaviours video was being developed for staff and would be available soon.

Ms Gardner described recent postal surveys conducted, and the key themes emerging from this, notably patients wishing to be more involved in their care and decisions about their care. Actions have been developed following this survey and were detailed within the report.

In summary, the Committee were content to note the report, and wished to thank Mrs Haynes for her production of the report and the teams involved in delivering the actions noted.

NOTED

13. BOARD CLINICAL GOVERNANCE FORUM

The Committee considered the minute of the Board Clinical Governance Forum Meeting held on Monday 3rd December 2018 [Paper No. BCGF (M) 18/12].

Mr Crawford noted the key points from the meeting including a presentation given on the Scottish Stroke Improvement Programme, CQI Project Update, Healthcare Quality Strategy, Inverclyde OPAH Inspection Report, and the five main service area reports.

In response to questions from Committee members in relation to the concerns raised by foundation Orthopaedic trainees, Mr Crawford advised that a full report would be presented to the Acute Clinical Governance Committee, before being presented to the Board Clinical Governance Forum, to consider the matter fully.

The Committee felt it would be helpful to hear the presentation by Ms Marie Farrell on the Scottish Stroke Implementation Programme and Dr Armstrong would be happy to ask Ms Farrell to attend a future meeting. This item would be included on the forward planner. **Secretary**

Ms Brimelow thanked Mr Crawford for the update. The Committee were content to note the minute.

NOTED

ACTION BY

14. DATE OF NEXT MEETING

Date: Tuesday 11th June 2019
Venue: Boardroom, JB Russell House
Time: 1.00pm

The meeting concluded at 4.30pm.

Health Protection Scotland

NHS National Services Scotland

Patient Placement, Isolation and Cohorting: Standard Infection Prevention & Control and Transmission Based Infection Control Precautions

Version: **Version 1.0 September 2018**

Owner/Author: Infection Control Team

DOCUMENT CONTROL SHEET

Key Information:		
Title:	Patient Placement, Isolation and Cohorting: Standard Infection Prevention & Control and Transmission Based Infection Control Precautions.	
Date Published/Issued:	September 2018	
Date Effective From:	September 2018	
Version/Issue Number:	1.0	
Document Type:	Literature Review	
Document status:		
Author:	**Name:**	Catherine Dalziel and Jennifer Longstaff (2018), Adriana Zalewska (2016) and Laura MacDonald (2014).
	Role:	Healthcare Scientist
	Division:	HPS
Owner:	Infection Control	
Approver:	Lisa Ritchie	
Approved by and Date:	September 2018	
Contact	**Name:**	Infection Control Team
	Tel:	[redacted]
	Email:	nss.hpsinfectioncontrol[redacted]

Version History:			
This literature review will be updated in real time if any significant changes are found in the professional literature or from national guidance/policy.			
Version	**Date**	**Summary of changes**	**Changes marked**
1.0	September 2018	Patient placement SICPs and TBPs review were amalgamated and updated using a double reviewer methodology. Term 'isolation room/suite' changed to 'enhanced single room' to align with Scottish guidance. Additional recommendation on protective isolation and the placement of patients receiving haemodialysis added.	

Approvals – this document requires the following approvals (in cases where signatures are required add an additional 'Signatures' column to this table)::				
Version	**Date Approved**	**Name**	**Job Title**	**Division**
1.0	September 2018	National Policies, Guidance and Outbreaks Steering Group		

HPS ICT Document Information Grid	
Purpose:	To inform the Standard Infection Control Precaution (SICPs) and Transmission Based Precautions (TBPs) sections on Patient Placement in the National Infection Prevention and Control Manual in order to facilitate the prevention and control of healthcare associated infections in NHSScotland hospital settings.
Target audience:	All NHSScotland staff involved in the prevention and control of infection in Scotland.
Circulation list:	Infection Control Managers, Infection Prevention and Control Teams, Public Health Teams
Description:	This literature review examines the available professional literature on patient placement in the hospital setting.
Update/review schedule:	Updated as new evidence emerges with changes made to recommendations as required.
Cross reference:	National Infection Prevention and Control Manual http://www.nipcm.hps.scot.nhs.uk SICPs Literature review: Hand Hygiene: Hand washing. http://www.nipcm.hps.scot.nhs.uk/documents/sicp-hand-hygiene-hand-washing-in-the-hospital-setting/ SICPs Literature review: Hand Hygiene: Use of Alcohol Based Hand Rub http://www.nipcm.hps.scot.nhs.uk/documents/sicp-hand-hygiene-use-of-alcohol-based-hand-rub-in-the-hospital-setting/
Update level:	Practice – **No significant change to practice** Research – **No significant change to research**

Contents:

1. Objectives

The aim of this review is to examine the extant scientific literature regarding the appropriate placement of patients (including isolation and cohorting) in hospitals to form evidence based recommendations for practice.

The specific objectives of the review in terms of SICPs are to determine:

- What is the minimum standard space required per bed/patient?
- What is the minimum standard required for a single-bed room?
- What are the minimum standards required for multi-bed rooms?
- What are the minimum standards for the provision of hygiene/sanitation facilities in patient rooms?
- What is the current guidance on single-bed room provision in hospitals?
- How should patients be assessed for infection risk upon admission/arrival at the care area?

The specific objectives of the review in terms of TBPs are to determine:

- Under which circumstances should a patient be placed in a single-bed room?
- What is an enhanced single room?
- Under which circumstances should a patient be placed in an enhanced single room (negative pressure)?
- Under which circumstances should a patient be placed in an enhanced single room (positive pressure)?
- Are there any legislative requirements relating to the use of an enhanced single room?
- What is a cohort area?
- Under which circumstances should a patient be placed in a cohort area?
- What is cohort nursing and under which circumstances should it be implemented?

N.B.

Recommendations relating to sink design and provision are outlined in the Hand Hygiene: Hand Washing Literature Review.

Recommendations relating to placement of alcohol-based hand rub products in the patient care environment are outlined in the Use of Alcohol Based Hand Rub Literature Review.

2. Methodology

This targeted literature review was produced using a defined methodology as described in the National Infection Prevention and Control Manual: Development Process.

3. Recommendations

This review makes the following recommendations based on an assessment of the extant scientific literature on patient placement:

3.1 Recommendations for standard infection control precautions (SICPs)

What is the minimum standard space required per bed/patient?

The minimum bed space in both single and multi-bed rooms should not be less than 3.6m (width) x 3.7m (depth).

Spacing should allow clinical/care procedures to be carried out from either side of the bed, with adequate circulation space to allow medical emergency teams and medical equipment to gain access to the patient.

(Mandatory)

What is the minimum standard required for a single-bed room?

A single-bed room is a room with space for one patient and should contain a clinical wash-hand basin in a visible and convenient location.

Single-bed rooms should also have en-suite sanitary facilities comprising of a shower, WC and a wash-hand basin.

Single-bed rooms require a total area of 23.5m^2.

(Mandatory)

What are the minimum standards required for multi-bed rooms?

The acceptable maximum number of beds in a multi-bed room is four.

Four-bed rooms require a total area of 72.5m^2.

Four-bed rooms require two clinical wash-hand basins for staff; one close to the entrance of the room, and another in an obvious and convenient position at the other end of the room.

Multi-bed rooms must have en-suite sanitary facilities. Ideally, an assisted shower room (with WC, shower and wash-hand basin) and a separate semi-ambulant WC (with wash-hand basin) both en-suite.

En-suite doors should not open directly onto adjacent bed areas.

(Mandatory)

What are the minimum standards for the provision of hygiene/sanitation facilities in patient rooms?

All single-bed and multi-bed rooms should have en-suite facilities with a WC and shower.

If en-suite facilities are not provided, sanitary facilities for patients should not be located more than 12m from bed areas or day rooms.

There should be clearly labelled separate, designated sanitary facilities for in-patients, clinical staff and visitors on wards in convenient locations.

(Mandatory)

There should be a sufficient number of wash-hand basins in all clinical areas.

(Mandatory)

What is the current guidance on single-bed room provision in new build hospitals and refurbishments?

There should be 100% single-bed room provision in all new build hospitals, unless there are clinical reasons to necessitate the availability of multi-bed rooms.

The minimum single-bed room provision in refurbishments is 50%, but as close to 100% single-bed room provision as possible is expected.

(Mandatory)

How should patients be assessed for infection risk upon admission/arrival at the care area?

Patients must be promptly assessed for infection risk on arrival at the care area (if possible, prior to accepting a patient from another care area) and should be continuously reviewed throughout their stay. An assessment of the potential infection, route of infection transmission and potential spread of infection; risk factors associated with exposure to blood and body fluids; and spatial considerations should be made when considering where to place a patient.

(AGREE rating: Recommend)

Patients who may present a particular cross-infection risk include those:

- Known to have been previously positive for a multidrug resistant organism (MDRO) such as meticillin-resistant *Staphylococcus aureus* (MRSA) or Carbapenemase-producing Enterobacteriaceae (CPE).
- Who have been hospitalised outside of Scotland in the last 12 months.

(Mandatory)

In addition to those:

- With diarrhoea, vomiting, an unexplained rash, fever or respiratory symptoms.

(Good Practice Point (GPP))

Patient placement decisions should be based on risk assessment which should consider the route of transmission alongside patient factors and symptoms that increase the risk of cross transmission.

A single-bed room should be considered as a minimum for patients on airborne precautions, and is preferred for patients on droplet and contact precautions.

(AGREE rating: Recommend)

3.2 Recommendations for transmission based precautions (TBPs)

Under which circumstances should a patient be placed in a single-bed room?

Patients who are known or suspected to be infected with a microorganism spread by the contact or droplet route should be cared for in single-bed rooms when available.

(AGREE rating: Recommend)

Hospitals should have systems in place to be able to rapidly identify:

- patients who have been transferred from a hospital outside of Scotland;
- patients who have been hospitalised outside of Scotland within the last 12 months;
- patients who have previously been positive for CPE (carbapenemase producing enterobacteriaceae) or meticillin-resistant *Staphylococcus aureus* (MRSA) at any body site.

(Mandatory)

Patients who are receiving haemodialysis and are known or suspected to be positive for a blood-borne virus (BBV) should be managed in a single-bed room using dedicated equipment.

(Good Practice Point (GPP))

Patients should remain isolated in a single-bed room whilst they remain symptomatic and/or are considered infectious.

(Good Practice Point (GPP))

The decision to discontinue isolation should be based on clinical judgement. The clinical judgement and expertise of the staff involved in the patient's management and the Infection Prevention and Control Team (IPCT) or Health Protection Team (HPT) should be sought.

(Good Practice Point (GPP))

The door of a single-bed room should remain closed when it is used to manage a patient with a known or suspected infection.

(Good Practice Point (GPP))

What is an enhanced single room?

An enhanced single room, often referred to as an isolation room/suite, is a single-bed room (en-suite) with in-built ventilation systems designed to prevent egress (negative pressure) or ingress (positive pressure) of potentially infectious air.

(Mandatory)

Under which circumstances should a patient be placed in an enhanced single room (negative pressure)?

An enhanced single room (negative pressure) should be used to accommodate a patient known or suspected to be infected with a microorganism spread by the airborne (aerosol) route whilst the patient is considered infectious.

(AGREE rating: Recommend)

The door of an enhanced single room must remain closed when a patient is managed within it and door opening should be kept to a minimum.

(Good Practice Point (GPP))

Under which circumstances should a patient be placed in an enhanced single room (positive pressure)?

An enhanced single room (positive pressure), ideally with a HEPA filtered air supply should be considered for patients at an increased risk of infection e.g. severely immunocompromised.

(Good Practice Point (GPP))

(AGREE rating: Recommend)

Are there any legislative requirements relating to the use of an enhanced single room?

As part of local COSHH assessments a log book should be completed for each enhanced single-bed room. These log books should be located in close proximity to the room e.g. the lobby or anteroom. The following information should be recorded for each enhanced single-bed room:

- a schematic layout of the enhanced single room and ventilation system serving it;
- information on the ventilation design parameters;
- a record of the actual ventilation performance at initial validation ("Acceptance testing");
- records of the annual validations;
- records of the lobby pressure, taken by ward staff from gauges and monitoring devices provided;
- records of any routine service and maintenance activities;
- records of any repairs or modifications;
- a method statement for disinfecting the system.

(Mandatory)

What is a cohort area?

A cohort area is a bay/ward in which a group of patients (cohort) with the same infection are placed together. Cohorts are created based on clinical diagnosis, microbiological confirmation when available, epidemiology, and mode of transmission of the infectious agent.

(AGREE rating: Recommend)

Under which circumstances should a patient be placed in a cohort area?

Patient cohorting may be appropriate when single-bed rooms are not available and there is more than one patient with the same confirmed infection.

(AGREE rating: Recommend)

Patient cohorting should be combined with other infection prevention and control measures e.g. hand hygiene, PPE and environmental decontamination.

(Grade D recommendation)

Patients should be separated by at least 3 feet (1m) from each other in a cohort area; and bed curtains can be drawn as an additional physical barrier.

(AGREE rating: Recommend)

What is cohort nursing, and under which circumstances should it be implemented?

Cohort nursing (staff cohorting) is defined as the use of a dedicated team of healthcare staff to care for patients infected with a single infectious agent.

Cohort nursing may be implemented to minimise the risk of contamination between groups of symptomatic and non-symptomatic patients if there is adequate staff resource available to do so.

(AGREE rating: Recommend)

4. Discussion

4.1 Implications for practice: SICPs

What is the minimum standard space required per bed/patient?

The majority of recommendations in guidance documents are based largely on ergonomic requirements rather than infection control needs.[1-7] However, guidance produced in 2007 by Health Facilities Scotland 'Infection Control in the Built Environment: Design and Planning'[8] and similarly, UK guidance produced in 2013 by Department of Health Estates and Facilities 'Infection Control in the Built Environment',[9] specifically recognise the important role of bed spacing in the prevention and control of infection. Specifically, the latter states that 'the principle should be to maintain sufficient space for activities to take place and to avoid cross-contamination between adjacent bed spaces'. Furthermore, 2014 guidance from Health Facilities Scotland 'Information for Design Teams, Construction Teams, Estates & Facilities and Infection Prevention & Control Teams' states that issues surrounding the design and layout of rooms can contribute to the transmission of microorganisms.[10]

There is consensus on minimum bed spacing; bed spaces should not be less than 3.6m (width) x 3.7m (depth) since it is considered that most activities can be carried out within this space.[2-5;11] Spacing should allow clinical/care procedures to be carried out from either side of the bed, with adequate circulation space to allow medical emergency teams and medical equipment to gain access to the patient.[1;7]

(Mandatory)

What is the minimum standard required for a single-bed room?

A single-bed room should contain a clinical wash-hand basin in a visible and convenient location.[4-8] Single-bed rooms should have en-suite sanitary facilities.[1;4-8] Specifically, en-suite facilities should contain a shower, WC and a wash-hand basin.[6;7] Single-bed rooms require a total area of 23.5m^2.[5;7]

(Mandatory)

What is the minimum standard required for multi-bed rooms?

The acceptable maximum number of beds in a multi-bed room is four.[1;5;7] Four-bedded rooms require two clinical wash-hand basins for staff; one close to the entrance of the room, and another in an obvious and convenient position at the other end of the room.[1;7-10] Multi-bed rooms must have en-suite sanitary facilities.[1;7;9] Best practice is to provide an assisted shower room (with WC, shower and wash-hand basin) and a separate semi-ambulant WC (with wash-hand basin) both en-suite to the bedroom area.[7] En-suite doors should not open directly onto adjacent bed areas.[7] Four-bed rooms require a total area of 72.5m.[2;5;7]

(Mandatory)

What are the minimum standards for the provision of hygiene/sanitation facilities in patient rooms?

In general, all single-bed and multi-bed rooms should have en-suite facilities with a WC and shower.[1;5;7;9] Toilet facilities should not be located more than 12m from bed areas or day rooms.[4] There should be clearly labelled, designated separate sanitary facilities for in-patients, clinical staff and visitors.[5;7] There should also be a sufficient number of wash-hand basins in all clinical areas.[1;5;7;9]

(Mandatory)

What is current guidance on single-bed room provision in hospitals?

It has been recommended that there is 100% single-bed room provision in new build hospitals, unless there are clinical reasons to necessitate the availability of multi-bed rooms.[3;4;6;7;12] In refurbishments, NHS boards should seek to maximise the number of single-bed rooms consistent with the recommendation for new builds.[3;4;6;7;12] The minimum recommended single-bed room provision in refurbishments is 50%, but as close to 100% single-bed room provision as possible is expected.[3;4;6;7]

(Mandatory)

How should patients be assessed for infection risk upon admission/arrival at the care area?

Patients must be promptly assessed for infection risk on arrival at the care area (if possible, prior to accepting a patient from another care area) and should be continuously reviewed throughout their stay.[13;14] The appropriate placement of patients within the acute healthcare setting should be determined by an assessment of the following aspects:

- The potential transmission of a healthcare associated infection when receiving healthcare in an NHSScotland facility.
- The risk factors posed by exposure to blood and body fluids by healthcare workers, patients, visitors and others.
- The potential route of transmission and spread of healthcare associated infection by blood and body fluids.
- Spatial considerations – including the availability of single-bed rooms and the current built environment within specific NHSScotland healthcare facilities.[13]

(AGREE rating: Recommend)

Patients who may present a particular cross-infection risk include those:

- Known to have been previously positive for a multidrug resistant organisms (MDRO) such as meticillin-resistant *Staphylococcus aureus* (MRSA) or Carbapenemase-producing Enterobacteriaceae (CPE); or
- who have been hospitalised outside Scotland in the last 12 months.[15-17]

(Mandatory)

In addition to those:

- With diarrhoea, vomiting, an unexplained rash, fever or respiratory symptoms.

(Good Practice Point (GPP))

There is a hierarchy of patient placement decisions that should be undertaken for patients requiring care using Transmission Based Precautions, following risk assessment. A single-bed room (neutral pressure) is always required for patients on airborne precautions as a minimum, and is preferred for patients on contact and droplet precautions.[13] This should include assessment of the route of transmission and potential spread of the infection alongside risk factors such as exposure to blood and body fluids.[13;14;18] Patient factors and symptoms that may contribute to cross transmission should also be considered (e.g. vomiting, diarrhoea, an unexplained rash, fever or respiratory symptoms).[14;18]

As single-bed rooms are often in short supply the use of an isolation priority tool is suggested in the literature.[19-23]

Patient placement decisions should be based on risk assessment which should consider the route of transmission alongside patient factors and symptoms that increase the risk of cross transmission (e.g. vomiting, diarrhoea, an unexplained rash, fever or respiratory symptoms).

(AGREE rating: Recommend)

4.2 Implications for practice: TBPs

Under which circumstances should a patient be placed in a single-bed room?

A recent (2016) Healthcare Improvement Scotland (HIS) evidence note found that there was a lack of robust evidence to demonstrate the effectiveness of single-bed rooms for preventing or reducing HAI rates.[24] The available studies are mixed in their conclusions with some demonstrating a reduction in cross-transmission of HAI in single-bed rooms compared to open wards or multi-bed rooms, and others showing no difference.[25-29]

Although there is a lack of a robust evidence base in support of isolation, there is no evidence to support the discontinuation of isolation measures in the UK.[30] There is evidence that isolation in a single-bed room is effective in reducing transmission of infections spread by the contact or droplet routes, particularly when combined with other infection prevention and control measures such as hand hygiene and PPE.[13;25;26;28;30-41] In addition single-bed room isolation has been shown to be effective for control of infections which can cause extensive environmental

contamination (e.g. patients with *C. difficile* infection)[13;35;42-46] and infections with microorganisms which are resistant to antibiotics.[15;18;33]

Patients who are known or suspected to be infected with a microorganism spread by the contact or droplet route should be cared for in single-bed rooms when available.

(AGREE rating: Recommend)

Recently carbapenemase producing Enterobacteriaceae (CPE) have become a major public health issue and guidance has been issued for NHS Scotland which recommends patients identified as high risk must be isolated in a single-bed room.[15] High risk patients are defined as those who: have been transferred from a hospital outside of Scotland; have been hospitalised outside of Scotland within the last 12 months; have previously tested positive for MRSA or CPE at any body site.[15;17] A CMO letter to reinforce this requirement has also been circulated.[16]

Hospitals should have systems in place to be able to rapidly identify:

- **patients who have been transferred from a hospital outside of Scotland;**
- **patients who have been hospitalised outside of Scotland within the last 12 months;**
- **patients who have previously been positive for MRSA or CPE at any body site.**

These patients should be prioritised for placement in a single-bed room.

(Mandatory)

The risk of seroconversion of hepatitis C virus (HCV) negative patients receiving haemodialysis in the same room as HCV positive patients has been highlighted in the literature.[47-49] It is suggested that patients with blood-borne viruses (BBV) receive haemodialysis in a single-bed room, using dedicated equipment.[47]

Patients who are receiving haemodialysis and are known or suspected to be positive for a BBV should be managed in single-bed rooms using dedicated equipment.

(Good Practice Point (GPP))

The duration that a patient should remain isolated in a single-bed room is determined by clinical judgement and depends on factors such as whether the patient is immunocompromised as this may result in prolonged shedding of microorganisms.[13;45] The clinical judgement and expertise of the staff involved in a patient's management and the IPCT or HPT should be sought.

Patients should remain isolated in a single-bed room whilst they remain symptomatic and/or are considered infectious.

(Good Practice Point (GPP))

The decision to discontinue isolation should be based on clinical judgement.

(Good Practice Point (GPP))

It is considered good practice to keep the doors to non-pressurised single-bed rooms closed, as this provides physical separation of patients in isolation from other patients.[50] One observational study found that keeping patient doors closed was associated with lower rates of hospital-acquired diarrhoea in paediatric wards.[51] Therefore, the door to the isolation room should remain closed, and should only be opened when entering/leaving; however, Department of Health guidance recognises that in some cases this may not be possible.[13;50]

The door of the single-bed room should remain closed when it is used to manage a patient worth a known or suspected infection.

(Good Practice Point (GPP))

What is an enhanced single room?

Also known as an isolation suite/room,[8] and enhanced single room has the same provision as a single-bed room (en-suite) with the addition of in-built ventilation systems designed either to prevent infectious airborne particles from leaving the room (negative pressure) or to prevent potentially infectious airborne particles from entering the room (positive pressure (typically a ventilated lobby or anteroom)).[8;11] Where a patient presents an infection risk to others, a 'negative pressure' enhanced single-bed room is used (source isolation).[11] Enhanced single rooms which include a positive pressure lobby enable the room to be used for both source and protective isolation by preventing air entering the corridor or escaping from the room. The lobby also provides an area for healthcare workers to prepare before entering/exiting the room. The

ventilation should be +10 Pascals in the lobby with respect to the corridor; patients' room should have 10 air changes per hour and be neutral in pressure to that of the corridor; the en-suite having at least 10 air changes per hour and a negative pressure to that of the patient's room.[11] For more detailed information on the requirements for an enhanced single-bed room, see SHPN 04 In-patient Accommodation: Options for Choice (Supplement 1 Isolation Facilities in Acute Care Settings).[11]

An enhanced single room is a single-bed room (en-suite) with in-built ventilation systems designed to prevent egress (negative pressure) or ingress (positive pressure) of potentially infectious air.

(Mandatory)

Under which circumstances should a patient be placed in an enhanced single room (negative pressure)?

There is consensus on the role of suitable ventilation in the prevention of infectious agents disseminated by the airborne (aerosol) route. One systematic review in which 40 original studies were evaluated by a team of experts in the field of engineering and microbiology, demonstrated strong evidence of an association between the spread of airborne infectious diseases such as chickenpox and measles and the direction of airflow and supported the use of negative pressure enhanced single rooms for the control of specific infectious agents.[52] For the purposes of infection prevention and control, an enhanced single room is the preferred choice for patients known or suspected to have infections spread by the airborne (aerosol) route.[13]

Where the enhanced single room is a negative pressure room (i.e. to prevent escape of airborne microorganisms from the room), or a positive pressure room (i.e. protective isolation to prevent airborne microorganisms from entering the room), then the door should remain closed to help maintain the correct pressure differential.[53] There is evidence that door opening can disrupt the containment effectiveness of negative pressure rooms, allowing the dispersal of airborne particles into adjacent areas.[54;55] Therefore, it is recommended that door-opening is kept to a minimum, and doors should remain closed when not in use.

An enhanced single room should be used, if available, to accommodate a patient known or suspected to be infected with a microorganism spread by the airborne (aerosol) route whilst the patient is considered infectious.

(AGREE rating: Recommend)

The door of an enhanced single room must remain closed when a patient is managed within it and door opening should be kept to a minimum.

(Good Practice Point (GPP))

Under what circumstances should a patient be placed in an enhanced single room (positive pressure)?

The CDC suggests that in general immunocompromised patients can be cared for in the same environment as other patients.[13] However, there are specific patient groups for whom isolation may provide protection from infection including:

- Any patient whose blood neutrophil count falls below, or is expected to fall below 0.5 x10^9/L.[56]
- Patients receiving haematopoietic stem cell transplant,[57] particularly allogeneic transplants[58]
- Patients with extensive burns[13;59]

Providing HEPA filtered air into the positive pressure room is also recommended.[57]

An enhanced single room (positive pressure), ideally with a HEPA-filtered air supply, should be considered for patients at an increased risk of infection e.g. immunocompromised.

(Good Practice Point (GPP))

(AGREE rating: Recommend)

Are there any legislative requirements relating to the use of an enhanced single room?

As part of local COSHH assessments a log book should be completed for each enhanced single room (isolation suite). These log books should be located in close proximity to the room e.g. the lobby or anteroom. The following information should be recorded for each enhanced single-bed room:

- a schematic layout of the enhanced single room and ventilation system serving it;
- information on the ventilation design parameters;
- a record of the actual ventilation performance at initial validation ("Acceptance testing");
- records of the annual validations;
- records of the lobby pressure, taken by ward staff from gauges and monitoring devices provided;
- records of any routine service and maintenance activities;
- records of any repairs or modifications;
- a method statement for disinfecting the system.

(Mandatory)

What is a cohort area?

A cohort area is a bay/ward in which a group of patients (cohort) with the same infection are placed together.[13;50] Cohorts are created based on clinical diagnosis, microbiological confirmation when available, epidemiology, and mode of transmission of the infectious agent.[13]

(AGREE rating: Recommend)

Under which circumstances should a patient be placed in a cohort area?

Cohorting forms part of a hierarchy of patient placement decisions for patients requiring care using Transmission Based Precautions. This approach is particularly used when there are increased numbers of cases e.g. MRSA and/or if single-bed rooms are in short supply.[8;13;25;30;36;46;50] It is difficult to elucidate the evidence to support the effectiveness of cohorting as it is mainly used during outbreaks, the findings suggest that it is effective when

combined with other infection prevention and control measures such as hand hygiene, appropriate PPE and environmental decontamination.[13;25;30;35;37;41;46] However, some studies have suggested that transmission between patients may occur during cohorting, particularly in the absence of microbiological typing or where some patients are convalescing/recovering and others still have active symptoms e.g. CDI.[60-62] Therefore, it is important to ensure that there is adequate separation of at least 3 feet (approximately 1 metre) between patients. The use of curtains may also be used as a further means of separation.[13]

Patient cohorting may be required when single-bed rooms are not available and there is more than one patient with the same infection.

(AGREE rating: Recommend)

Patient cohorting should be combined with other infection prevention and control measures e.g. hand hygiene, PPE and environmental decontamination.

(Grade D recommendation)

Patients should be separated by at least 3 feet (approximately 1m) from each other in a cohort area, and bed curtains can be drawn as an additional physical barrier.

(AGREE rating: Recommend)

What is 'cohort nursing', and under which circumstances should it be implemented?

Cohort nursing (staff cohorting) is defined as the use of a dedicated team of healthcare staff to care for patients infected with a single infectious agent.[13;50] Evidence suggests that this approach may be beneficial when control methods have been unsuccessful and/or an outbreak is continuing.[63-65] There is some evidence to suggest that cohort nursing is an effective intervention to further minimise the risk of cross contamination and should be implemented if there are adequate resources to do so.[46;50;66-68]

Cohort nursing (staff cohorting) may be implemented to minimise the risk of contamination between groups of symptomatic and non-symptomatic patients if there is adequate staff resource available to do so.

(AGREE rating: Recommend)

4.3 Implications for research

Limited robust literature was identified by this review regarding the appropriate placement of patients, although there is acknowledgement within guidance that adequate bed spacing, provision of single-bed rooms and provision of separate sanitary facilities for staff and visitors are important factors in infection control.[2;5;8] Furthermore, terminology in the published literature is varied and confusing, the term 'isolation' is used to mean both physical separation and other infection control measures such as use of PPE. In addition the term 'isolation room' is used to mean either an enhanced single room with negative pressure or simply a single-bed room with neutral pressure. Further research is required to ascertain: the impact of single-bed room provision on infection control across NHSScotland inpatient facilities; the effectiveness of both source and protective isolation for the prevention of HAI; the effectiveness of both patient and staff cohorting for the prevention of HAI and any potential risks of transmission associated with cohorting.

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Water Review Meeting – Draft meeting Note

Tuesday 4th September 2018 at 8 a.m. in MAK Office, JB Russell House [and Teleconference]

Present		
Jonathan Best (JB)	Director – Acute Services	
Jim Leiper (JL)	Lead Project Manager (attending by teleconference)	
Tom Walsh (TW)	Infection Control Manager	
Mary Anne Kane (MAK)	Interim Director of PPFM	
Apologies		
None		
In Attendance		
Allyson Hirst (AH)	Admin Support to – Interim Director of PPFM	
	Discussion	**Action**
	Review of Guidance	
	JL confirmed: • Water Investigation Interviews are progressing with a report to be prepared for the CEO who JL is meeting on 5th September. JL noted that there are still a few people to interview but due to annual leave etc this has not been possible but thought that the information already gathered was sufficient to put the report together. The information he has gathered has given a clear picture of the situation at the time and will review this with JG. Recommendations are not the intention of the report and this will be apparent from the reports content	
	Governance	
	• Verbal update to the Board meeting on 21/08/2018 and no further update from the Scottish Government at this time • It was agreed that a meeting with HFS and HPS would be appropriate after receipt of their report with regards to national guidance and the progress of this. It was noted that water sampling is being discussed nationally with a paper being submitted to the Microbial Project Board in order to extend the range of organisms that are tested. TW noted that this has not been ratified and timescale for this to conclude was not clear. JL noted that the experienced gained in Glasgow should be shared with other Boards to allow them to change their own monitoring arrangements. MAK noted that A Rankin was taking information back to her colleagues including the issues with flow regulators to make a determination on the best way forward but noted that at this time no guidance has been altered. It was noted that Glasgow should have input to this as we have already started to make some changes to ways of working and protocols. • It was noted that of 17 patient's infections water was considered to be the most likely cause but no direct correlations in any of the cases. Water experts have indicated that this is not uncommon due to biofilm continually changing and being affected by the water, flow etc. T Inkster has indicated that highly likely that the water contamination was the cause but no absolute scientific response and it should be noted that some of the children found to have infections have been out on pass and therefore no control of the environment and this could also have been a factor in considering the cause. No absolute evidence and agreed that almost all sinks will have some bio film and bacteria. JL offer to meet with TInkster if required.	
	Action Plan	
	• Dental Chairs –TW to chase up and clarify the flushing and maintenance with G Jenkins and S Walker and will feed back any response • Scanners – no progress and MAK is awaiting feedback from Estates Team. L Ross believes that Estates carry out maintenance but MAK noted that this was not the case and this could be an area of weakness and has requested Estates to review and provide a written summary and this will be picked up at the Board Water Safety Group. Agreed that turnkey systems require a revision of what is included in the specifications specifically around the maintenance of the scanners to ensure clarity on this from installation. Estates only monitor the water going into the clinical sinks but not scanners – MAK agreed to follow up	**TW** **MAK**

	Taps	
	• Still awaiting national guidance - this is being followed up on a weekly basis at the Water Technical Group. MAK to pick up on potential damage to taps during CD process	MAK
	AOCB	
	• Filtration Plant – MAK reported that the capital order has been placed. A challenge with the DoF around the ongoing revenue costs and this was expected to be picked up within the FM budget and this will require to be reviewed with the PPFM accountancy team. A Gallacher and I Powrie have been asked to pull together an easily understandable breakdown of costs – worst case/best case. Consider the possibility that we may require to shock dose and possibly more than once – costs are variable and the slow approach is planned but this will become clear once the process starts • Multiplex – the approach to Multiplex will be determined after the report to J Grant is submitted. Meeting with S&W is scheduled for the 14th September to seek legal advice. MAK noted her own concerns that as we approach the winter season and the CHP not consistently achieving appropriate temperatures that this may cause further issues. MAK has been asked by J Grant to determine how this will be fixed. Meeting with Multiplex this week to take forward	MAK MAK
	Date and Time of Next Meeting	
	The next meeting of the Group will be **Tuesday 11th September at 8am. Post meeting note – the meeting on 11th September was cancelled and the next meeting will take place on – 18th September 2018 at 8am**	**All**

RHC Water Incident.

Further update to the informal Director meeting 10th December 2018.

As previously discussed NHS Greater Glasgow and Clyde (NHSGGC) have since January 2018 been investigating possible linked cases of bloodstream infections associated with ward 2A Royal Hospital for Children. Early on it was proposed that this could be linked to a contaminated water system. On 20th March 2018 the Scottish Government invoked the national support framework which included commissioning HPS to lead an investigation into this incident. The attached HPS report is in final draft format and following review by the Cabinet Secretary may be shared with Parliament in the coming weeks.

Recognising Patient Safety as the highest priority a risk assessment was completed by the Senior Management Team (SMT) in the Royal Hospital for Children and a recommendation was made to the GGC Board Directors who approved this recommendation, i.e. to move patients from 2A/B to suitable accommodation in the adult building. A robust and comprehensive planning process was undertaken in terms of risk assessment and risk mitigation of all aspects of the decant which successfully took place during September.

Interim measures have been implemented as the incident review progressed, these include:

- Introduction of a local continual treatment of the water system in ward 2A/B with Chlorine dioxide due to be completed in the near future.
- Replacement of all Thermostatic Mixing Taps (TMT's) clinical wash hand basins (CWHB) including modified drain connections and trap arrangements.
- Modifying the hot water flow and return position in relation to the tap.
- Replacement of all local WC cisterns with direct flushing valves.
- Point of Use (POU) Filters which will remain on outlets until testing has demonstrated satisfactory Total Viable Counts (TVCs) of bacteria are being maintained.

A number of further local and national recommendations are detailed in the HPS report based on the investigation to date. These include recommendations for NHSGGC and National learning points which are being reviewed and progressed by HPS and HFS. The GGC recommendations are being progressed through the IMT and GGC Water Group.

1. Recommendations for NHSGGC

- Continue developing and implementation of the decontamination maintenance protocol of flow regulators.
- Ensure that any tap replacement programme has no flow regulators.
- Ensure that the management of the water systems is as described in guidance, including letters of appointment; appropriate numbers of authorised persons and competent person and appropriate training.
- Consider the resolution of outstanding issues with Energy Centre.

- Consider having a formal process in place to prioritise, manage, record and react to any BMS alarms from anywhere in the campus network.

- Carry out routine maintenance and reactive maintenance on the hot and cold water systems and components as per the Planned Preventative Maintenance (PPM) schedules in ZUTEC and specific manufacturers' recommendations and ensure that all infrequently used outlets are managed and flushing is recorded. This should include all water dump valves and checking turnover of the water tanks.

- Have the seasonal commissioning as required by the specification carried out by the Contractor.

- Ensure all pipe work to remove external bib taps has been removed and all EPDM flexible hoses have been removed or managed by risk assessment.

- Ensure that the BMS server provided under the contract meets the requirements of the contract specification in relation to data storage integrity.

- Ensure all electronic records relating to water are checked and any missing or incorrect documentation rectified and provided.

2. All NHS Boards

- All NHS boards should ensure facilities teams are adequately resourced to ensure maintenance of all aspects of the water system are maintained in accordance with policies and guidance.

- All maintenance undertaken should be recorded and maintenance records should be reviewed regularly to ensure all aspects of the water system are maintained in accordance with policies and guidance

3. HPS/HFS

HPS via the existing Infection Control Built environment programme will, in conjunction with HFS:

- Prioritise water safety and undertake a review of NHS Scotland current approach to water safety.

- Review NHS Scotland current approach to water testing in healthcare settings.

- Review NHS Scotland current surveillance and reporting of potentially linked water related HAI cases.

- Based on findings develop risk based guidance on water testing protocols, results interpretation roles and responsibilities and remedial steps to be considered.

- Review existing national and international guidance relating to water safety and develop robust requirements/guidance for building handover requirements in relation to the water systems.

- Review the role of the IPCT into the built environment, including day to day activities, refurbishments and new builds (including design, commissioning, handover, maintenance).

- Develop an evidence based/best practice built environment manual which will be evidence based and cover as a minimum current and emerging evidence and the technical requirements from a clinical and HAI perspective that will be adopted by all NHS boards.

- Establish a risk based approach to water testing and any remedial action required, including roles and responsibilities that NHS boards will adopt.

- Produce evidence based guidance on water coolers, ice machines and dishwashers from a water safety and decontamination perspective.

- HPS to scope out a review on the use of flow regulators across NHS Scotland and identify any associated risks and recommend any remedial actions required.

- Sink and drain cleaning guidance to be reviewed as part of the HPS built environment guidance

- HPS to review the requirement for 100% ensuite single side rooms in new builds in light of changing hand hygiene practice as part of the HPS built environment guidance

- HPS to review the evidence for and requirement for the number of clinical wash hand basins per patient/bed in light of changing hand hygiene practice as part of the HPS built environment guidance.

There have been no cases associated with water since the ward move to the adult hospital. The Incident Management Team and the GGC water group continue to meet on a regular basis to review and assure on progress.

Dr Jennifer Armstrong, Board Medical Director

Notes of HSE visit meeting ,

Present

Tom Steele, Colin Purdon, Teresa Inkster, Karen Connelly, Kenneth Flemming, John Green, Christine Peters , Cameron Adam, Kathryn

Inspectors introduced, legal duty to not expose patients to risk. Query if this has occurred and if a safety notice has to be imposed.

Aim to clarify time line and details of the cryptococcal outbreak as many conflicting reports in the press.

Went through timeline with Teresa:

Two cases :

Case 1 , cancer adult 3 weeks in 4c prior to developing illness

Friday 21st _ Air sampling undertaken in plant rooms and rooms – 3 bird associated organisms

Saturday 22nd I chase up pest control report and clean up – it takes 11 men to do the jon

I went through the basic AHU and the investigations that I have been asked to undertake by Peter Hoffman.

I pointed out that crytpococcs from either the external air of plant room would get through F7 at 80% efficacy and that Cryptococcus could enter room from void in a non positively pressurised room. There are therefore a number of plausible routes , but at this stage it is very hard to confirm the exact route in these cases.

It was noted that there were no HEPAs in the room either patient was housed in therefore they were not protected from fungal spores. I pointed out SHTM 03-01 regulation re ventilation in neutropenic patients state positive pressure , increased ACH and HEPA filtered air. I also drew attention to the lack of negative pressure facilities and Tom Steele stated that the negative pressure rooms are being commissioned currently.

Tom Steele said he had commissioned a review from concept to build and commissioning to explore why the hospital had not been built to spec. I asked if infection control would be included in review, he said that not been agreed and I stated that it need to be as there are a suite of SHTMs which deal with IC being involved in the whole building planning and commissioning process. The company involved would be AECOM consulting .

The inspector indicated that a new hospital that failed to meet standards was a very big issue .

Questions were asked re the pigeon problems and history and control measures taken,

They asked for copies to be sent to them via John Green:

1. My SBAR for the IMT re crypto and ventilation
2. Air sampling results for plant rooms, 4C 6A and any other ward recently sampled
3. All IMT minutes for current Crypto outbreak
4. PAG minutes for crypto outbreak
5. Photos of this morning of the quadrangle
6. History of pest control re pigeons on the site
7. The report issued under FOI request re pigeons
8. Plan for clean up

We then go on a walk round firstly to the quadrangle where the guano had just been cleaned up. The inspectors were talked through the possible route of ingress into the ventilation system

Then we went into the plant room on the 12th floor,

Of interest there was a clear breach in the seal of the AHU 06 as air was pouring out of the dooe
There was still evidence of bird guano on a vent shaft .
The route of entry was actually through baffles which have netting
Baffles around the height of the building would have allowed pigeons to enter the void previously.

Cryptococcus

Inkster, Teresa [redacted]

Thu 01/10/2020 15:11

To: Hood, John [redacted]; HOOD, John (NHS GREATER GLASGOW & CLYDE) [redacted]

Cc: Peters, Christine [redacted] Angela Wallace (NHS Forth Valley) [redacted]

Hi John,

The meetings we have had over the past two weeks have raised more questions rather than answers re Cryptococcus;

1) Yesterday you stated to the patient's family that only one plantroom (123) had evidence of pigeon guano. The microbiologists involved at the start of the incident have photographic evidence to the contrary. Is the group not aware of this?
2) Reference to the pigeon guano only being wet. Again the photographic evidence and the guano witnessed by my own eye was dry in many places. There is also a photo from the pest control company with what looks like pressure hosing equipment in it , which we discussed previously risking aerosolisation . What was the reason for wet guano in the plant room, were they hosing it? You also mentioned the Scotland has a wet climate, given that cases have occurred in Scotland I do not understand the relevance of this statement.
3) You mentioned HAI was unlikely as renal patients unaffected. Renal patients are at less risk and we quickly implemented control measures in this group including prophylaxis and portable HEPA. Is the group aware of this? I don't think is a scientific approach, we wouldn't not attribute an environmental source just because another high risk group did not develop infections.
4) You have suggested the adult patient acquired Cryptococcus from a wide open space and you mentioned Queens park. Given that there are many lymphopenic lymphoma patients ,would we not expect to see this frequently? If we are saying there is a risk to lymphoma patients from public parks what is the public health advice to this patient group? Is there evidence of a pigeon issue at Queens park? What is the explanation for Cryptococcus in the [redacted]?
5)With respect to investigations, was a tracer gas released in the plant room? was thermal imaging employed given issues in Edinburgh with pigeons in walls? What was the outcome of the investigation into the risers and voids?
6) Is the group aware that the original epidemiology report from public health has omissions with respect to patients being admitted to the QEUH?
7) what is the theory behind the most recent case in a 2nd paediatric patient and is there any history of recurrent issues with pigeons?
8) At the start of the incident we recommended increasing the number of HEPA filtered rooms for high risk patients. Yesterday however you stated that the air quality in ward 4C is good. Given that air quality is only an assurance check, is the spec of ward 4C with less than 3 ACH in your opinion suitable for immunosuppressed haem onc patients? (it differs from that of the equivalent Beatson ward, so the same patient group is in a unit with better spec)

Can I have a copy of the groups report as per the terms of reference. It will need to be circulated to all IMT members for comment.

kr
Teresa

RE: Ventilation IMPORTANT

Steele, Tom [redacted]

Mon 28/01/2019 18:36

To: Peters Christine (NHS GREATER GLASGOW & CLYDE) </o=MAIL/ou=NHSFB01/CN=Recipients/CN=ZLGFFYKV>; Powrie Ian (NHS GREATER GLASGOW & CLYDE) [redacted]; INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]

Christine, given the evidence of bird activity around the helipad area I would like to consider further if this is a credible hypothesis. Rather than rehearse this at an IMT, should we meet separately to evaluate this?

Regards Tom

Tom Steele | Director of Estates and Facilities | NHS Greater Glasgow and Clyde | JB Russell House | Gartnavel Royal Hospital | 1055 Great Western Road | Glasgow | G12 0XH
t: [redacted]

From: Peters, Christine
Sent: 28 January 2019 12:44
To: Powrie, Ian [redacted] Inkster, Teresa (NHSmail) [redacted]
Cc: Steele, Tom [redacted]
Subject: RE: Ventilation IMPORTANT

Hi Ian,

When we visualised the areas last week it was fairly dark (photos attached). There was evidence of fouling to a minor degree on the flat surfaces below the intakes (where the pigeon traps are located)

The black inlet grids are flush and there was no evidence of pigeons attempting to perch there (bearing in mind it was dark and windy).

We visualised the intakes for two out of three AHU which supply the corridor and half the rooms on 6A.
We were not able to visualise the roof area above the inlets, but there are reports that the flat roof area has been heavily contaminated and Teresa had further information regarding fortnightly clean up being required for the area under the helipad. There are many pictures in the press showing numbers of pigeons perched on the edge of the flat roof areas above the inlets.

We noted the turbulence of the very strong winds experienced in that area.

So the question really is: have we ruled out the possibility of Cryptococcus entering inlets from the external air supply?

The answer to that in my mind is no we have NOT excluded it. In fact with thenumbers of pigeons around the heights of the building it is hard to imagine that there would not be occasions when the large volumes of air that are being drawn in did not have at least some level of cryptococcal contamination. The regularity or scale of number of spores ingressing is not possible to determine, and I think the work group with John Hood will need to consider all of this along with the knowledge of the plant rooms and the ventilation ducting etc.

kind regards,

Christine

Dr Christine Peters

Consultant Microbiologist
Clinical Lead Microbiology QEUH
[redacted]

From: Powrie, Ian
Sent: 28 January 2019 10:13
To: Peters, Christine; Inkster, Teresa (NHSmail)
Cc: Steele, Tom
Subject: RE: Ventilation IMPORTANT

Hi Christine,

Can you please confirm that you are satisfied from our site visit last week that we have visualised the air intakes on level 12 and there is no visible external fouling at these in-takes?

Regards

Ian

I. Powrie
Deputy General Manager (Estates)

Queen Elizabeth University Hospital Campus
Property, Procurement & Facilities Management Directorate
Facilities Corporate Services Dept
CMB Building
Glasgow
G51 4TF

[redacted]

SUSTAINABILITY ACTION
Our NHS Our People Our Planet

Think SAFE ENVIRONMENT.. ....please help cut carbon.....don't print this email unless you really have to.....and remember to recycle.....SAVE ENERGY - THE EASY WAY TO SAVE MONEY!

From: Peters, Christine
Sent: 21 January 2019 10:34
To: Inkster, Teresa (NHSmail)
Cc: Powrie, Ian

Subject: Ventilation IMPORTANT
Importance: High

Hi Teresa,
An important postscript to my report :

I had been told that the ventilation inlets were clear of pigeons, however on discussion with Ian that is not actually ascertained and so a fourth route for the cryptococcus to enter the ventilation system is in fact at the point of inlet.

I have agreed with Ian that these inlets need to be visualised – either I can go up with a trained person to operate the lift, or they can send photos .

We need to have that urgently verified as heavy contamination at the inlet will definitely be a possible source .

We have agreed to meet at 2pm to :

Inspect the AHUs for ITU, 6A and 4C. Ian will get permit to work organised for AHU for 4C and 6A to be shut down so I can get in to visualise and test.
Ian will source the records re the F7 filters

Christine

Dr Christine Peters
Consultant Microbiologist
Queen Elizabeth University Hospital,
GGC
[redacted]

Summary of Whistleblowing Report
Incident Management Team – Ward 6A, Paediatric Haemato-Oncology

Background

On 21 August 2019, NHS Greater Glasgow and Clyde's (NHSGGC) Medical Director received contact from the Medical Director of NHS National Services Scotland regarding a number of concerns which had been raised confidentially by a member of staff in NHSGGC. These were about the Incident Management Team (IMT) in NHSGGC for Ward 6A, which relates to an infection control situation. The concerns were that the chair of the IMT was unable to do her job effectively due to lack of support for her role by management, communication problems and challenge and questioning of the views of the chair and others on the scale and nature of the problem.

NHSGGC were asked and agreed to take these concerns forward under the local Whistleblowing Policy.

The investigation was carried out jointly between Dr Linda de Caestecker, Director of Public Health for NHSGGC (who is a named senior manager in the Whistleblowing Policy for investigating concerns), along Ms Barbara Anne Nelson, Director of Workforce in NHS Fife, to help give assurance of objectivity and impartiality and to advise if formal HR processes were required. It was agreed that given the nature of the concerns raised, the most appropriate investigatory method would be to interview key staff involved with the IMT. This was to be conducted as an initial investigation in order to decide if formal HR policies should be invoked.

Findings

There was recognition and appreciation that chairing an IMT of this nature, where the issues are complex and the impact is substantial, can be a pressurised position and therefore good support is vitally important. An IMT is usually a short life group but in this situation as there have been consecutive IMTs looking at related but different incidents, it moved into a different pattern.

It was clear that there were varying views within the IMT on both hypotheses and safety issues and therefore the assessment of risk.

Most interviewees discussed concerns about the practical arrangements of the IMT and the need for these to be improved, particularly in this situation of a long-running complex IMT. These included timings, location, administration and attendance.

The meeting of 14 August 2019 was highlighted by a number of people interviewed as a particularly difficult meeting with many feeling unable to state their views freely.

Conclusions

- There should be more effective administration support for a complex IMT to ensure effective meetings with papers provided in sufficient time for consideration by all members.

- The chair of a complex IMT should not be expected to both manage the meeting and be the key contributor of expertise. Additional team members would be required in this situation.

- Information being denied to the Chair was not an issue that emerged from the interviews.

- Collaborative and multi-disciplinary working is key in this situation, where views are given in a way that is both respectful, and also respected. Respectful challenge is healthy and effective in an IMT in order to get to root causes. Chairs and team members require support, training and ground-rules to enable this to happen.

- In the interviews there were no specific examples of lack of transparency but there was feedback that there needed to be clarity about the purpose of pre-meetings to support the chair.

- There was not the evidence or the desire from interviewees to instigate any additional formal processes.

Recommendations

The investigation resulted in a number of recommendations about practical arrangements for IMTs, support and training for IMT chairs and support to improve behaviours and reach consensus when there are variations in views on causes and actions. The recommendations will be discussed with relevant teams, with individuals affected and those interviewed as part of this investigation.

Linda de Caestecker
Director of Public Health, NHSGGC

Barbara Anne Nelson
Director of Workforce, NHS Fife

December 2019

FW: Epidemiology

Inkster, Teresa [redacted]
Fri 14/08/2020 20:13
To: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]

5 attachments (2 MB)
BSI capetown.pdf; CMJ-130-2076.pdf; Arne SImon paper.pdf; Schelenz s.pdf; arega.pdf;

From: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]
Sent: 06 April 2020 12:46
To: Inkster, Teresa [redacted]
Subject: [ExternaltoGGC]Fw: Epidemiology

Dr Teresa Inkster
Consultant Microbiologist, QEUH
National Training Programme Director Medical Microbiology
Dept of Microbiology
Queen Elizabeth University Hospital
Glasgow
[redacted]

From: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)
Sent: 19 August 2019 21:12
To: Peters, Christine; Kennedy Iain (NHS GREATER GLASGOW & CLYDE)
Cc: Devine, Sandra; Deighan, Chris
Subject: Re: Epidemiology

Thanks both
We have spoken about the difficulty in obtaining data from other UK centres and we are working on that within microbiology
In the meantime the papers attached from elsewhere provide a useful illustration of the nature of the organisms seen in this patient group. The tables in these papers are very helpful in that they list the Gram negatives over the timespan of the studies.
You will note what the most common organisms are and they are not the environmental Gram negatives we are seeing. This is what is causing concern amongst the microbiology team.
The paper which is most akin to what we are seeing is one from Ethiopia (attached), likely relating to unhygienic conditions there
If you let me know when you are meeting I will try to join

Kind regards
Teresa

Dr Teresa Inkster
Lead Infection Control Doctor NHSGGC
National Training Programme Director Medical Microbiology
Dept of Microbiology
Queen Elizabeth University Hospital

Glasgow
[redacted]

From: Peters, Christine [redacted]
Sent: 16 August 2019 10:14
To: Kennedy Iain (NHS GREATER GLASGOW & CLYDE)
Cc: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)
Subject: RE: Epidemiology

HI Iain thanks for this,

It is unfortunate that your data was being used at the IMT to imply that there is no issue at present, which I am sure had you been present you could have clarified the position regarding the limitations of your data.

My main concern is that your report is not actually an outbreak epidemiology report and therefore was not the most relevant data to be discussed at the IMT as it was neither up to date nor inclusive of cases ascertained through other laboratories. The difficulty with including a search based on previously identified organisms is that new novel isolates are potentially missed . Fundamentally the acceptance level for these types of organisms in blood cultures is zero. Any case merits at least investigation at the discretion of the ICD. Teresa has the data and epi curve already from ICNET and I am sure you would agree that it is her data which is the most relevant for the IMTs as it is real time.

In the context of a previously contaminated water system, rather than trying to formulate baseline acceptable levels, the approach should be alertness for any new cases and rapid concerted action to identify possible sources, which is exactly what Teresa is doing.

With regards to the details of denominators used, as well as cross checking the cases, I am happy to collaborate and discuss in person . With regard to 2017, I am happy to discuss previous records I have of discussions of the rates and nature of bacteraemias on the unit at the time.

Is there a good day of the week for you to meet ?
Kr
Christine

From: Kennedy, Iain
Sent: 15 August 2019 16:10
To: Peters, Christine [redacted]
Cc: Inkster, Teresa (NHSmail) [redacted]
Subject: RE: Epidemiology

Hi Christine.

The report is attached, it is an update of the draft report you previously saw in October.

As to conclusions, I would categorise it more as since the decant to 6A, there has been a significant reduction in the number of the cases, and a reduction of the number of polymicrobial cases, with the 3 monthly rolling count being at similar levels to second half of 2016, and close to those in the old hospital, though with more month-to-month variability. That this improvement has occurred does not remove the need to monitor and investigate when additional or unusual cases occur. In particular, there does not appear to be the same improvement in enterobacter, and I comment on the need to investigate that further in the report.

There are a couple of points to note though, in particular that the report only includes data up to June, and will not include cases where isolates were processed in non-GGC labs. Other limitations are included in the report.

I am not sure what happened with the examination of the data in 2017, as I was not involved at that time.

In terms of aggregation, the data is based on the list of organisms which were involved in the situation, either from clinical, water or drainage samples at the time. As such, the reporting does cover “outbreak organisms”. There would be a number of sub group examinations that would be valid, including environmental v non-environmental that we have discussed before. I have attached an additional epi curve that have drawn up today, split on that basis, with July and data so far in August, as that may help the discussion.

I would be happy to discuss on the phone or face to face, or to jointly review any of the lab data, just let me know.

Best wishes

Iain

From: Peters, Christine
Sent: 14 August 2019 16:58
To: Kennedy, Iain
Cc: Inkster, Teresa (NHSmail)
Subject: Epidemiology

Hi Ian,
I am rather astonished that there is a report re epidemiology on 6A gram negatives that implies no increase in numbers of cases over the last few months as this does not chime with my reading of the laboratory data, or indeed the existence of an IMT, or closure of the ward with a huge number of actions to solve environmental issues.

I think it’s important that we understand the detail of what is happening and not be “chunking” data and merging very different organisms, as happened at the start in 2017 when the significance of the nature of the gram negatives was perhaps not appreciated.

Would you be happy to share your report with me so I can identify why we have such very different interpretations of the current situation?

Kr

Christine

Dr Christine Peters
Consultant Microbiologist
Queen Elizabeth University Hospital,
GGC
[redacted]

comments on paediatric haemato-oncology data

INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]
Thu 07/11/2019 14:44
To: IMRIE, Laura (NHS NATIONAL SERVICES SCOTLAND) [redacted]
Cc: Leanord, Alistair [redacted];Crighton, Emilia [redacted];Peters, Christine [redacted]

Dear Laura,
Please find attached comments on the HPS review of paediatric haem-onc data . This is an impressive document turned around in a short space of time and my comments below are to generate further discussion , not criticism

Page 7
What is the statistical opinion on the use of SPC charts for organisms that are not endogenous flora and considered non endemic?
Page 12

The SPC chart is not identifying outbreaks. During Feb- Sept 2018 there was a significant water/drain contamination incident with 23 cases and typing results linked to environmental isolates. However at no point is the UCL breached.
There are several other episodes whereby the definitions in Chapter 3 of the national manual are met yet not detected by these charts

There are no charts provided for individual organisms, again meaning that outbreaks can be undetected. These would however likely be too sensitive due to the non-endemic nature of these organisms. UCLs are likely to be frequently breached.
I would be worried about using SPC charts moving forward as they may lead to a false sense of security and the concept of preventable HAI is lost in them.

Page 17
The QEUH 6a/4b chart does not appear to contain all the cases from the current incident therefore the diverity is not captured
There is huge diversity within the Pseudomonas genus , therefore the species should be separated out . Some of these cases are Ps putida which is much rarer than Ps aeruginosa

Page 19
'it is difficult to ensure that the blood cultures are true clinical cases of bacteremia' . Gram negatives are always treated by microbiologists as clinically signficant especially in such an immunosuppressed patient group , all of these were classed as true cases.

Page 20

Triggers for environmental Gram negatives have been in place in GGC since 2016 and were adapted from Barat Patels work on neonatal outbreaks The triggers for investigation are ;
- a single case of bacteraemia
- two infections in a 2 week period
- three colonisations in a 3 week period
- a general increase in environmental Gram negs at the discretion of an ICD - **relevant to current incident, and acknowledges that more than one organism may be involved when there is an environmental source**

General comments

There is no commentary on the nature of the bacteria and how they differ from other units . We have previously highlighted that these environmental bacteria are out of keeping with elsewhere. I don't think we can benchmark against Yorkhill which is an old building and based on Legionella results, one which has poor water quality. I don't recall Gram negatives being looked for.
There is no commentary on the period from Sept 2018-March 2019 where there were no cases - that is key in understanding the hypothesis, a prolonged period with not a single case. It is likely due to environmental control and all the measures that were put in place prior to 6A.

Similarly there have been no new cases since the [redacted] October, is this because there is now source control ie. removal of wet material from kitchen. At the time I chaired the IMT we did not have this info but observing the water damage, it would appear to be a long standing drip. This ,coupled with other water leaks on the ward and what is emerging from John Hoods ventilation work could be the explanation i.e. airborne dispersal of bacteria made even more effective by a suboptimal ventilation strategy.

Lastly, clinical data is collected routinely by microbiologists for all cases and RCAs undertaken with identification of risk factors and potential source. What would be more useful and should be part of any outbreak investigation is a case control study to identify why some and not other children are developing bacteraemias
Kr
Teresa

Dr Teresa Inkster
Consultant Microbiologist, QEUH
National Training Programme Director Medical Microbiology
Dept of Microbiology
Queen Elizabeth University Hospital
Glasgow
[redacted]

Fw: Environmental links 6A

INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]
Fri 12/06/2020 21:35
To: RANKIN, Annette (NHS NATIONAL SERVICES SCOTLAND) [redacted]

Sent from my BlackBerry 10 smartphone on the EE network.

From: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]
Sent: Monday, 23 September 2019 3:37 PM
To: Peters, Christine; Crighton Emilia (NHS GREATER GLASGOW & CLYDE)
Cc: Williams, Arwel; GREEN, Rachel (NHS GREATER GLASGOW & CLYDE); Wood Kathleen (NHS GREATER GLASGOW & CLYDE); Gibson, Brenda; RITCHIE, Lisa (NHS NATIONAL SERVICES SCOTLAND); alison.balfour[redacted]; teresa.inkster[redacted] Khanna Nitish (NHS GREATER GLASGOW & CLYDE); Valyraki, Kalliopi; Wright Pauline (NHS GREATER GLASGOW & CLYDE); Sastry Jairam (NHS GREATER GLASGOW & CLYDE)
Subject: Re: Environmental links 6A

Hi Christine

I agree with your comments . In addition I would like to add the following observations;

Typing
It continues to be reported and emphasised that typing results are unique .This is typical of environmental incidents and should not be used evidence that the environment is not a source.

Environmental conditions conducive to one strain of bacteria are conducive to others, particularly when dealing with biofilms. The easiest analogy is the cystic fibrosis lung. In the lab an agar plate from a sputum of a CF patient might look to the naked eye like a heavy pure growth of Pseudomonas but we know when we pick the individual colonies off there will be multiple strains present. In a water/drain incident it is not unusual to find mismatching of strains. This opinion was supported by international water expert Susanne Lee in her report from April last year.

Water results
I trust that the IMT are linked in and aware of results being reported back to the water technical group from the external laboratory. There are reports of Enterobacter , Pseudomonas putida, Klebsiella and different strains of Aeromonas at outlets. I note an email response to these that states that the last Enterobacter case was 6 weeks ago. The Enterobacter positives at outlets are actually a recurring theme and were present before the most recent patient cases. I understand the advice form an external expert is that these are outlet issues and not systemic although I notice recent positives from a tank sample and an email where control measures focus on a tank. I think it needs clarified whether there is a systemic or outlet issue. If thought to be an outlet issue it would be important to establish the number of outlets positive and the mechanism for such outlet contamination e.g. retrograde biofilm creep, aerosolisation from drains, cleaning methods etc.

Epidemiology
Epidemiology is not just about size it is also about nature and the nature of the bacteria in the current incident is what is unusual i.e. environmental Gram negatives. Whilst the classic outbreak definition is 2 cases linked in time place person over a 2 week period it has long been recognised that this is too restrictive. There are other definitions utilised and the important one cited by WHO, CDC and our own National Manual is that of the occurrence of a rare pathogen. Rare does not

mean previously unheard off. Whilst some of the environmental Gram negatives found have indeed been seen before in York hill they remain rare in microbiological terms and would not normally predominate in this patient group. Outbreaks of HAI/HCAIs classically have small numbers and limited baseline data and as such can easily be missed as changes may be subtle.

As I have stated before the typical pathogens e.g. E coli, Klebsiella, MSSA in this patient group are low, no doubt due to the work of the CLABSI group however environmental Gram negatives predominate. I previously sent round literature which demonstrates that what we are seeing in terms of the nature of the bacteria differs from other institutions. A useful paper by Aumeran et al, in Journal of Hospital Infection describes an outbreak of two strains of Pseudomonas in a paediatric haemonc unit. They do not benchmark overall numbers of Gram negatives rather they comment on seeing no Pseudomonas putida the year before i.e. it is the environmental nature that is concerning and this is a subtle finding

If the alternative hypothesis is that patients have acquired these infections in the community then it needs to be investigated as to why this is suddenly the case for his patient population. IPC does not stop at the hospital setting. It may be that there are public health interventions that would be appropriate such as instructions on hygiene, line care and water filters in the home environment.

Media statements

I have been catching up with media statements on my return from leave and would like to bring to your attention to the following;

'*There is nothing to link the infections to the wards infection control practices or the environment. In one case we found the type of bacteria to be widespread in the general domestic water supply and in the water supply to public buildings*'

I assume this statement refers to Mycobacterium chelonae and I am not sure what the relevance and reference to finding this organism in public buildings is. Whilst it is ubiquitous and found in water supplies we would not expect to find it at concentrations of >100 cfu at hospital outlets, so that statement is not reassuring.
The presence of M chelonae at significant concentrations in our system suggest one or more of the following has happened 1) Failure of filtration of incoming supply prior to tanks 2) Bypass of filtration possibly during construction phase 3) Low level seeding and proliferation in the water system . I note from the recent Edinburgh investigations no mycobacteria were identified in the hospital water in the new children's hospital there. I have previously circulated publications of single case infections with atypical mycobacteria that led to removal and replacement of showers and outlets in other centres. Infection control teams should be proactive with respect to rare and unusual infections. I do not seek comfort in the fact this bacteria is present in domestic water supply, there is a responsibility to protect the most vulnerable patients in our hospitals.

'*The infection rates within ward 6a are consistent with infection rates at the old Yorkhill hospital*'

I don't find this in the slightest reassuring. Have IPC practices not moved on sufficiently since then even taking into account increased patient numbers? Are we really aspiring to be the same as on old building years ago?? For noting the water in Yorkhill has Legionella problems, a marker of poor water quality and almost certainly Gram negatives will be present if looked for. How many bacteraemias in Yorkhill were in fact as a result of contaminated water? Was it ever checked?

I agree with Christine that zero tolerance is not achievable in this high risk group however we must continually be looking to prevent infections and should not become complacent because the

numbers are the same as years ago. We have to acknowledge the differences between exogenous and endogenous infections and that infection control interventions for each group will differ. Exogenous infections are largely preventable. We should look to the period of time when the building first opened and the period from September 2018 to April 2019 when our infection rates were very low. That is the most appropriate benchmark.

We also need to acknowledge that infection control incidents, particularly complex environmental ones are multifactorial and require a multimodal strategy to address. Rarely do we get definitive answers such as typing that matches and positive surface swabs .Also it is usually impossible to assess which intervention has been most effective.

My final query is in relation to water and air sampling SOPs. I note these are to be reviewed. I wrote these SOPs whilst working at GRI and this is an accredited lab. Please can you highlight what the issues are with the SOPs

Kind regards
Teresa

Dr Teresa Inkster, MBChB, BSc (Hons), FRCP, DTMH, MPH, FRCPath
Consultant Microbiologist, QEUH
National Training Programme Director Medical Microbiology
Dept of Microbiology
Queen Elizabeth University Hospital
Glasgow
Direct dial : [redacted]

From: Peters, Christine [redacted]
Sent: 17 September 2019 17:30
To: Crighton Emilia (NHS GREATER GLASGOW & CLYDE)
Cc: Williams, Arwel; GREEN, Rachel (NHS GREATER GLASGOW & CLYDE); Wood Kathleen (NHS GREATER GLASGOW & CLYDE); Gibson, Brenda; RITCHIE, Lisa (NHS NATIONAL SERVICES SCOTLAND); alison.balfour@[redacted]INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE); Khanna Nitish (NHS GREATER GLASGOW & CLYDE); Peters, Christine; Valyraki, Kalliopi; Wright Pauline (NHS GREATER GLASGOW & CLYDE)
Subject: Environmental links 6A

Dear Emelia,

I am writing to you as chair of the 6A IMT in order to facilitate discussions regarding the assertion that the current cases in 6A “have no link to the hospital environment” from a microbiology perspective.

As Teresa explained to the IMT the likelihood of getting typing results that match clinical cases depends on many factors as per the CDC guidance that was circulated to IMT including; the numbers of samples taken , the location of the samples (eg trolley handles and lockers unlikely to be harbouring essentially water borne organisms) and an understanding of the large diversity of the types within the environment.

I have therefore tabulated the important information with regard to this discussion – please be aware that the information available to me is far from complete, I used the telepath gather system to identify cases as per Microbiology Clinical Scientist methodology over years of monitoring cases, thus there may be differences in case ascertainment from other data gather methods. I only refer to environmental results that I have seen; there is much, no doubt , that I have not seen and I am very happy to admit that caveat to the notes below. Furthermore any errors in numbers are entirely my responsibility and I would be happy for anyone to point out mistakes as this data is complex and time is short.

Re ? Environmental link of cases to Hospital environment of cases of environmental organisms in Haem onc paediatric patients Bacteraemias 6A inpatient and daycare

Organism	Link	Comments	Conclusion
M chelonae	13 SNP difference between clinical isolate to water isolate in hospital system Multiple water outlets have >100 CFU/ml of M chelonae throughout the hospital at multiple outlets, Subject to specialist water group management	Two clades in the water system, with isolates within the water system being thousands of SNPS apart from each other . Biofilm build up and selection process of biocide use , under review by water expert group DOES NOT have to be in the outlet patient was at to prove a link – water system is large, complex and flow from up stream contamination goes downstream to multiple outlets, we have a proven system wide M chelonae issue	Very strong evidence of link to hospital water
Pseudomonas aeruginosa 2 Cases in March 2019, 5 days apart	Pseudomonas aeroginosa isolated > 100 CFU/ml from chilled beam water system Chilled beams have leaked Multiple occasions isolated from drains and taps in hospital	Have the chilled water beam isolates been typed ? Have the taps and sinks in 6A been sampled including the day unit where the patients were being seen on a regular basis ? Please note Unlikely to grow from dry surfaces . Many types isolated from a large complex hospital environment. Missing the match is of poor negative predictive value, a match is a strong positive predictive value. Cases with same type can be indicative of person to person spread, however different typing of clinical isolates more in keeping with multifaceted environmental sources	Pseudomonas is an alert organism in this ward/patient group and a single bacteraemia case should result in the Pseudomonas checklist being completed. This is evidence based as international experience is that hospital water systems pose a significant environmental hazard to certain patient groups. 2014: 1 2015: 0 2016: 0 2017:1 2018:5 (water incident included cases) 2019: 2 (within 5 days of eachother) Strong suspicion of environmental link Steps to control environmental sources need to be taken irrespective of typing results , are these in place such as tap maintenance, chilled beam system biocide treatment and

			plans for continued monitoring ?
Stenotrophomonas x 3 in IMT case list	Isolated many times from taps and sinks 46 CFU /ml of stenotrophomonas in recent water samples	Unique types in current patients Have the taps and sinks in 6A been sampled ?Unlikely to grow from dry surfaces Very rare to match steno isolates from environment however – recent CF isolate matched to a PICU isolate pointing to hospital environmental strains being acquired by patients, possible likely vector would be water given distance in this case , giving circumstantial weight to the thesis that water could be implicated in the 6A cases ? if unique types isolated from environment does that mean they are not environmental	Increase in numbers linked with previous hospital experience and high numbers in water samples 2 014: 2 2015:1 2016: 1 2017:7 2018:8 2019:3 Difficult not to have a degree of suspicion of hospital water system as potential source given water sampling Control measure need to be in place irrespective of typing results Hospital Control measures likely to result in reduced numbers of cases
Enterobacter cloacae x4 In IMT case list	Grown from multiple drain sites in hospital Most recent water results growing enterobacter cloacae from external lab results	Unique types in current patients. In 2A water incident unique typing did not warrant exclusion from case numbers due to an understanding of the context and limitations of environmental sampling Have the taps and sinks in 6A been sampled including day care ? Unlikely to grow from dry surfaces What is the diversity of Enterobacter in hospital, what is the typing results of the water and environmental samples? Water isolates need typed	Increase in case numbers 2014: 3 (Yorkhill) 2015:0 2016:1 2017:7 2018:8 2019 to date: 8 Contemporaneous with enterobacter in water (should be ZERO TVC of enterobacteraeciae in potable water) Hard to say there is no link with any degree of confidence
Pseudomonas putida x2 in IMT case list	Grown from water samples reported 11/09 From external lab, under supervision of	Previously grown from hospital sinks ? external lab isolates typed	2 Cases within 1 month contemporaneous with this species being isolated from water supply 2014: 0 2015:0

	the specialist water group.	Needs assessment of whether this is a tank issue and how widespread before conclusions can be drawn	2016:2 2017:1 2018:1 (part of water outbreak, multimicrobial infection)) 2019:2 (within 2 weeks of eachother) Strong suspicion of hospital water/environmental source, controls measures need to be in place.
Chryseomonas x1	Repeatedly grown from hospital drains and sinks across the site	Have the taps and sinks etc in 6A been sampled ? Unlikely to grow from dry surfaces	Typing system not available 2014:2 2015;0 2016;1 2017;1 2018-1 2019-1 No increase in this species, taken alone not so strong evidence as link to hospital of this organism, HOWEVER – has always been isolated as multi microbial infection with other environmental organisms, lending weight to the environmental link.
Elizabethkingia spx1	Repeatedly grown from drains throughout hospital	Have the taps and sinks, drains, showers in 6A been sampled ? Unlikely to grow from dry surfaces	Rare isolate , no increase in cases Only one case in this IMT - less strong evidence for link to hospital when taken alone , again clustering with other drain/waterborne isolates would strengthen link . Also mainly isolated as part of poly microbial infection with other environmental organisms
Aeromonas sp x1	Grown from recent water samples in external lab ? how widespread is contamination	Have the taps and sinks in 6A been sampled ? Unlikely to grow from dry surfaces Need speciation results for further assessment of case	Only one case in 5 years , which is occurring during this cluster contemporaneous with Aeromonas isolates in water High level of suspicion, typing need to be carried out. Control measure need to be in place irrespective of typing
Pantoea septic x1	Different Pantoea sp grown from Chilled beams on 6A	Were dirty chilled beams sampled extensively or just post cleaning ? Cleaning not surprisingly affects the	Recent other cases in sterile sites, possibly pointing to wider issues typing awaited

		sensitivity of environmental sampling	4 isolates in 5 years in this cohort, 2 cases included in water incident
Gordonia polyisoprenivorans x1	Linked to incident with effluent containing faecal material ingressing into shower	Really rare organism and as per Chapter 3 of National manual requires investigation after single case . Time line and incident fairly clear.	Highly likely linked to an environmental incident all be it on another ward , this is the same patient cohort under discussion.

It has been quoted that current rates are in keeping with rates in Yorkhill in 2013. I have not seen that data. My question would be at that time what actions were taken by the IPC? What environmental sampling and what typing? I would hope that a new building would in fact be a key factor in reducing environmental acquisitions and indeed the original baseline at QEUH is zero cases of environmental organism bacteraemia in this patient cohort. There were 9 months when this was achieved when the building first opened, furthermore case numbers decreased after interventions targeting water and drain sources during the water incident in 2A , which has been the subject of an extensive report by HPS, and a further 5 months of reduced case numbers post the move to 6A.

Comparisons of overall rates of CLABSIs with other centres is not the comparison that is required. The comparison in this IMT setting is with the numbers of environmental organisms causing bacteraemia.

While no one is under the illusion that zero infections can be achieved in a very vulnerable patient group, they key question in infection control is: are these infections amenable to prevention? If so what are the key interventions? Are we doing them? There is a vast and growing literature on the subject of gram negative environmental infection prevention in hospital settings as has already been alluded to with papers being circulated by Teresa, and assessed by the HPS literature review and resultant recommendations being made to all Health Boards in Scotland – largely as a result of the learning from the 2A water incident. Of course non-hospital home environment may be a potential source of some infections also. However the epidemiology is not pointing towards that , with clustering of organisms in time place and person. However it is worth exploring .

Accommodation standards are designed to minimise infections, therefore are the standards being met for each patient group according to risk status for each patient at every admission?

Very High risk (as per EORTC host factors, or HPSC National Guidelines for prevention of nosocomial Aspergillosis) – BMT standard accommodation, (eg as per Beatson BMT ward), with additional quality monitoring of environment , records of all actions taken if any aberration from standards established with regard to air and water .

High Risk – accommodation as per B7 at Beatson

Low risk – accommodation as per SHTM standards with regard to ACH etc

In summary, from my point of view it is simply not possible to state that there is no evidence of links of the current cases to the environment, neither is it possible to claim that the current accommodation meets the standards for all the patients in any of the groups above.

I fully recognise that the question which the IMT has to grapple with is, what is the best risk balanced approach in the short, medium and long term for these patients. In order to do that competently there needs to be a recognition of the issues delineated above and the options appraisal which was recommended many weeks ago to be undertaken so that a science based risk assessment can be made and duty of candour requirements met.

kr

Christine

Dr Christine Peters
Consultant Microbiologist
Queen Elizabeth University Hospital,
GGC
[redacted]

Precognition of Dr Teresa Inkster

Dated 24.10.19

Queen Elizabeth University Hospital Independent Review
Atlantic Quay 4
Glasgow
G2 8JX

Present at interview: Dr Andrew Fraser, Dr Brian Montgomery, Keigh-Lee Paroz

1. I started at the QEUH in August 2015, when the hospital was open and functioning; patients were there around May or June time, earlier than my arrival. Commissioning and handover were complete and final before my arrival. Regional hadn't moved over so other Infection Control Doctors (ICDs) (including Christine Peters and Pauline Wright) covered before I got there. The Neurosurgical Institute, Bone Marrow Transplant (BMT) and Renal were all my remit.

2. Christine Peters, Pauline Wright split their workload between the Queen Elizabeth and the Victoria Infirmary because that was the Southside, they had the two hospitals. And then you had Craig Williams who covered the Royal Hospital for Children. He was the overarching lead for the whole of Glasgow and Clyde. Pauline Wright demitted and I took her slot, so then there were three – Christine, Craig, and myself. That happened soon after, or immediately after I arrived. I think it was mid-August when I took over there. So it was me and Christine for the Adult Hospital, Craig for Paediatrics.

3. Craig Williams left around April 2016 and I was appointed lead ICD and I took over about the third week of April 2016 for the whole hospital and the whole of GG&C. There's a whole story before Craig left.

4. Quite a lot happened between August 15 and April 16. I started to really get involved with the QEUH about June 2015 onwards. Professor Williams was going on annual leave and he always appointed someone to cover for him so he'd assigned cover to Linda [Maguire/MacDonald?], the Clyde sector ICD but he phoned me and said if there are any issues with ventilation in the QE, can I cover. I think because I'd had a history of built environment experience. He didn't explain why. It was a very specific remit for the two weeks he was off, so I said that's fine.

5. Christine Peters phoned me up and said she was having a meeting with Estates and Project Team to get a handover of the building and asked me if I would come both as the Deputy of the ICD but also as somebody who was moving over and would probably want to be familiar with the build and the commission, the validation and the design, that kind of thing, before I took up my post.

6. So I went across to the meeting; I think I didn't understand the significance of that meeting at the time. I was just filling in for someone for an afternoon. I was fairly horrified at that meeting when I met with the design team and Estates to find there were all these specialist areas; they couldn't give us any details about the specification, about the commission, the validation, and clearly there were patients in the building.

7. So I came out the meeting and the first thing I asked Christine to do was to go look for the Adult Bone Marrow Transplant unit. We were told there hadn't been any air quality monitoring. I instructed the lab to do that piece of work and to come over and monitor and air quality. So I left Christine to go and have a look at all the issues. Patients were in at that point.

8. Within a matter of days we had particle counts and the initial air sampling that were hugely elevated. Christine also had a look around the Unit and produced a report on all the issues she thought were present. It was clear that it wasn't a BMT Unit specification, a lot of things were missing, they couldn't produce any commissioning or validation data for us, and there hadn't been any air quality testing before patients moved in.

9. We had patients in rooms not designed for their needs. Ward 4B is the BMT; originally it was HemOnc patients. So BMT was a late addition. To replace the existing Southern General 10 beds HemOnc was moved due to 4C being [inaudible] and 4B ended up being used for BMT. We had a series of meetings with management. I came over to one of the meetings and after that, I went to look at the paediatric BMT Unit. I was doing this while I was doing a job with the North, so I was just having to do what I could when I came over.

10. I found workmen in the Unit with patients in the Unit, people drilling holes, fixing skirting boards. We were asked which room, Room 17 or 18, could they transfer a [redacted] for BMT. So I go and look at the rooms and there's a hole in the ceiling. The light fittings aren't fitted, you can see right up into the ceiling void, there's all this dust and dirt coming out and getting onto the floor. So my answer was "none". Neither of these rooms was safe. But the problem was the [redacted] had started induction chemo or was about to start induction chemo and there was nowhere else in Scotland they could go.

11. So we had to rapidly sort that room out. And that transplant went ahead because the clinical risk was so high of delaying that transplant when the [redacted] had already started induction chemo.

12. So that was the second big issue – a paediatric BMT [immuno-supressed?] patient should never have been in there. So there was a massive failure in the whole process.

13. Normally when there's a project like this, there are walk-rounds by Infection Control, to make sure the buildings fit for purpose and that there aren't holes in the ceiling or holes in the wall, that kind of thing. So that clearly hadn't happened and the patients had moved into a Ward that was essentially still a building site.

14. I mean, I don't know if you're familiar with the CEL that was published in 2007, specifically around the built environment went to all Infection Control Managers, about the role of the Infection Control Team and it's right at the beginning, and it's all the way through, so all the stages, the planning, the commissioning, validation and handover. And, in North Glasgow, I mentioned that we had extensive refurbishment work and that was an embedded process. So when I was in North Glasgow, it was an expectation that I would be at all the design meetings from the beginning. So I knew all the architects, Jeremy Armitage and his firm, we sat round the table looking at the design plan, we had the Users, we had Estates, Facilities, everybody that needed to have input was in that room; long, long meetings going through layout, what had to be

in each room, the Infection Control, the flow through the Ward, all of that was looked at an we signed our names on the plans at the end, so there would be an Infection Control signature, an Estates, and the design team themselves.

15. This was evidence of good practice for GG&C, albeit not in relation to Queen Elizabeth necessarily. There was really good practice, which is why I was astonished to find the Queen Elizabeth in the condition it was in because I couldn't understand why the process in the North, in light of the CEL letter and the spread document, hadn't been embedded in the South. And we would walk around during the build stage with the hardhats on to make sure the layout was accurate, we would walk round again before patients were in and that was more about making sure the sinks were okay and the [cold?] gel was in the right place. And then we would walk round again with the patients in and pick up snagging issues. So it was a very well-defined process. So for me to come to the Queen Elizabeth to find the two BMTs and the Operating Theatres had no evidence of validation; Endoscopy – a huge list of specialist areas that, in my mind, the process just hadn't been there.

16. There were separate Estates teams in the North and South. The infection control team was the same so I don't know why infection control weren't involved in the process of the Queen Elizabeth. There was a nurse consultant, Jacqui Barmanroy, for the new build, along with Annette Rankin, an earlier one. Craig Williams was the designated ICD and there would be updates from both parties at the various meetings that went on, it was an agenda item. So it looked like things were proceeding as they should; the paper trail looks like infection control were involved in these decisions.

17. When I first joined the team, there was a "suppression culture". As an ICD, you can find yourself in very difficult positions; rarely are you picking up the phone with good news. I think sometimes it's a case of 'shoot the messenger'. So it can be difficult. A colleague described it as infection control can be combative.

18. There can be tensions between someone pursuing a management agenda compared to a person who's pursuing an infection control agenda. Also between the infection control and microbiology communities. There's a history of tensions there. A lot of Infection Control Doctors have resigned over the years. One of the problems my colleagues faced was lack of information sharing. That's been a huge, huge issue so ICDs find themselves in a position where they're having to make decisions about patient safety and they don't have all the information available to do it and that seems wrong. Or being coerced or persuaded to sign off documents or Scribes or even theatres as being fit for purpose without all the information. Because that needs to have approval. There's pressure, there's something political behind it, pressure to say they've done this.

19. The overall conditions led a group of colleagues to whistleblow. So they went to Stage 1. Two of the original three then took that to Stage 2 whistleblow. When I came back in January 2018 that whistleblow process was well underway. When I went back into the team, I found that the culture had reverted back to what it was before I started and I've had a fairly difficult time since then.

20. As both the ICD and as someone who wasn't around at the time but clearly dealing with the impacts of it, I think they were right to raise the issues. I think all of the concerns they raised were valid concerns. For me, it's a huge building, there's an

awful lot to do and we weren't going to fix it overnight. So I guess the frustration when I came back and saw the whistleblow document was that actually, we've made quite good progress with some of this stuff but I hadn't been around to input into it. So that was quite difficult but I do think all the concerns were valid. I do think everything was slow moving. I do think there was obstruction from Estates and Facilities in what I was trying to achieve. So I do support the issues that they raised, I think they were very valid.

21. I'll need to have a look at this document [the P Redding SBAR? The Action Plan] with regards to evaluating how many of the issues could have been avoided with good Infection Control expertise and practices. I mean, certainly on this, all the ones about PPVL, isolation rooms, HEPA filters, probably right up until number 11, yeah, I would say absolutely increase in line infections.

22. I think one of the things I need to mention here is the situation with water and that's where number 12 and 13 come in here. There are emails from myself and Christine, asking for results at the time of commissioning because there was a rumour of Legionella in the system. There's a meeting where I have said there are no risk assessments available for this hospital, where are they? We didn't get any answers. There was lots that weren't shared with us. Subsequently, during the middle of the water incident in 2018, I got a phone call from the Medical Director to say that she'd been passed two risk assessments, one from 2015 and one from 2017 from an external contractor DMA. And she was extremely concerned about the content. And it was apparent that no one from Infection Control had had sight of these.

23. These are Legionella risk assessments, and there are multiple red ratings on these risk assessments. There was also reference to positive water results before the building opened. So high TBC counts, with reference to some of the organisms that were implicated in the outbreak. So I didn't see those, we'd asked for them, we didn't get them. The follow-up risk assessment two years down the line again noted that not all the actions had been complete. There had been a recommendation for [a chlorine dioxide] system to be installed. That clearly didn't happen. I find this out halfway through the water incident, despite sitting on the Incident Management Teams (IMT) with people in the group who'd seen the reports, who were aware of the findings, who were aware of the bacteria that had been found in the water and none of that was shared with me. So the frustration with that.

24. So, from where I'm sitting, almost the entire water incident, I think, was preventable. All those [bacteria/bacteremiums] in 2018, had we seen those risk assessments, had we known what was in the water, with my experience of water and installing [chlorine dioxide] system in the Old Infirmary for Legionella, I would have said, way back in 2015, put [chlorine dioxide] in this water. It's a massive hospital, it's impossible to design out the risk from the plumbing in a building of that size.

25. And that's the approach they took. If we design the risk out, the building would be fine for 10 years. But with that there was no maintenance. So there was no maintenance for the taps.

26. I think those documents weren't shared because they didn't want us to know. Why wouldn't you share this information with your ICDs who are part of your Estates and water group meetings? Especially when it's been requested repeatedly. And you've

got your Infection Control Manager on the Board in emails as well. So I think it's because they didn't want us to know. Because we'd moved patients back to the Beatson so if we were faced with a contaminated water supply then that would have been a pretty big deal back then, given that we had immuno-suppressed patients in the building.

27. By comparison, North Glasgow was totally inclusive. You were clearly a member of the team and a member of the team that would be respected. So any time I gave advice on the design, that advice was taken. If it wasn't taken, then there'd be a conversation with the clinicians, a risk assessment, clear documentation, everything would be documented as to why they reached a decision. Some of the documentation is missing from QEUH.

28. There are examples of information being withheld around the Cryptococcus incident, which was around [redacted] 2018. Nothing was revealed about the pigeons and I was told "what you said is generating myth". But then John Hood came to me a few days ago and said he'd got all the emails from November when an external contractor was on site and said "you've got a pigeon problem" and expressing concern as to why there were dead birds in the plant room. There's an email trail around it but none of it was shared with me. Similarly, I was denied access to photos taken from the plant room; I was told there were none but they surfaced about two month ago to a colleague who's working with them on a hypothesis. So that was another IMT where information wasn't shared. So I've no confidence that I've seen everything to do with the building or with the water or the ventilation.

29. Following the Cryptococcus incident, John Hood has a specialist group. He's working with Estates and actually has quite a good relationship with some of the Estates officers, particularly the one that's got an interest in ventilation. So a lot more information has been shared. I think we had a pretty good set-up. For example, the 6A Sick Children's, every time there was positive cultures, someone would come to my door with that information. We've had morning hand-over meetings where any issues are discussed, any Infection Control scenarios, that kind of thing. So I would say that was good.

30. I think for me it was just that, previously, I had to be very persistent to get things done. I don't think the governance and assurance was robust enough. The PPVL rooms are an example and I've included evidence in my submission about this, including the SBAR which I escalated up the organisation as to the suitability and safety of PPVLs with airborne infection. There's a series of conversations with the previous Facilities Director, David Loudon, and also the Medical Director, and I think it was Anne Harkness about these PPVLs. The tone of their emails were quite dismissive. It's very much "we didn't plan to have an ID unit so what's the problem". But we've still got high risk infectious patients in this hospital. And it's one of the largest hospitals; people come with airborne infections and we've still no got anywhere to put them. So it's irrelevant that we didn't have it in the design, we need to address that issue and make sure these rooms are in place.

31. So it was a struggle to get things done, including getting Health Facilities Scotland (HFS) to come in and produce a report which then did back up what I'd been saying all along. So I think although things got done, and we now have negative pressure rooms, things got done very slowly and I had to be really persistent and continuously

casing things and to me there wasn't really any kind of leadership from the top. There was acknowledgement that things weren't right but no sort of push and leadership from the top, nobody was really taking charge, it felt like it was being left to me to really drive things.

32. Even though new information is coming to light, I don't think it's a positive trend – I think it's pretty much the same and maybe in some ways is even worse.

33. The Board and senior management have not been particularly receptive to input around the changed use of the rooms and making it fit for uses that weren't originally intended or designed for. So whilst we've dealt with a number of issues, there are still problems in the building with ventilation. New things come to light all the time. Specifically around Ward 2A, which was the Paediatric Hemato-Oncology. The background there, before the water intestinal pathogens, that despite very aggressive infection control measures we could not get on top of. Then the water incident came along. They were a red flag at government level for the number of incidents related to that Ward and HPS came along and said "let's just look at the ventilation" and serious issues uncovered with the ventilation there in terms of things like thermal wheels and abnormal ductwork connections which meant that the dirty air was mixing with the clean air. And actually the view from HPS in their review as that perhaps these outbreaks were actually related to the ventilation.

34. The ventilation would not have been fit for any Ward; I don't know what the explanation for that is. There are still issues of complete imbalance and no rhyme or reason for some of the ventilation readings and positive and negative pressures.

35. It was too big a job for me, and there was no real leadership, nobody pulling all of it together and I was just desperate to have someone come in and have a look at it. I emailed the Medical Director and the Infection Control Manager and asked for a Project Manager but didn't get anywhere with that.

36. I resigned from the role in early September 2019 for a number of reasons. Culture mainly. I've just hit a brick wall. I just can't move things along any further. I just seem to face obstruction everywhere I turn. There are a series of emails I've submitted to the Review and some of the language in them from David Loudon; the tone is just dreadful. I just find him very obstructive to move things on. He kept saying " we didn't design it this way, it was never meant to be an ID, it was never meant to be a BMT, so it's okay". He wasn't listening to why I felt we needed to upgrade these areas. Then he left and the new Facilities Director is obstructive in a different way; he tends to withhold information or is economical with the truth. He's the person who said there's no water leaking from the ceiling, when we've got photographic evidence to the contrary. He got very upset when I sent the photographs to the IMT and there's a minute where he's expressed concern about photographs of a sensitive nature being sent around. So the obstruction still exists, I would say, with Facilities.

37. The most recent IMT with the 6A Children and the gram negative bacteremiums has been extremely difficult, very tense meetings, dreadful attitudes in the room. Again, information not being shared, being contradicted even though we know the chill beams are leaking. I've got forensic-level microbiology evidence that the internal water circuit has leaked externally because it's an incredibly rare pathogen I've found and it's inside and outside and I'm faced with a room full of managers saying there's no

problem and there is no leak, despite having evidence to the contrary. I'm accused of being a lone voice in the room and told I'm "out on a limb with [my findings]". So I bring two colleagues to the next meeting, one of whom is Christine Peters who was actually the person who went up into the ceiling and witnessed the water dropping onto the floor. That was a dreadful meeting in terms of behaviour from management. Very aggressive towards Christine, myself and another microbiology colleague.

38. Christine was very assertive and basically said this is what I've seen. She didn't accuse anyone of lying but she said this is what I've seen, this is the fact, these chill beams are leaking. It was a dreadful meeting after which I was asked to demit as Chair of the IMT with no reason given. Then there was a meeting chaired by the Director of Public Health with mainly management in the room to discuss the IMTs. There was reference to bad behaviour from Diagnostics staff – that's myself, my colleague and Christine – promoting a dreadful culture, a culture of fear, of people not being able to speak up, reference to results not being open and transparent. So it was dreadful seeing the minutes of that meeting in my Inbox. And it made it look like I had tolerated all of those things. So that was partly the reason I resigned. I just couldn't carry on.

39. There was a whistleblow about that IMT to HPS by one of the members of the IMT about how I'd been treated as Chair, the lack of respect, lack of communication. So there was an internal investigation into the runnings of this IMT which I think is ongoing. So it' a mess right now, a real mess. Having been labelled as a lone voice, someone who's out on a limb, over-reacting, and then I take someone else in which means I'm no longer a lone voice, I'm ousted as Chair and can't continue. So I've given up the role and gone back to being a microbiologist. So I think the culture is a big problems, as to how ICDs are treated.

40. There was also an issue of how meetings were being run. There would quite often be a pre-meeting which were predominantly management in the same room as the actual IMT and that has been very unsettling for clinicians. What they will see is "that's a stitch up", "that was a set up", "they had it all planned", they had an agenda. So there's definitely a division I would say, in this IMT between clinicians and management. And I know that Paediatric Haematologists are hugely concerned about the environment. I know that they've met with the Cabinet Secretary and they've met with the Chairman of the Board so they were very concerned and I think the feeling is that management aren't listening to them. Management aren't taking it seriously.

41. ID physicians have historically had issues with management, particularly this lack of negative pressure rooms. There are issues around the placement of the Intensive Treatment Unit (ITU) and the Infectious Diseases Isolation Rooms. Nursing staff aren't experienced in dealing with infectious diseases, airborne infection, they're away from the Infectious Disease Ward, so that was very poor planning. They've struggled to get the ear of management to get ring-fenced beds in there. So both the Infectious Disease and Paediatric Infectious Disease physicians have had concerns they didn't have the facilities, or they didn't up until recently, around the negative pressure rooms. They felt they hadn't been listened to. Definitely comparable levels of frustration, within the Paediatric Hemato-Oncology Ward.

42. "Management" would be the Directors mainly, so by that I mean the Director of Facilities, I would say the Director of Women's and Children's is very difficult and the

Chief Operating Officer as well. There seems to be a need to stop things from getting to the Chief Exec. I don't know where the Chief Exec fits into it all but it's "oh, we haven't told the Chief Exec about this" – that kind of culture. For whatever reason, they don't want to go up to that level, so they'll try to squish everything. It may be that they don't want to be the bearer of bad news either, I suppose.

43. The hospital Estates guys are absolutely fine, I think. We've had a good relationship with them. I think they struggle to speak up in the presence of their Director. There is an example where an Estates officer said to me before a meeting that they were told to say that all the rooms were positively pressurised when they were negative. They were told to say that by their Director. So I jumped in and protected him from that. I think they have been afraid to speak up about the truth. And I think that in that meeting about the pigeons, had the Director not been there, I think the local Estates team would have told me what was happening. I think there's a culture of fear there.

44. Other examples include how female ICDs are spoken about; "troublemakers", accusations of leaving trails of destruction and so on. But there's Penelope Redding before me, Stephanie Dancer before that, it's classically female microbiologists who are labelled as "hysterical females" and "overacting". How many people do you go through before it's not personality? Gender is a problem, I think, and the gender make-up of Estates, microbiology etc. and it's a big problem which has been there for a number of years. In meetings, there might be two females including myself, and the rest males. I'll raise something like toilet plumes and they just start laughing at me, say "don't be ridiculous" and are dismissive. But two weeks later, a male water expert, Tim Water, comes in and says it and suddenly it's the new hypothesis. I've been laughed at a few times. And John Hood, who's been working across at the Queen Elizabeth, I'll find they've asked me a question but then they've gone and checked with him, or they've bypassed me completely and asked him and he tells them to come back to me. So I do feel there is a bit of sexism there, particularly amongst Estates and Facilities. I think they feel they can give you information that's irrelevant and you don't quite understand buildings and estates problems because you're a woman but the information they've given you is completely irrelevant to the medical issue.

45. There's not so much sexism in general management and clinicians. I think within microbiology there have been issues with the culture there, particularly related to male colleagues. Not maybe so much experienced by me but by Stephanie Dancer, Penelope Redding. They could maybe speak more about the culture there with the men and microbiology.

46. In terms of reporting, I report to the ICM and then up to Jennifer but I had a system where if I had to contact Jennifer I could, so I could bypass my manager if need be.

47. My link to Jennifer was unofficial; I would see her at a Board or Infection Control Committee and have a once-a-month meeting; if there was something urgent, I could pick up the phone and that was fine. I had a meeting with Jennifer earlier his year, after the HEI inspection, because I had raised some issues there Jennifer came to see me. At that point, in February/March, she was very supportive. I talked about culture then, about undermining and lack of respect, sexism, feeling intimated and just the cultural issues. She assigned me a mentor and I had three sessions with that mentor. But the problem was that the mentor was the person to whom Christine and I had

written our resignation letters on these issues. That was back in 2015 and that was Dave Stewart.

48. In 2015, that letter was all about our concerns about the BMT, the culture in the infection control team, the mismanagement of an outbreak, a whole range of issues. We went through a whole HR process and we'd come out the other end with no confidence in the process whatsoever. He had done some interviews; we never got any feedback or saw a report from that. I do remember saying to him "if you don't sort this culture, you'll end up with a second Vale of Leven type inquiry" – it was the last thing I said. But no HR reports, we didn't really get a resolution. We were told we couldn't resign; we were in a dreadfully difficult position. We weren't allowed to resign on the basis of patient safety; that there had to be ICDs and we clearly knew what we were doing so had to continue. But were told that we must go to meetings together, don't go to meetings alone. So there was acceptance there was a problem. We were being alienated; if Christine had a day off and there was a meeting, then I wouldn't go. And we ran with that for several months until my predecessor quit. So I did not have a good relationship with this particular Associate Medical Director. He wasn't really someone I could speak to about undermining, sexism, lack of respect. He wasn't the right mentor for me; I didn't get a choice of mentor, I was assigned one.

49. They had designed a new Clinical Director for Infection Control role. Anne Cruikshank was a consultant biochemist and she was very effective, actually. She was probably the most effective person I've encountered in trying to tackle the culture head-on with me and Christine; she's now retired. Anne was the one who persuaded me to go for the job. Jamie Redfern has also been a supportive manager and there was some support; clinicians were very supportive both passively and actively. Professor Gibson I'd highlight as the paediatric hemat-oncologist was very supportive. And very verbal. But apart from those people, no, not a lot of support.

50. When it comes to what was pushing the move of Infectious Diseases, I'm not sure what drove the move. There were a lot of positives about the Brownlee Unit at Gartnavel, which was purpose built maybe 30 years ago. There was an HDU but ID was there for a number of years. I'm not aware of any patient that came to harm with not being an ITU there. So I don't know why they moved, it makes no sense. From an IC perspective, it made no sense for me to move Infectious Diseases across into what is now a general medical ward that isn't specc'ed for infectious diseases and they have these rooms available in Critical Care and I've gone through the issues with that. And particularly when, in Glasgow, we have a history of having the first thing in the UK so we have the first [inaudible], untreatable TB, we had the first Congo Crimean Haemorrhagic fever, that flight that comes in twice a day from Dubai. It doesn't make sense to me why you would take that unit, with all of those negative pressure facilities, and move it across to the Queen Elizabeth.

51. Rumours are that clinicians wanted to be in the Queen Elizabeth; that clinicians wanted to be in this nice shiny new Europe's largest hospital because of the status attached to it. I don't know if that is actually the case. I wasn't privy to who and how the decision was made. I've seen it being discussed in AICC and BICC minutes and Jennifer Armstrong herself said "wait a minute, we need to be sure of something" but it went ahead. I know questions were being asked as to why. BMT, similarly, may have been driven by clinicians but their patients are obviously much sicker and so there is a risk of not having an ITU on site, although at the Beatson they had been many years

without an ITU on site. I don't know who made that decision in the end and why they were moved. It's left a vacant two wards with a fully functional BMT setup that's stood the test of time.

52. I agree that you can't have everything on the one site. I think also, that linked to that, some of the frustrations for me and for other ICDs is we hear "oh but there's no guidance" or that guidance is vague but actually, they successfully built these units decades ago, to a very high spec. We've done it before so why couldn't we do it again? I don't think the right people were involved.

53. There's a huge drive toward energy efficiency; some of the features on the new build, chill beams for example, are all about energy efficiency. But with that you've got reduction air changes to less than 3 and your standard hospital room is 6. And we've got a risk above patients heads, particularly if they're immuno-suppressed. You don't want water dripping on an immuno-suppressed patient.

54. The whole issue around the 2A ventilation work thermal wheels, that's another energy efficient process. But with that comes a risk of mixing dirty and clean air. So why you would have that in a ward with immuno-suppressed patients I have no idea. It's all very well putting these technologies in other buildings, general public buildings like libraries or schools but a hospital? So I think there has be a lot of thought as to whether these energy efficiency methods are actually applicable in a hospital setting and is there a risk with them? And I don't think that was considered at any point. I think it was all about wanting to be this green hospital and say that they're energy efficient.

55. That may have been why I was perceived as the bearer of bad news on so many occasions; by promoting the patient safety argument, you were cutting across what might have been other people's priorities.

56. There's a CDC document which talks about air changes and how long you need to leave for dilution of micro-organisms, for example, to a patient with TB, and there's a very nice table – I can't remember the actual reference – that tells you according to your air change rate how long you can leave between patients and that's all about the time it takes to dilute out the micro-organisms. So there is evidence behind it. I don't have it off the top of my head.

57. There are three different things that are key when it's a closed system, for example, bone marrow transplant, patients with no defences but intact skin etc. I think the most important is actually the HEPA filtration, as opposed to the pressure and the air changes. So the HEPA filtration is about controlling the fungi and fungal spores. And there is evidence from a chap called Vonberg, I think it is, the work he's done, that a single fungal spore is sufficient to cause infection in an immuno-suppressed patient; one single spore. So that is primarily the basis for the HEPA filtration and [maximums? of] good measure so you can have that in the room and you can have that in the corridor. The pressure of 10 Pascals, that's about keeping anything coming into the room, so you don't want a relatively high pressure there. But actually, if you've got HEPA filtration, as an ICD, would accept a slightly lower pressure. I would accept something about 6 Pascals as long as there's a sufficiently high pressure that when you open the door, there's not going to be a rapid reduction and contaminated air's going to come in. And then your air changes, again, that's about the dilution, so you

probably do want that up about 6 and 10 for Bone Marrow Transplant. But the key there is the HEPA filtration.

58. HPS tend to be advisory. I actually worked there for six months on a secondment while I was in Glasgow Royal. HPS would be pulled in for maybe a more complex incident, where we require literature reviews, issues around ventilation, water, that kind of thing. Sometimes we'd pull in HFS but the first port of call would be HPS. So anything complex, where you want to consult with experts, for example, where the expertise is in Public Health England. So to get access to Peter Hoffman, a ventilation expert, for example, I'd need to go via Public Health England and he has to input via them. So they tend to be advisory. Unless the CNO algorithm's invoked when actually they may come in and take over a situation but predominantly it's advisory.

59. I think HPS and HFS have a challenge because they've got such a big remit. They cover the whole of Scotland so I'm not sure they'd be appropriately staffed or even have the appropriate range of expertise to actually come in and deal with every incident. It makes sense to locate expertise for the next big hospital in a central agency, for built environment and any environmental issues, that might work. I think there would be a reluctance to move the decision-making to them rather than having an expert advisory role. It's difficult to know how is that interaction between the Boards, the governance, local estates, I don't know.

60. HFS tends to be less involved than HPS. From my experience, HFS tend to be very slow with their actions and seem to take an awful lot of time. That might reflect workload. Obviously, they're dealing with Edinburgh and Glasgow at the same time, so I don't want to be too critical but they tend to be just a little bit behind, a bit slow, less engaged with Boards than HPS are.

61. Based on what we've been through at the QE, I think it's a good idea to centralise knowledge and to make people with certain expertise available to other Boards. And I know there's a fear from more junior colleagues to take on infection control in terms of water and ventilation because of what they've seen at the Queen Elizabeth. It might be that they're scared of being the person held to account for some of the decisions. Very few people are interested in that area and I think it can be quite intimidating for an ICD to suddenly find themselves faced with a new build and all the work that entails; do you make it part of any ICD's remit or just those who have an interest in it? And if you do have experts nationally that can do the job and enjoy it and have the experience then it makes sense.

62. There's only a few networks and opportunities for knowledge sharing; there used to be the Infection Control Network which was the managers, the practice directors in Scotland and then that was abolished. The ICDs have some dialogue via email but that's not visible; it's an email list and people can put enquiries out to it. Recently there's a group, chaired by one of the GG&C ICDs; the first meeting is soon; the remit is shared learning and support and is being driven by the ICD community. I'm also meeting with Elaine Cloutman-Green, she's in Great Ormond Street Hospital (GOSH). She runs an environmental network for ICDs and ICNs with an interest in built environment and that meets twice a year, usually in London and Manchester. There are more things south of the border. I'm trying to pull some of this stuff together for ICDs in relation to the built environment, some sort of supportive network, some sort of guidance for ICDs, that kind of thing.

63. The profile of ICDs needs to be raised and peer support needed if you're in this area. That would benefit the wider NHS I think. I think some ICDs are blissfully unaware of what's going on in their own hospitals, to be honest. I'm not sure that CEL and SHFN-30 was or is fully implemented. I'm not sure we've got the process right despite all the guidance around it.

64. The Action Plan, with the 27 points on it from the meeting in 2017, it's the Medical Director's document. There's a problem with version control. It came out for comment in February this year (2019). When I came back from being sick, the person who was filling it out for me, Brian Jones, and the Associate Nurse Director had responded but it didn't reflect some of the work that I'd done and more up-to-date information. So I amended it and sent it back to them. When it came again for update this year, it was the original version not the one I had updated. So I contested that in a series of emails. It was the document sorting all the problems. So they sent the original one, not the one without the updates, and I was told that it was the one that had gone through clinical governance and they needed to stick with that. So there's a problem in that there's two different versions of the document. It would have been the Medical Director's office who controlled it. One of them, for example, had a statement saying Aspergillus wasn't a problem and I came along and said actually Aspergillus was a problem. There's a problem with documents having the same date but there are different versions.

65. I wouldn't have said that Estates felt it was a document they were working to. It didn't feel like it was mine. I think the difficulty I had was that I was off sick at the time. Lots of issues arose while I was off, with culture, governance, decision-making and that was the basis for this whistleblow. So I didn't consider this to be my document by any means. I only have it because the Associate Nurse Director forwarded it to me; I have a document where I'm not happy with the content and I was omitted from emails about it. When I raised the issue that it was the wrong version they weren't particularly receptive to my comments. I saw it sitting with the Medical Director, it was coming from her office, she was the one asking for updates, she was the one sending it to her team of directors beneath her. But it certainly wasn't an infection control document as such. At infection control meetings, we weren't working to it. It was just something that regular updates were being provided back to the whistleblowers but nobody was working with this as an Action Plan, even though progress was being made on some things, like PPVL rooms etc.

66. We sit together, the Associate Nurse Director and I, and report up to the Infection Control Manager. So she must have felt the need for me to see it. I wasn't included in the email thread which is a concern given I was the lead ICD. We both report separately up to Tom but there was no obligation for her to forward it to me. Clearly she felt I needed to have input.

67. I would say Tom had a very relaxed attitude. He would rarely intervene with anything unless he was pushed. A very sort of laid-back, step back attitude towards management, I would say. To the point that he didn't really bother if I was in the dark. He was copied into to emails about the Action Plan.

68. I was appointed to the role in 2016 and a year in, I went off sick. It wasn't a lot of time to get established; I've felt under pressure to re-establish now I'm back. I had lymphoma and I had chemo and have done really well. I was really sick. But I came

back and I don't think people were expecting me to come back. People had moved into the role on a temporary basis so there was a different way of working. Instead of sector-based ICDs they had a different ICD every day providing cover which was just a disaster. And a lot of issues that I'd raised hadn't really been progressed, documentation was really poor. I came back to no handover whatsoever. The acting lead […] manager said to delete all my emails, I had thousands of them so there was no way I was going to get through them. So I was very much in the dark as to what had taken place. Colleagues were filling me in and I had access to the shared inbox, so I could see all the handovers and was quite astonished as to what had gone on while I was away.

69. It felt even worse than when I had come back in in 2016 and tried to change the culture. There were plans to change the reporting structure as well, so plans to change my role; there would be five layers before I reported to the Medical Director, which doesn't work for infection control. I actually tried to give it up. So coming back was challenging; I don't think I was treated particularly well by infection control management. I think it's quite hard coming back with a chronic illness, people sort of treat you like you're damaged goods almost. It's really difficult to re-establish, even though I feel better than I have in years because I had Chronic Fatigue without realising that's what was actually wrong with me. So to come back to things not having been done, information not being shared, things that had taken place while I was away, things I was told about my colleagues Christine Peters and Penelope Redding that I don't think were actually true by the Infection Control Manager and it was just all over the place. And it's like, how on earth do I re-build this team for the second time? It was like being back at square one.

70. I then found myself in the middle of a water incident on a phased return to work, two days a week dealing with the most significant water contamination we've seen in the UK. With very little support. That was quite stressful. I communicated with Jennifer and she tasked Rachel Green, who was the Chief of Medicine with Diagnostics to come and talk with me and persuade me to stay in the role and I then went to Jennifer and she was actually really supportive. She listened to everything I had to say and then confirmed she wasn't changing the structure, said I was coming back as the lead ICD, and she was probably the most supportive person I would say to me at that time.

71. We had huge resourcing issues because there was no resource within microbiology. We had all these people who had a terrible time when I was away refusing to do infection control. I came back having no infection control team and no ICDs, it was just me. So I literally had to persuade two colleagues to come and help me; they picked up sessions to fill half the week with five sessions and I found myself trying to cover the rest of the week, less than full-time at that point, under huge pressure so it was just a really difficult time. Very unsupported and people not wanting to do their jobs and most of it relating to what happened while I was off sick.

72. The ICDs who had resigned were [redacted], Alison Balfour, Pepe Valouraki; they were put in dreadful positions, asked to sign off complex pieces of work with no information. Similar issues to what I've described in the IMTs, that kind of thing. One of them in particular was being bullied by senior management so the three of them resigned from the Ward. Which meant that there was no infection control cover on the site and they had to implement this emergency infection control rota, so what that meant was between the five or six consultants, one day a week each, which is no way

to run an infection control service; infection control is all about continuity and about building relationships with clinical teams, with infection – it's all about teamwork. Nurses, clinical teams, estates teams, so all that fell apart. So by the time I got back, not only am I trying to rebuild an infection control team, trying to rebuild relationships with clinicians, with estates, so it was really, really difficult. Really difficult time.

73. The people we talked about earlier, from North Glasgow etc., they've all gone to HPS. My infection control team at the Western was a first class team led by Laura Imrie. She was the lead ICN, and is now the boss in HPS. I always knew Laura would go far because she just had that pro-active nature. Very supportive, very cohesive. It didn't matter that I was a doctor and she was a nurse, everyone had a role. So that was the kind of team that I came from. Laura's ended up there, Susie Dodds ended up there, Hayley Keen is now an Infection Control Manager for Blood Transfusion. So everyone in that team has done very well and gone onto HPS roles. But the competence, capability has left Glasgow. So what you then had was quite an inexperienced team, I guess, in the Queen Elizabeth, led by Lynne Pritchard, who's great but came from Partnerships. But Partnerships infection control is very different so that's things like Mental Health, General Practice, so I really felt for Lynne coming from that background to this huge busy site with minimal acute experience at that level. So that's been very difficult as well for the nursing team.

74. The nursing team are much more your sort of interface, they're out there in the wards on a daily basis, dealing with all the organisms. So any time a patient pops up with MRSA or a C-diff, they're the ones liaising with clinical teams, speaking with patients and so on. Where the doctor gets involved is when you have an outbreak situation, where there's a requirement to Chair maybe an IMT and the reason the doctor tends to do that is because if you look at who's around the room, there are usually clinicians in the room, there can be Estates in the room, they can be very difficult meetings. And it's terrible to say this but there is a lack of respect for nurses amongst clinicians still. I have seen nurses attempt to chair IMTs and the clinicians in the room are just awful whereas they will behave themselves if there is a clinician at the table. It's unfortunate because a lot of the ICNs have the experience that they could be chair, for example, norovirus IMTs but they don't because of that whole approach. Doctors don't like to be told what to do by an ICN, so that's where the ICD would come in.

75. Water and ventilation has classically been an ICD role. Water tends to be quite complex microbiologically. You really need an understanding of the bacteria and the organisms and many they're not trained so much, they've got very basic training in microbiology but not sufficient to handle a water incident or even interpret water results. Ventilation's similar; air sampling is all about interpretation of fungi bacteria. It's just a different skillset that's needed for those particular areas. So I mean the nurses do the bulk of the work on the ground, they do all the surveillance, they do all the education, the audit, the policies. Where the doctor comes in if there has to be an incident meeting, or another meeting that needs to be chaired, and then we have oversight of policies, surveillance, we have oversight and will detect any issues and investigate them. So we do have to work very closely together with the ICNs but with quite distinct roles.

76. Public Health is quite interesting in GG&C. Public health initially would occasionally come to an IMT if it had implications for the public, like measles or Legionella. In recent years they've had more of a presence at IMTs and more of a role. Ian

Kennedy's been at a lot of IMTs and he will usually do the epidemiology. But there are issues with that because Public Health and Hospital Acquired Infection are quite distinct visions of [inaudible] Public Health. And again, Ian doesn't have a microbiological background so there have been issues with the most recent IMT and the epidemiology that Ian has produced versus the epidemiology that myself and Christine as microbiologists have produced, in terms of how you classify bacteria, how you deal with the small numbers in a Hospital Acquired Incident versus a big community outbreak, your use of various SPC charts, epidemic curves, so there are subtle differences in the epidemiology in a big Public Health incident either in the community or in a Hospital Acquired Infection. So I would say there has been a bit of blurring of the roles and responsibilities around that.

77. I guess microbiologists are actually trained in the rare and unusual so when a Cryptococcus comes along, for example, we'll know what to do with it because it's in every Part 2 exam. So we are actually quite au fait with rare and unusual bacteria. And this is where sometimes we come into problems with management because management haven't heard of something therefore it's not an issue. It's not in the National Manual for HPS therefore it's not an issue. And it doesn't matter that you've got an expert in the room who understands the organism, they see it as not being an issue. So that's been a little bit problematic, with these more rare and unusual bacteria. But if you think about it, for any bacteria or virus, the basic epidemiological principles are the same, the outbreak management is the same. It doesn't matter how rare the organism is, people get very excited about it and say we need experts, "oh this is really rare, we've never seen it before" but actually your epidemiology [linking/link in] time, place and person, all your infection control measures are exactly the same. What you need to understand is what the pathogen is and what is the route of transmission. That's the key. The transmissibility and pathogenicity. But the microbiologist is the person who has that information to hand.

78. We've successfully built hospitals in the past with the guidance, so I don't think there's an issue with the guidance but with the process. Roles and responsibilities haven't been clear and I'm not sure what the role of the infection control team was (in the design/build). CEL clearly delineates the process, as does SHFM-30. Local ICDs, over-burdened with work and maybe who don't have experience of built environment may come up against it with Estates teams and architects and may not have the knowledge to debate or overrule.

79. Having a Centre of Excellence and a core group of people with knowledge would be a really good thing. I'm not sure we should take it away from local infection control teams entirely. But there clearly needs to be support and almost policing of these buildings along the way because you can go and give advice but then you get something very different. It requires quite a lot of thought how a Centre of Excellence would interact with local infection control and estates.

80. I had conversations off the radar with the ICD in Edinburgh who phoned me up and told me all his problems but we have to "not tell anyone". And that's not how we should be working. We should be collaborating a lot more. We've got so much experience that we could have shared with Edinburgh. We actually tried to but were discouraged by HFS who said "no, no, we're not going to share this with Edinburgh". It was actually minuted at a meeting.

81. One of the key things should be around behaviour and culture. How ICDs tend to be treated and I don't know if that's just a Glasgow thing. It wasn't my experience at the Western. There were responses in the ICD mailbox from ICDs around the country responding to a recent fairly stressful incident and they've got similar experiences. When there's a problem, the ICD is the person expected to fix it, can take the heat for it but they're not given the information to make decision often. But they are then the person that is expected to sort out the issue. If there's a problem they're the person who's going to take the blame. There were quite a few people who responded in that vein. I think the role probably needs to be elevated, a bit higher, a bit similar to the south of the border where they have a DIPC – a Director of Infection Prevention and Control. Sitting just below the Medical Director. At the moment, on most Boards, ICDs are quite a bit down the chain. It's a medical function, it's a medical microbiologist usually in that role as a DIPC.

82. In Scotland, it's more aligned to nurses. Jen(nifer Armstrong) was the Exec Lead, which is a bit unusual; the Medical Director is such a massive remit and a massive role but as an HEI Exec Lead's got such a hugely important part of the role and, for me, it's just that Jennifer doesn't have the time to actually sit down with me. We used to have an hour a month with the HEI Exec Lead which I don't think is enough for the Lead Clinician in terms of infection control and everything that's been taking place. I do think it's a medical role, as opposed to a nursing role, the HEI Exec Lead, but whether it's better replaced with a DIPC or whether the DIPC sits just below and has a closer working relationship rather than going through an Infection Control Manager. I think a lot gets translated very differently at times.

83. Much of what we do with surveillance is mandatory and targets are good but they're not sensible because you focus your resources on that. We have driven down MRSA and C-diff and we're struggling with SABs so it's always good to have a target but there's an expense. You're focussed on those and neglect other areas because we can't have surveillance in place for everything. So there's a whole load of stuff out there that we're just not looking at and are dependent on laboratory surveillance; when an astute microbiologist is authorising reports to patter-spot, to say they think something is wrong. So there are disadvantages to mandatory surveillance and also reliance on electronic surveillance as the only way forward.

84. If you're thinking about Hospital Acquired Infection (HAI), we're only doing surveillance for the patients that are in the hospital and then sub-sets of patients who develop SABs and HAIs and renal dialysis but we know there's patients who go out into the community and we'll never know whether they've acquired the infection in hospital. There's an example from a few days ago with a patient with a gram negative environmental. The question is how many of these things do we miss because a patient was discharged back into the community and we're just not capturing all that out there. To do surveillance you would need a very sophisticated IT system. I think Americans do data mining and I think there's probably ways you can set it up so you can alert yourself if there's two or more unusual infections in an area. There's probably a lot more we could do with that to have more robust surveillance. It might lead to over treatment. And again it depends on the type of bacteria and the particular patient, endogenous versus exogenous; it's hugely complex. And what is an acceptable background rate?

85. If you look at SSI surveillance, we do quite a broad base surveillance on a number of surgeries that are mostly mandatory. We're missing an awful lot. Some of the units down south are taking it a step further and reviewing individual patients. In Scotland, we wait for an out of control chart before we'd investigate that. But south of the border, there are initiatives where a single SSI means a root cause analysis and a very detailed review of that patient's case and then feedback to the clinician. A bit like we do here for SABs. So there are other things we could use the surveillance intelligence differently for individual patients rather than wait till we have a problem. I think we're a little behind some of the rest of the UK with SSI surveillance.

86. Surveillance needs a bit more resource. Our levels of CDI are reduced, levels of MRSA are reduced but, as an ICD, you can request surveillance and it's very much a battle to get it implemented because of the mandatory surveillance. We could maybe have a background light surveillance with help from neurosurgeons. There's competing interests so mandatory surveillance isn't always necessarily a good thing because it detracts from real problems. I don't have as robust surveillance for environmentals in that hospital as I would have liked.

87. I did a piece of work around duty of candour and what that means for infection control. It meant I was getting out a lot more and speaking to patients and families explaining that they had an HAI, apologising for it, answering questions, talking about future prevention, that kind of thing. It's quite a new concept for ICDs really. It's difficult, dealing with likelihoods that become certainties, explaining things like the Cryptococcus and the water incident to patients. But you always go with the patient's clinician and usually the way I explain it is that I have to make them aware that this is what we're investigating and the likelihood is that this is an HAI, apologise to them, explain the process as to what investigations we're doing. I think some of the families in the 6A incident found that quite difficult; they weren't getting definitive answers and I think they felt that myself and Professor Gibson were lying to them. We were telling them to the best of our knowledge what we're doing with investigations we had in place. It's difficult because in infection control, sometimes you just never get definitive answers. Incidents are usually multi-factorial, with all different things coming together at the same time and to solve it is multi-modal. You can't know which of the measures has been most effective and you can never provide the exact route of transmission. For patients that can be quite difficult to get their heads around. They want the answer. It causes huge stress for families. Duty of candour for infection control is very difficult.

88. I took one particular issue around duty of candour to the General Medical Council (GMC). The manager was expecting me to go along with him and lie to a [redacted]. I couldn't lie to this man and I told him the truth. Senior management were not happy with me, there were expletives uttered down the phone about me telling this parent the truth. There were senior medical people involved in that, I had nowhere to go so I went to the GMC and they said your only option is to whistleblow. Which I haven't done. But that was the advice they gave me. Because of the structure of GGC and who's who, the Medical Director is also the HEI Exec Lead who's also the first point for a whistleblower. The Director of Public Health, who's been looking at all the IMT issues and all the internal investigations is the second stage of a whistleblow, so who do you go to when these people can often be part of the issue? It's a problem.

89. So I handed that to Jennifer as part of my resignation to highlight the duty of candour incident and also the significant clinical incidents I had been involved with as well. Again, a whole load of my stuff had been removed from the Cryptococcus case, scored out of the report to go back to the family without my knowledge, by people who are not qualified. I got a copy of it from someone else. There was interference with an SCI process by senior managers and nursing staff and pretty much all of my content about the biology of the Cryptococcus potential source was scored out. And that's supposed to be an open and transparent process by the people involved in the SCI. I've ended up with three different versions of that SCI in draft form. The changes were to dilute it; it's a very bland SCI. It's not giving the family the answers they need. And it's breached the three month limit. So again, version control, three different versions of the SCI, still no answers for the family and managers interfering with the content. I understand the need to make it language that families understand but to actually remove scientific content I just don't think it's appropriate.

90. I think it's all about the organisational reputation. And I understand that but I think it's a priority over patient safety. A lot of the Comms and media statements are inaccurate. And with the Director for the Children's Hospital, it's all about image. and control over Comms and trying to suppress things to get out a positive message.

91. So I guess the issues are around processes, document control, minutes, conflicts of interest, fairness. There's a lot that makes me uneasy. It's hard to know who to go to when you're in a lonely place, absolutely. It's been difficult.

END

Queen Elizabeth University Hospital Independent Review

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Sent by email to:
chrispeaters[redacted]
teresaink[redacted]
MRamsay[redacted]

15 July 2020

Dear Dr Peters and Dr Inkster,

Thank you for submitting your commentary on the final report which we received on Tuesday 7 July and which we have considered carefully. As you know, the report was published on 15 June 2020 and the Review will be closing down operationally as of today.

The Review was conducted on an independent basis and as such considered evidence from numerous sources and a variety of perspectives – including evidence submitted by both of you. The report represents our sincerely held views; we reached conclusions and made commentary on the totality of the evidence that we had before us. We believe the content of the report is an accurate reflection of the findings of the Review and these findings are a product of a number of processes where fairness was a core guiding principle.

We accept that not everyone will agree with all aspects of the report and of course, that is their prerogative. The Review report is now published and we do not consider that there is anything in your commentary that compels us to retract chapters of the report or make any alterations or additions to the narrative.

We remain grateful for your contribution to the Review.

Yours sincerely

[redacted] [redacted]

Dr Andrew Fraser **Dr Brian Montgomery**

Co-Chairs, Queen Elizabeth University Hospital Independent Review

IPCT Meeting to discuss Domestic Services for Ward 4C, 7A & 7D

Seminar Room, Level 5, QEUH

1st November 2018 at 14:00

Present: Dr Teresa Inkster, Sofie French, Donna McConnell, Pat Coyne, Dr Gordon MacGregor, Karen Connelly, David MacDonald, Jill Leckie, Joan Edge, Judith Ross, Pamela Joannidis, Myra Campbell

In Attendance: Calum MacLeod (minutes)

Item

1. Welcome & Apologies

Dr Teresa Inkster welcomed everyone to the meeting and introductions were made round the table.

2. Background

The Infection Prevention & Control Team (IPCT) had received two emails within a day raising concerns of the standard and frequency of cleaning within Ward 4C Haematology and Ward 7A&7D.

3. Current Situation

Ward 4C Haematology

Dr Inkster was contacted by Ward 4C Haematology who raised their concerns with regards to the standard and frequency of the cleaning of patient rooms. This comes following a recent patient complaint which had been specifically highlighting the perceived lack of cleaning of Ward 4C.

Wards 7A & 7D

Wards 7A & 7D are wards in which Cystic Fibrosis (CF) patients attend who are a high risk group of patients that are vulnerable to cross infection. Dr MacGregor has raised cleaning issues on numerous occasions since the hospital opened. He felt the cleaning does improve after he has raised concerns but only for a short period of time.

Item

4. Cleaning Hours/Frequency/Dynamic Risk Assessment

The current dynamic risk assessment involves Domestic Supervisors carrying out an assessment of cleaning requirements during the first three days of a patient admission. Each room has their surfaces / flooring checked and typically bins emptied and sanitary areas cleaned on daily basis. From day 4 following admission onwards, the room receives a full clean. This risk assessment was applied to all wards where no separate methodology was created for high risk areas. It was agreed that this dynamic risk assessment will be dropped from Ward 4C Haematology and Ward 7A & 7D.

The IPCT currently think there is an issue with the current cleaning guidelines and the pressure for cleaners to clean 28 rooms per day, including any additional discharge cleans is adding to their workload. There isn't enough domestic hours for domestics to sufficiently clean every room at present.

It was reported by 4C that domestics are not using the correct PPE when cleaning isolations rooms for certain patients isolation rooms. The IPCT will look into what PPE should be worn by domestic when cleaning rooms especially patients who are in isolation.

Actichlor Plus used on floors during double cleans and terminal cleans of isolation rooms. It is not otherwise being used on floors routinely. The vinyl used within the QEUH cannot withstand heavy use of chemical agents on them. Actichlor Plus is used on horizontal/frequently touched surfaces within each room as per winter cleaning regime. The group agreed that a deep clean of Wards 4C, 7A & 7D will be carried out following the meeting.

To help capture dust within the ward floors it was agreed that Hepafilter vacuum cleaners will be sourced to be used with these 3 high risk ward areas.

Karen Connelly has agreed to increase the domestic working hours for each ward by 7.5 hours per day Monday – Friday. There will also be a constant domestic presence from 7.30am – 9pm

Domestic monitoring of these 3 areas will be increased to weekly frequency. Domestic supervisors will ensure daily dialogue and sign-off with Charge Nurses and are available to meet and carry out walk rounds with representatives from each ward until they are satisfied that the cleaning is up to standard. All domestic audit detail will be discussed with and sent to SCN and lead nurses for each of the 3 areas in a format that can be viewed by staff.

5. Cleaning Methods – Microfibre

Microfibre mops were introduced after an HPS review in which IPCT were not involved. However the microfiber mops are limited to how much debris they can pick up and domestics may require numerous mop heads to clean certain size of areas. The microfiber mop heads can only be used with water and any introduction of detergent agents damages the integrity of the Microfibre. This

has led to the IPCT finding out that domestics are bringing their own cleaning products into work and using them to clean areas.

There doesn't seem to be a process to track the lifespan of Microfibre mop heads which should be replaced every 75-100 times they have been laundered.

Item

5. Cleaning Methods – Microfibre Contd

Karen Connelly will report this back to Mary Ann Kane and see if a different strategy for cleaning can be looked into for high risk areas and a larger review of Microfibre mops may need to be undertaken.

6. AOCB

Joan Edge & Dr MacGregor asked about the vent cleaning and informed the group that numerous vents within Ward 7A & 7D are silting up, making the rooms hotter due to lack of air being able to circulate within the room. Karen Connelly will raise this with estates.

Joan Edge has requested a timeline of when the dishwashers are being removed from Ward 7A and 7D from a historic IPCT request.

Summary of Actions

1. Karen Connelly will escalate to Mary Ann Kane the use of Microfibre mops and look alternative cleaning system.
2. Karen Connelly will look into procuring Hepafilter Vacuum cleaners
3. An extra domestic will be provided to Wards 4C/7A/7D which will consist of 7.5 hours per day (9-5) Monday – Friday.
4. Signage within Ward 7A/7D will be looked at so that domestics know what rooms require isolation cleans.
5. The IPCT will look into what PPE should be worn by domestic when cleaning rooms especially patients who are in isolation.
6. Karen Connelly will escalate the vent cleaning within these wards
7. Karen Connelly will look into the dishwashers being removed from ward 7A and 7D.

Cleaning Issues

- Not enough cleaning materials
- Cleaning agents being brought in from home
- Staff not sure what products to use - Is Actichlor Plus being used?
- Lack of backshift domestic cover
- Patient complaints about standard and frequency of room cleaning
- Attitudes and behaviours or domestic staff and supervisors (staff wearing headphones whilst cleaning patient rooms)
- Dynamic risk assessment – is this being used as no-one knows who's cleaning responsibility is who's?
- Order of cleaning rooms and length of time between 2nd isolation clean
- Microfiber mops – assurance of how many times they are being used and then replaced?
- Domestic audits – cleaning being carried out directly before an audit and issues rectified on an audit and not marked down

IPCAT Audits

- Ward 7A - (94% Feb 2018)
- Ward 7D - (89% Jul 2018) Domestic Issues identified
- Ward 4C Haematology – In 4B at the time - (March 2018) Domestic Issues identified

Scottish hospitals enquiry

Report from Professor Stephanie Dancer

Chronology of my involvement with QEUH

BJ messaged me via *Linked In* on Feb 7th 2019 asking me to get in touch with him.

I replied on Feb 8th explaining that I was overseas, but provided email and mobile phone number.

Reply: Brian Jones 3:08 pm

Thanks for reply Stephanie.
GGC IPC under a lot of pressure right now. Teresa Inkster wondered if you would be available for a 2 days a week IPC locum to help during the crisis? If current pressures persist perhaps we could discuss on your return?

SD: Feb 11th reply

Yes, understand, meet up later this week? Tell Teresa to stay cool and stick with basic hygiene principles (Isobel Maurer's book spells it out). My Lanarkshire mail is stephanie.dancer[redacted]

I work 2-3 days per week shared between NHSL and Edinburgh Napier.

Dr Teresa Inkster: Tuesday 12th Feb

Hi -I think BJ has been in touch. Are you free for a coffee sometime? There is the possibility of some sessions at QEUH to help me as workload huge at moment. Its environmental issues, lots of! Even if you are not interested it would be useful to chat! Best wishes,

Teresa

SD: 13th Feb 2019 Mail to Teresa,

Of course I can help you. Where are you tomorrow (Thursday 14th)?? I could get to the QUEH late morning. Kindest Stephanie

Reply from Teresa: 13th Feb

Hi, I am in QEUH tomorrow so that would be great Text me when you arrive - [redacted] we can grab a coffee and I will fill you in

Teresa

SD to: Hamill, Raymond (NHS Lanarkshire) - Senior R&D Manager

Sent: 14 February 2019 17:59

Subject: Re: Pigeon droppings

Raymondo,

I have been asked to go and help Greater Glasgow & Clyde sort out hygiene in the QEUH…. I'd quite like to do that and it would be for one day per week. They have offered locum rates and it will be short term. You've probably seen what's been happening in the press. I know all the key players and I know what really happened. Should the contract go through NHSL, ie. they pay me for my services through you?? Or is it a separate contract between me and them?

Wasn't much of a holiday!! I was fielding >50 e-mails a day…

SD

Mail from RH 15th February

Howdy – do you want to do this on one of your current 'working' days (i.e., instead of a day you are working for me, or instead of a day you are working as a clinical locum in NHSL?). If not, then I suspect they would just employ you separately as a locum themselves – that would be tidy and keeps NHSL at arms-length from any controversy. Best would be to confirm with Marlene Fraser or Ruth Broadfoot at Medical Staffing.

Val / James – catch up next week re: the Leeds funding referred herein (Steph – can you re-send for convenience?). Arrangement was that we were billing Leeds, if I recall. Steph – easiest would be to arrange a cross-charge for extra hours. Would that be via Ian McCormack?

Will be glad to get recruitment started for e-Water – I'm getting twitchy about it.

Raymondo

Raymond Hamill, Senior R&D Manager, NHS Lanarkshire

Met with Dr Teresa Inkster on 19th Feb 2019. Emailed her later that day.

SD: Help offered Tuesday 19th February

Dear Teresa

Thank you for your full and frank expose of all things fungal and more this morning; it was extremely interesting, and clearly of great concern.

I would be delighted to give you a hand for one day a week -preferably Thursdays, but can change the day depending upon meetings, etc. I may be able to offer another day in the summer when a major research project comes to an end.

Do please send me your response to 'What is the scale of health problems acquired from the healthcare environment in Scotland,' when you can, and I will tinker with it.

In the meantime, I will mail Mr Nicholas Meakin, CEO Aqualution Ltd, who would be able to assist with cleaning up the plumbing, at reasonable cost. Some selected parameters relating to your Spinal Injury Unit would be helpful, because we can then estimate a decontamination schedule for the water supply. I can present this at the appropriate forum when required. I have attached a comprehensive review of electrolysed water in EJCMIC.

I promised to send additional papers! They are: a proposed schedule for cleaning the occupied bedspace (Dancer SJ & Kramer A); Michelle Balm's study on Bacillus, building and linen; another of Michelle's papers on *E. meningoseptica* (which I think you will find helpful) and Elaine Larson's paper on risk of infection for patients admitted into a room previously occupied by HAI patient. I have added a personal commentary to the latter following a request from the journal editors, but I gather this has been pruned... (Visualising the Invisible). (Now published: *Dancer S. Visualising the invisible; why cleaning is important in the control of hospital-acquired infection. Evid Based Nurs. 2019 Oct;22(4):117*)

I believe there will be many other reports in the literature that will assist our cause and I will brood on this in the meantime.

Reply from Teresa: 15th February

Thanks for all of these, I will read over the weekend! Response attached, I will probably think of more things to add.

I have emailed Brian re Thursday sessions, so will let you know as soon as. I will start digging out info for the spinal unit.

Have a good weekend. I have bought the book from amazon, looking forward to reading it

Best wishes

Teresa

SD to Teresa: Friday 22nd February; Paper for Scottish Government and associated multiple papers and references

Teresa

Here is a draft of your document

Do please adapt change edit etc however you want but I hope that I have managed to create something that will have an impact. References are all the most recent that I can find but you are welcome to suggest others.

By the way, as you well know, I am not precious…you take what you like and delete what you don't. It's also possible that I have misunderstood some issues or prioritised things inappropriately.

There is so much more we could do but time is running out. I particularly wanted to say something about getting the windows open! Sorry for not getting this done earlier but I am exploding!! (like you)

See you next week, just after 9am unless you tell me otherwise

S

From Teresa: 22nd Feb

This is amazing! Thanks for sorting it all out. I will address the comments and send in. I think Monday is the deadline

Have a great weekend

Teresa x

Between **19th -22nd February**: Collection of emails pertaining to necessary documentation for new post: CV; Fitness to Practice; PVG clearance; Occupational Health; Trak Care application; Clinical Portal application; honorary contract; payment process; office allocation; and car parking.

Email from BJ on 28th Feb 2019, terminating a contract that hadn't even been signed.

Dear Stephanie,

I very much regret to inform you that NHS GGC has reviewed current staffing for IPC and clinical microbiology and wishes to restructure and support these services internally, incorporating the two sessions intended for yourself into a more substantive post to support the services in the longer term. Unfortunately, this means we will not require your assistance in IPC at this time.

I apologise for any inconvenience this may cause and wish to thank you for your willingness to have taken on this role at such short notice.

Kind regards,

Brian

Professor Brian L. Jones, Consultant Medical Microbiologist

Head of Service, NHS GGC

Response to BJ, Sent: 28 February 2019 11:54

Dear Brian,

This is really rather shabby treatment, is it not? I would never have done this to a colleague. Clearly, the 'Glasgow boys' have put the boot in (again) based on preconception, ignorance and petty jealousies. No surprises there. Did you stick up for me??

I would have made patient safety an absolute priority as well as supporting and helping the local infection control team. I'm sure you know that. As it was, even after just two visits, it wasn't difficult to get the measure of QEUH –or the culture- and I would have engineered a raft of interventions that would have immediately reduced the HAI risks for everyone. These are evidence-based and cost-effective. I'm surprised that none of your resident experts have already suggested the more obvious amendments.

There are serious environmental deficiencies at the QUEH. Protecting your patients now, and for the future, needs courageous people to speak out and resolve the problems. I would have done that for you with diplomacy and humour. I do not support, nor would contribute towards, a witch hunt or a culture of blame. I abhor

irresponsible media liaison. I only wanted to help resolve issues that I understand and care about. GGC can no longer paper over the cracks in this multi-million pound flagship hospital.

Kindest regards

Stephanie

Dr Stephanie J. Dancer, Consultant Medical Microbiologist, NHS Lanarkshire and Professor of Microbiology, Edinburgh Napier University, Scotland.
Tel: [redacted]

Mail from SD to Teresa: 28th Feb

Dear Teresa

Thank you for calling me earlier; it has actually made me feel a bit better.

I have attached the response to Brian. Thank you for supporting my continued involvement; there is no doubt that we could work together for the benefit of both department and hospital.

Kindest regards

Stephanie

SD mail to boss, RH on 7th March 2019

Actually Raymondo, need to tell you summat. THIS IS IN CONFIDENCE.

NHS GGC have sacked me before the contract was signed.

Alistair Leonord found out that I had been asked to help, threw a wobbly and threatened Prof Jones. So the latter retracted the invitation. They had already organised passwords, id tag, computer access, parking permit, Disclosure Scotland and office.

I had been introduced to key players, taken round the hospital twice, conducted an IC ward round AND co-wrote a report on all IC concerns and outbreaks ongoing.

The latter was sent to the Scottish government Dept of Health &Safety in response to a call for comment on environmental contribution to HAI. This came from the HAI deaths reported in the press over Xmas.

Here is the link:
https://www.parliament.scot/parliamentarybusiness/CurrentCommittees/111085.aspx

Dr Teresa Inkster and I submitted our report 2 days before I received the e-mail telling me that my services were no longer required.

So Teresa and I have asked the Scottish Government to anonymise our report when they publish it next week.

This is not because I am concerned for myself. I like a good fight and there is nothing that anyone can do to me for telling the truth or voicing an opinion. But GGC could make life extremely difficult for Teresa. I taught her 20 years ago, invited her to be an assistant editor for JHI when I was editor-in-chief (got rid of Leonord because he was clearly useless), and she started at QEUH months after it opened (guess who was lead for infection control during the build). Subsequently, she was diagnosed and treated for lymphoma. I will not have her subjected to bullying; harassment or sacking.

So there you have it. A. Leonord has always had a problem with me. That's the third or fourth post he's stopped me getting. I sent a dignified e-mail back to Brian Jones. There was no point in shooting a messenger.

S

Ps Teresa told the DHS what GGC had done! The committee meets next week.

PPS Do you want to see the report??

Murcomycosis within Critical Care QEUH
Incident Management Meeting

Monday 21st January 2019

Present: Dr Christine Peters (chair), Iain Thomson, Ann Traquair Smith, Ruth Forrest, Ruth McLaughlin, Colin Purdon, Karen Connelly, Lynn Pritchard, Donna McConnell, Lorraine Dick, Dr O'Sullivan, Calum MacLeod (minutes)

Actions

Welcome, Apologies, Introductions

Dr Peters welcomed everyone to the meeting, introductions were made and everyone was reminded of the confidentiality surrounding IMTs.

General Situation Update

Two patients within Critical Care (ITU1 and ITU2) have samples from which a very rare isolate Murcomycosis has been grown. This organism is a mould usually found in damp environments and has a wide spread distribution in the environment and can also be found in bird faeces.

Both cases were isolated within 24 hours of each other and are linked in time and place. They meet the definition of HAI as had been in hospital for >48 hours before organism isolated. As this is a rarely isolated organism, 2 cases should be treated as an outbreak requiring investigation.

Patient Report

Case 1
Previously fit and healthy post Flu A severe lung infection
Mucor isolated from tracheal aspirate. Patient in ITU1 is ventilated, high temperature and already on broad spectrum antibiotics. Patient was put on antifungal on Saturday 19th January. Patient is post flu A which is known to predispose to fungal infections. Patient currently heavily sedated and concerns re clinical condition expressed.

Case2
The second patient is in ITU2 and had Murcomycosis grown from one sample only and did not grow on repeat subculture The lab have been unable to grow it again from the initial sample and it has not grown from subsequent samples so the patient is probably colonised , or the sample was contaminated . The patient does not require any antifungal therapy as it is not considered to be a pathogen within the patient at the moment CRP is rising and the current impression is possible.

Other Relevant report

The IPCT have not identified any shared equipment , laundry and staff cross over between the two patients. They have also looked at patients post codes where there has been no cross over within the community.

A timeline of the patient movements was circulated.
Case 1 had been through ARU1 and ward 7C prior to admission to ITU to room 23 which is a PPVL room. The organism was isolated from a sample taken on day 6 of ITU admission

Case 2 had been on CCU for one day and then in bed space 34 of ITU 2 for 9 days prior to isolation of organism.

Hypothesis

The following hypothesis of how the patients contracted Murcomycosis was discussed:-

One of the patients was situated in Room 23 (PPVL Room) which reported a leak from its dialysis point on the 4th of January. It was repaired the next day but it was agreed that further inspection to see if there could be damp/mould in which spores from the mould could of become airborne It was noted that there had been a previous issue with this particular dialysis point which had required significant repair work in the past year . There has also been leakage problems and mould associated with dialysis points in other rooms. The group agreed to block this room off until further investigations can be carried out by estates.

As this organism can come from bird faeces the group asked about where the air supply to Critical Care originated from which is plant room 21. Estates informed the group that they had inspected the plant and had found not pigeon faces within it.

Rooms on the MHDU unit and ITU were being updated to negative pressure rooms and could work on the ventilation system have a bearing on the current cases? The work stopped at the start of December and all rooms were HPV cleaned.

A water leak was reported on 3rd December within a staff only area. This has since been repaired but a vent is located directly above where the leak happened. The IPCT were unaware of any HEI scribes completed for this work.

The mislabelling of specimens was discussed but was ruled out as the two patients are in different areas of Critical Care (ITU1 and ITU2)

Lab contaminant is being investigated but Dr Peters thinks this is highly unlikely as no other samples are positive which they would expect. To confirm this a plate to see if any fungus grows is being placed in the lab machine and any further positive samples would be investigated as possible laboratory contamination.

Further Investigations

All vents were cleaned in ITU in November/December. A special machine is used to clean the vents and the group are not aware of any issues with the current procedure it employs. Questions were raised on how the machine itself is cleaned and facilities will look into this.

There has been no reports of damp linen within Critical Care and all linen is being stored correctly.

The IPCT will see if the hi flo nasal machine used on patients is self decontaminating as it is a close circuit machine with all tuning being single use.

Routine screening of patients for broken skin sample or respiratory sample only for patients who are currently in ITU1 and ITU2.

Air sampling has been taken in ITU today including room 23 The results from the air sampling will be ready within 7-10 days

Risk Management - Patients

Only immunocompromised patients are at risk from this organism. The patients do not require to be isolated as it is not being spread from patient to patient.

No further cases have been reported since 15th January.

Dr David Irvine will be contacted about any haematology patients that come up to Critical Care.

Critical care consultants to be made aware that immune compromised patients may be at risk of infection with mucor until there is evidence that air is clear and therefore consideration should be given to using ambisome for prophylaxis and they should be isolated in the PPVL rooms with HEPAs (room 50).

Risk Management - Staff

Only immunocompromised staff would be affected where they would need to contact occupational health regarding any queries. Staff looking after immunocompromised people at home will not spread this organism onto them.

HIIAT

The HIIAT was explained and the content of each classification read out. The group agreed the following score of RED;

Severity of illness – Major
Services – Moderate
Risk of transmission – Moderate
Public anxiety – Major

Communications - Public

It was agreed that Dr Peters will report this IMT conclusions to Dr Inkster as there is communications which will be going out regarding Cryptococcus and the high level of anxiety around the press regarding this. TC with Dr Inkster took place and it was agreed that Lorraine Dick would send form of words for staff and fro public to be approved by Dr Peters and Dr Inkster .

Dr O'Sullivan said he will be informing the relatives of the patient who is being treated about this later on this afternoon.

Communications - Professionals

Request staff to be aware of cases on the ward especially for patients who are immune compromised and show signs of infection eg pyrexia . Samples should be sent asking for fungal test to be carried out.

Communications - Media

Due to an ongoing issue within the QEUH a media statement will be released regarding this is going to be discussed with the press office senior management.

Communications – Health Protection Scotland (HPS)

Lynn Pritchard will complete the HIIORT and send it onto Dr Peters to review before being sent to HPS.

Action List

1. Dr Peters will report back if anything is grown from the test plate left within the testing machine to see if any possible source of contaminant.	**C Peters**
2. Room 23 closed to admissions and sealed off. It is a PPVL room and this gives a good level of barrier protection of air in the bedroom from disseminating throughout the unit	**Facilities**
3. The dialysis point located in Room 23 ITU1 is going to be investigated to see if there is any damp/mould behind it. This will require an HAISCRIBE	**Facilities**
4. Details of dates of works carried out on ITU to be provided	**Facilities**
5. Details regarding the ventilation system are to be provided to Dr Peters	**Facilities**
6. Awaiting air sampling results due in 7-10 days	**Lab**
7. Awaiting on final identification of organisms which have been sent down to Bristol.	**C Peters**
8. Cleaning of the hi flo nasal machine on patients is to be investigated	**IPCT**
9. Cleaning of the vent cleaning machine is to be investigated.	**Facilities**

Hot debriefing document

This is not a mandatory requirement but for the purpose of sharing lessons learned across Scotland particularly for rare or unusual events. The IPCT/HPT or chair of the IMT should complete this immediately following the end of an incident. It may be deemed that a full IMT report is not needed and this document may be sufficient. A full IMT reporting template can be found in the resources section of the NIPCM

1.Incident reference

Rotavirus/Astrovirus Outbreak – Ward 2A, RHC. April 2017

2. Details of incident

Ward 2A, RHC is a 25 bedded (all single side rooms) Haemato oncology ward. This is an immunosuppressed patient group therefore infection can be more severe and symptoms can be prolonged. The outbreak lasted 13 days in total with significant disruption to the service. In total 9/10 patients were hospital acquired cases.

6 patients tested positive for Rotavirus , 5 of which were deemed hospital acquired.

4 patients tested positive for Astrovirus. Two of these patients had long term chronic infection , the other two were hospital acquired cases

One patient with Astrovirus was transferred to PICU with aspiration pneumonia as a result of vomiting

3. What went well?

Please list aspects of the incident considered to have been managed well:

Following the implementation of infection control measures there was no onward transmission of Rotavirus or Astrovirus

Good attendance at IMTs and engagement of all staff. Excellent team working. Several individuals assisted over the Easter public holiday period giving up personal time to do so.

4. What did not go well?

Please list aspects of the incident considered not to have been managed well:

Concerns re cleaning – ward scored poorly on an audit of the environment despite being on twice daily cleans during the outbreak. Professional cleaners were utilised .

Concern re hand hygiene – hand hygiene compliance was low and urgent education was undertaken of medical staff and domestics.

Concern expressed re nursing staff resource to implement infection control precautions particularly at weekends

5.Lessons Learned

Please provide details of any learning points or recommendations:

1) Review of domestic resource in 2A – complete
2) Review of nursing resource in 2A particularly at weekends
3) Monitoring of environment and HH by ICT - ongoing

6. IMT lead details	
Name:Dr Teresa Inkster	Email:Teresa.Inkster[redacted]
Job Title: Lead Infection control doctor	Address: Dept of microbiology, QEUH, Glasgow
Contact number: [redacted]	Contact number (mobile):
Date: 26/4/17	Signed:TI
Completed templates to be returned to: NSS.InfectionControl@[redacted]	

Hot debriefing document

This is not a mandatory requirement but for the purpose of sharing lessons learned across Scotland particularly for rare or unusual events. The IPCT/HPT or chair of the IMT should complete this immediately following the end of an incident. It may be deemed that a full IMT report is not needed and this document may be sufficient. A full IMT reporting template can be found in the resources section of the NIPCM

1.Incident reference

Increased incidence of invasive Aspergillosis in paediatric haemato-oncology patients.

2. Details of incident

Ward 2A, RHC is a 25 bedded (all single side rooms) Haemato oncology ward. This is an immunosuppressed patient group .

Between June 2016 and April 2017 there were 3 probable and 1 possible case(s) of Invasive Aspergillosis. Patients required treatment with antifungals and chemotherapy was delayed as a result. Two patients had considerable morbidity as a result of the infection.

3. What went well?

Please list aspects of the incident considered to have been managed well:

Team working

Application of EORTC trial definitions was useful to accurately define cases

Use of particle counts alerted us immediately to water damage ahead of culture results

4. What did not go well?

Please list aspects of the incident considered not to have been managed well:

.Water leak occurred in ceiling void and not all the affected tiles were removed which served as an ongoing source .

ICT were informed of possible cases at a meeting about another incident.

5.Lessons Learned

Please provide details of any learning points or recommendations:

Construction is a well established risk factor for Aspergillosis. It should be noted that extensive construction works continue within and around the QEUH site.

Water damage as a source of Aspergillus should also be considered.
Water leaks should be promptly reported to estates and dealt with – finding the source is essential.
A full inspection of the ceiling void or area should be undertaken with removal of all damp materials and those with visible mould
We are developing a water damage policy for estates officers.

Surveillance for invasive aspergillosis by ICT can be difficult due to the complexity of the diagnostic criteria. Patients can still meet the diagnostic criteria without having positive culture results and can therefore be missed from ICNet. We are reliant on the clinical team to inform us of any cases which we have requested moving forward.

6. IMT lead details	
Name:Dr Teresa Inkster	Email:Teresa.Inkster[redacted]
Job Title: Lead Infection control doctor	Address: Dept of microbiology, QEUH, Glasgow
Contact number: [redacted]	Contact number (mobile):
Date: 26/4/17	Signed:TI
Completed templates to be returned to: NSS.InfectionControl@[redacted]	

Hot debriefing document

This is not a mandatory requirement but for the purpose of sharing lessons learned across Scotland particularly for rare or unusual events. The IPCT/HPT or chair of the IMT should complete this immediately following the end of an incident. It may be deemed that a full IMT report is not needed and this document may be sufficient. A full IMT reporting template can be found in the resources section of the NIPCM

1.Incident reference

Please provide a reference/title for this incident.

Water contamination incident

2. Details of incident

Please provide a brief summary of incident:

A patient presented with a bacteraemia due to unusual organism , Cupriavidus pauculus. Having previously seen this organism in water, water testing commenced on the patients ward and extensive outlets tested positive for Cupriavidus pauculus Further water testing revealed extensive multi ward/unit involvement of outlets for this organism and other pathogenic Gram negative bacteria in addition to fungi. An additional 3 patients presented with Stenotrophomonas bacteraemia during the incident.

Case definitions;

- Any patient with Cupriavidus bacteraemia (1)
- Any patient with Stenotrophomonas bacteraemia (3)

Hypothesis – continues to be developed with input from external agencies.

3. What went well?

Please list aspects of the incident considered to have been managed well:

Excellent team working in what was a challenging and complex incident with several people giving up evenings and weekends to ensure patient safety

Excellent engagement from clinical teams and good representation at IMTs.

Huge undertaking by estates colleagues and external company to undertake testing, tap maintenance and filter fitting/quality assurance

Microbiology laboratory increased resource to enable processing of 100 water samples a day and reduced turnaround times to 48 hours

Rapid procurement of portable sinks and filters

Excellent support from HPS and HFS colleagues who also contributed to teleconferences on weekends

Rapid production of infection control guidance by infection control nurses

Media colleagues handled media and political enquiries very well with excellent communication in relation to this and frequent updates provided.

Staff on wards coped well with enhanced infection control measures in addition to the pressures of dealing with anxious parents and families.

4. What did not go well?

Please list aspects of the incident considered not to have been managed well:

Incident was very fast paced. As a result ICT did not produce action plans after each meeting, so actions were difficult to keep track off.

Direct queries from SGHD to chair of IMT, when busy trying to deal with incident

Confusion at times in relation to water testing

5.Lessons Learned

Please provide details of any learning points or recommendations:

Significant learning from this incident which will be reflected in full outbreak report and HPS report

Immediate learning for sharing with other NHS boards;

1) Consider water as a source when bacteraemias detected due to Cupriavidus sp, Stenotrophomonas maltophilia, Delftia Acidovorans, Elizabethkingia sp

2) Consider testing water supply for fungi when dealing with an outbreak of invasive fungal infections.

3) Silver hydrogen peroxide is a powerful biocide but may not be immediately effective when heavy biofilm present. Repeat sampling is necessary.

4) Point of use filters can be utilised as a rapid control measure but should not be considered a long term solution

5) Portable sinks can be useful when frequent dosing of a system is required, to ensure an alternate source of warm water and when shower water is contaminated to enable a patient to wash

6) Consider covering line sites whilst immuocompromised patients are showering as best practice

6. IMT lead details	
Name: Dr Teresa Inkster	Emai Teresa.Inkster[redacted]
Job Title:Lead Infection control doctor, NHSGGC	Address:Dept of Microbiology, QEUH, Glasgow
Contact number:[redacted]	Contact number (mobile):
Date:29/3/18	Signed:
Completed templates to be returned to: NSS.HPSInfectionControl@[redacted]	

From: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)
To: RANKIN, Annette (NHS NATIONAL SERVICES SCOTLAND)
Cc: Dodd Susan (NHS GREATER GLASGOW & CLYDE); Devine, Sandra
Subject: Re: 2A RHC Enterobacter
Date: 01 June 2018 19:04:57

Hi Annette - just to inform you this incident remains AMBER. We have results from drain swabs from 2A and 2B which have grown a range of bacteria including Enterobacter cloacae.

Given that staff have reported visible black material from the drains it is possible this is the source of the patients bacteraemia , coming back into the sink and contaminating hands.

I have discussed urgent decontamination of the drains with estates colleagues. This is not straightforward as Scottish water need to be informed of chemicals being flushed into drains. Ian Powrie will take this forward on Monday and we will proceed with decontamination thereafter.

From typing 3 out of 4 patient results available are different strains. Positive drain swabs will be sent for typing also.

In the meantime I have asked staff in 2A/B to apply the additional step of alcohol gel after hand hygiene until this situation is resolved.

For noting , we have a case of Mycobacterium chelonae bacteraemia in a 2A patient - reported to us yesterday . This is the typical patient group for such an infection - immunosuppressed with a line. This is another environmental organism with numerous potential sources , very unlikely to be water related with filters on. We will continue to monitor for further cases

Kind regards
Teresa

Dr Teresa Inkster
Lead Infection Control Doctor NHSGGC
Training Programme Director Medical Microbiology
Dept of Microbiology
Queen Elizabeth University Hospital
Glasgow
[redacted]

From: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)
Sent: 29 May 2018 20:31
To: RANKIN, Annette (NHS NATIONAL SERVICES SCOTLAND)
Cc: Hamilton Catriona (NHS GREATER GLASGOW & CLYDE)
Subject: 2A RHC
Hi Annette,

Please find attached a HIIORT for ward 2A RHC in relation to 5 cases of Enterobacter bacteraemia. This has been assessed as AMBER on HIIAT.

Kind regards
Teresa

Dr Teresa Inkster
Lead Infection Control Doctor NHSGGC
Training Programme Director Medical Microbiology
Dept of Microbiology
Queen Elizabeth University Hospital
Glasgow
[redacted]

NHS Greater Glasgow and Clyde	**NHS Greater Glasgow & Clyde** **Infection Prevention and Control Team**
Purpose:	Briefing Paper
From:	Sandra McNamee
To:	Dr. J. Armstrong Board Medical Director
Date:	18 February 2018
Subject/ situation:	Recent Outbreaks or Incidents which scored AMBER or RED using the National Healthcare Infection Incident Assessment Tool (HIIAT) December 2018 February 2019.
Summary	**QEUH – *Cryptococcus neoformans*** **HIIAT RED 20 December 2019.** **HIIAT GREEN 15 February 2019.** **Situation** Two cases of *Cryptococcus neoformans* in patients' blood cultures between the [redacted]/18 and the [redacted]/18. Both were [redacted] patients – one adult and one paediatric. Summary of the two cases is as follows: Patient 1 Adult patient with a diagnosis of [redacted] and [redacted]. Blood cultures taken on the [redacted]/11 were positive for Cryptococcus. [redacted] was commenced on treatment. At the time of referral [redacted] was [redacted] The infection was not thought to be significantly contributing to [redacted] condition at this time, however this [redacted] died on [redacted]. Cryptococcus [redacted] Patient 2 [redacted] with [redacted] who was admitted to Ward 2A of the Royal Hospital for Children (RHC) on [redacted] 2018. Ward 2A was decanted to ward 6A, Queen Elizabeth University Hospital (QEUH) on [redacted] 2018 to allow for upgrade works to take place. The patient was transferred to paediatric intensive care unit (ward 1D) on [redacted]/18. [redacted] tested positive for *Cryptococcus neoformans* from blood cultures obtained on [redacted] ~~This is condition~~ This is considered an exceptional infection episode and therefore should be and was reported as per Chapter 3 of the National Infection Prevention and Control Manual. There have been no new cases since [redacted] 2018. **Background** Cryptococcus species is harmless to the vast majority of people and rarely causes disease in humans. It is caused by inhaling the fungus Cryptococcus. These fungi are primarily found in soil and pigeon droppings. **Action** An initial Problem Assessment Group meeting was held on the 18 December. Immediate actions were put in place including:

- Review of drugs given to patients by the aseptic pharmacy.
- Review of Paediatric Intensive Care Unit (PICU) to review possible contamination with pigeon excrement on window ledges etc.
- Review of plant room on the roof of the adult hospital.
- Air sampling of ward areas.

The review of the plant room lead to the convening of an Incident Management Team (IMT) meeting. The first meeting was held on the 20 December 2018. To date there have been 12 IMT held. This is a list of actions undertaken and their results if applicable:

- Review of all areas patients were located. *Competed and additional pest control measures put in place throughout both hospitals in areas identified by IMT.*
- Review of ventilation and plant rooms. Plant room air tested positive for Cryptococcus *albidus this was also found in pigeon droppings. Review of ventilation in plant room conducted. Hypothesis at this time was that this may be associated with the ventilation system.*
- Patients thought to be at risk were prescribed antifungal prophylaxis.
- Air sampling was undertaken in plant rooms, wards and areas next to inlets.
  Plant rooms positive – 7 January 2019, *Cryptococcus albidus*
  Ward 6a positive -16 January 2019 *Cryptococcus albidus*
  Ward 4C positive – 16 January 2019 Cryptococcus albidus
  PICU positive – 11 January 2019 *Cryptococcus albidus*
  Floor 7 QEUH positive – 17 January 2019 *Cryptococcus albidus*
- Samples of bird droppings were sent to a vet laboratory in Ayr for analysis. *Positive for Cryptococcus albidus. Further samples sent and results awaited*
- Patient isolates sent for typing to a specialist laboratory. *Results not available as yet.*
- Professional clean of plant rooms was completed. *Completed Dec 20-24*
- Epidemiological review by Public Health Protection Unit. *Completed no real conclusions due to low numbers. Evidence of sporadic community cases as expected. HPS contacted (Vet) to ask if there was and information regarding the general bird population but this organism is not ~~particularly relevant to this population~~ under vetinary surveillance so no useful intelligence was gained from this.*
- Consultation with UK ventilation and mycology experts was ongoing throughout incident.
- Thermal imaging report on window seals commissioned. *No major issues noted.*
- Water tanks reviewed and they are covered so unlikely to be a source.
- Review carts taking patient supplies to ward to ensure clean – reviewed and they were covered and clean. *Also checked storage facility in Hillington, again no issues with bird dropping reported.*
- Portable High Energy Particulate Air (HEPA) filters were placed in areas defined by IPCT with patients who were considered to be potentially vulnerable to this type of infection. *Air sampling post placement was optimal.*
- HEPA filters will remain on 6A until ward 2b is returns to the RHC.
- Ongoing fortnightly air sampling in 6a will continue indefinitely.
- Ongoing surveillance – clinicians and microbiologists will consider as part of differential diagnosis and send serum antigen and blood cultures.
- Plant rooms will now be inspected every two weeks for evidence of pest, infestations. *In place.*

- Review of Helipad – contamination evident. *Tac mats reviewed and purchased for this area.*
- In order to review all results and hypotheses, a short life Expert Advisory Group has been convened which will report to the IMT. Included in this group are representatives from Health Protection Scotland, Health Facilities Scotland and a UK expert on ventilation as well as representatives from Greater Glasgow and Clyde. *First meeting 14 February 2019.*

Communications

- Patient/relatives of both patients were spoken to by clinical staff.
- 13/1 All staff and inpatients given written brief, alongside verbal communication.
- 18/1 Proactive press statement released. Communications prepared for patient and parents. Members of IPCT and SMT Women's and Children's continue to make themselves available to address specific concerns of patients, parents and staff.
- Letter to patients/parents approved by CEO and issued by W & C Directorate.

16 January 2019

On the 16th of January air sampling confirmed the presence of Cryptococcus in the samples taken from the ward (6A) environment, although these were not the same type i.e. *Cryptococcus albidus*. During the detailed investigation, a separate issue was identified with the sealant in some of the shower rooms. In order for remedial works to be completed some very vulnerable children were moved to ward 4B and the remaining haemato-oncology patients moved to Clinical Decision Unit in the children's hospital.

The Cabinet Secretary for Health and Sport visited the hospital on 22nd January to speak to staff, management and patients and families about the issue. She has commissioned a external review of the Queen Elizabeth University Hospital, this will include a review of the design, commissioning, and maintenance programme.

12 February 2019

Repairs are now complete and air sampling results confirm that the air quality in ward 6a is now optimal. Children were returned to ward 6a on the 12 February 2019.

[redacted]

No new cases
Control in place as per actions
Incident has now been assessed as GREEN

From: MacLeod, Calum
Sent: 21 August 2017 15:29
To: Devine, Sandra
Subject: Email correspondence in relation to scribe
Attachments: FW: Ward 4b En-Suite Ceiling works; WARD 4b Ensuite HAI SCRIBE.doc

Hello Sandra

Please find attached the email correspondence and scribe relating to Ward 4B ceiling work.

Please let me know if there is any other information you require.

Kind Regards

Calum MacLeod
Infection Prevention & Control Administrator
Zone 2-1, Office Block
Queen Elizabeth University Hospital
G51 4TF

[redacted]

[redacted]

From: Pritchard, Lynn
To: MacLeod, Calum
Subject: FW: Ward 4b En-Suite Ceiling works
Date: 07 July 2017 17:38:59

Lynn Pritchard
Lead Infection Prevention & Control Nurse - South Sector
Queen Elizabeth University Hospital
Zone 2 - 1 Office Block
Govan Rd
Glasgow
G51 4TF
[redacted]

-----Original Message-----
From: [redacted]
Sent: 06 July 2017 15:28
To: Pritchard, Lynn; Powrie, Ian
Cc: MacLeod, Calum
Subject: RE: Ward 4b En-Suite Ceiling works

Thanks Ian,
As long as all measures compliant with the level and grade of risk , and agree with Lynn's comments. Would be good to confirm Lynn's question about the stage. The patient risk level is group 4.
Best wishes
[redacted]

From: Pritchard, Lynn [redacted]
Sent: 03 July 2017 13:32
To: Powrie Ian (NHS GREATER GLASGOW & CLYDE)
Cc: [redacted] MacLeod, Calum
Subject: FW: Ward 4b En-Suite Ceiling works

Hi Ian
I have reviewed the SCRIBE and made a couple of comments. I am not sure if I am reading this correctly, but can you confirm that when Stage 1 is undertaken is this left for the duration of the works? I have included [redacted] in the email as he is covering for Theresa in her absence.
Thanks
Lynn

Lynn Pritchard
Lead Infection Prevention & Control Nurse - South Sector Queen Elizabeth University Hospital Zone 2 - 1 Office Block Govan Rd Glasgow
G51 4TF
[redacted]

From: Powrie, Ian
Sent: 26 June 2017 12:45
To: Pritchard, Lynn; Inkster, Teresa; McColgan, Melanie; Brattey, David; Campbell, Myra; McArdle, Alyson; Boyd, Robert (NHSmail)
Subject: Ward 4b En-Suite Ceiling works

Dear all,

Please find attached a copy of the HAI SCRIBE for the above works.

Can I please have your comments and approval for this documents by noon on Wednesday of this week to allow this to be issued with the tender document due for issue on Friday.

Many Thanks

Regards

Ian

I. Powrie
Deputy General Manager (Estates)

Queen Elizabeth University Hospital Campus Property, Procurement & Facilities Management Directorate
Facilities Corporate Services Dept CMB Building Glasgow
G51 4TF

NHS National Services Scotland

SHFN 30:
HAI-SCRIBE

Questionsets and checklists

Health Facilities Scotland
Engineering and Environment

January 2015

A50002331

Introduction

Scottish Health Facilities Note (SHFN) 30 in its 2014 published form comprises two parts:

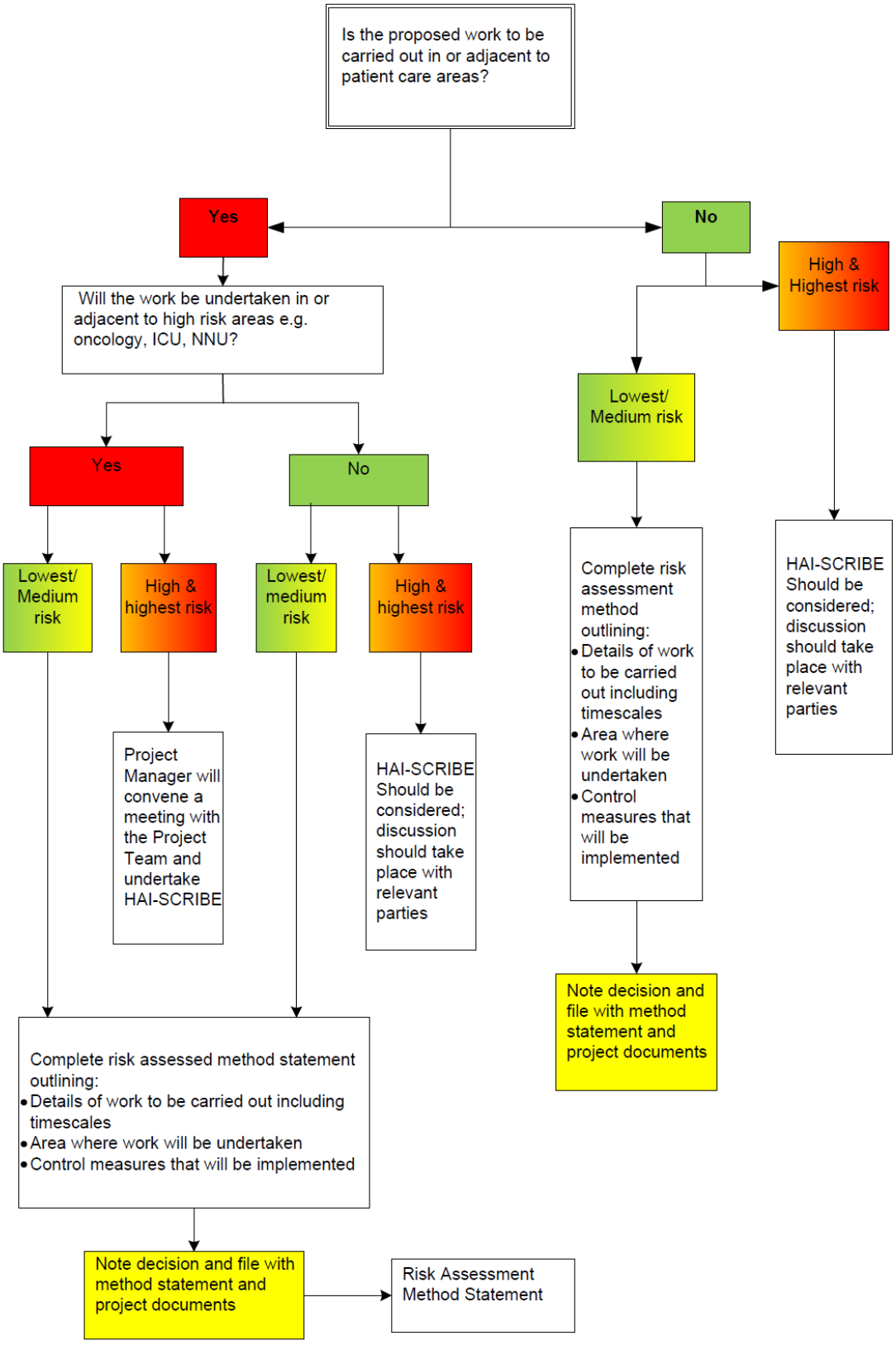
- **Part A**: Manual: Information for Design Teams, Construction Teams, Estates & Facilities and Infection Prevention & Control Teams.
- **Part B**: HAI-SCRIBE Implementation Strategy and Assessment Process.

Both have been published in book form.

It is appreciated that, as familiarity with the use of the procedures grows there will be progressively less need to rely on printed text, eventually leading to situations where Questionsets and checklists will themselves be sufficient. Photocopying from published books is a ponderous and time-consuming process with a tendency to produce distorted images and/or damage binding. To facilitate the process, therefore, Questionsets and checklists for each of the four project development stages have been produced in the form of an information pack ready for photocopying and distributing to project teams to assist in the HAI-SCRIBE review procedures as each new Project requires assessment. This pack is only available electronically.

The various proforma's, comprising Questionsets, checklists and certifications are provided for the following:

- **Development Stage 1:** Initial briefing and proposed site for development:
- **Development Stage 2:** Design and planning:
- **Development Stage 3:** Construction and refurbishment work:
- **Development Stage 4:** Pre-handover check, ongoing maintenance and feed-back.


Is the proposed work to be carried out in or adjacent to patient care areas?
Yes
No
Will the work be undertaken in or adjacent to high risk areas e.g. oncology, ICU, NNU?
High & Highest risk
Lowest/ Medium risk
Yes
No
HAI-SCRIBE Should be considered; discussion should take place with relevant parties
Lowest/ Medium risk
High & highest risk
Lowest/ medium risk
High & highest risk
Complete risk assessment method outlining:
• Details of work to be carried out including timescales
• Area where work will be undertaken
• Control measures that will be implemented
Project Manager will convene a meeting with the Project Team and undertake HAI-SCRIBE
HAI-SCRIBE Should be considered; discussion should take place with relevant parties
Note decision and file with method statement and project documents
Complete risk assessed method statement outlining:
• Details of work to be carried out including timescales
• Area where work will be undertaken
• Control measures that will be implemented
Note decision and file with method statement and project documents
Risk Assessment Method Statement

Type	Construction/Refurbishment Activity
Type 1	**Inspection and non-invasive activities.** Includes, but is not limited to, removal of ceiling tiles or access hatches for visual inspection, painting which does not include sanding, wall covering, electrical trim work, minor plumbing and activities which do not generate dust or require cutting of walls or access to ceilings other than for visual inspection.
Type 2	**Small scale, short duration activities which create minimal dust.** Includes, but is not limited to, installation of telephone and computer cabling, access to chase spaces, cutting of walls or ceiling where dust migration can be controlled.
Type 3	**Any work which generates a moderate to high level of dust, aerosols and other contaminants or requires demolition or removal of any fixed building components or assemblies.** Includes, but is not limited to, sanding of walls for painting or wall covering, removal of floor coverings, ceiling tiles and casework, new wall construction, minor duct work or electrical work above ceilings, major cabling activities, and any activity which cannot be completed within a single work shift.
Type 4	**Major demolition and construction projects.** Includes, but it not limited to, activities which require consecutive work shifts, requires heavy demolition or removal of a complete cabling system, and new construction.

Table 1: Redevelopment and construction activity

Type 3

Risk to patients of infection from construction work in healthcare premises, by clinical areas	
Risk rating	**Area**
Group 1 Lowest risk	1. Office areas; 2. Unoccupied wards; 3. Public areas/Reception; 4. Custodial facilities; 5. Mental Health facilities.
Group 2 Medium risk	1. All other patient care areas (unless included in Group 3 or Group 4); 2. Outpatient clinics (unless in Group 3 or Group 4); 3. Admission or discharge units; 4. Community/GP facilities; 5. Social Care or Elderly facilities.
Group 3 High risk	1. A & E (Accident and Emergency); 2. Medical wards; 3. Surgical wards (including Day Surgery) and Surgical outpatients; 4. Obstetric wards and neonatal nurseries; 5. Paediatrics; 6. Acute and long-stay care of the elderly; 7. Patient investigation areas, including; • Cardiac catheterisation; • Invasive radiology; • Nuclear medicine; • Endoscopy. Also (indirect risk) 8. Pharmacy preparation areas; 9. Ultra clean room standard laboratories (risk of pseudo-outbreaks and unnecessary treatment); 10. Pharmacy Aseptic suites.
Group 4 Highest Risk	1. Any area caring for immuno-compromised patients*, including: • Transplant units and outpatient clinics for patients who have received bone marrow or solid organ transplants; • Oncology Units and outpatient clinics for patients with cancer; • Haematology units • Burns Units. 2. All Intensive Care Units; 3. All operating theatres; Also (indirect risk) 4. CSSUs (Central Sterile Supply Units).

Table 2: Different areas of health care facility and the risk associated with each area.

Group 4

	Construction Project Type			
Patient Risk Group	**TYPE 1**	**TYPE 2**	**TYPE 3**	**TYPE 4**
Lowest Risk	Class I	Class II	Class II	Class III/IV
Medium Risk	Class I	Class II	Class III	Class IV
High Risk	Class I	Class II	Class III/IV	Class IV
Highest Risk	Class II	Class III/IV	**Class III/IV**	Class IV

Table 3: Estimates the overall risk of infection arising and will indicate the class of precaution that should be implemented

Type 3 – Highest Risk

Control measures			
	During Construction Work	**After Construction Work**	**By**
Class I	• Execute work by methods to minimise raising dust from construction operations;. • Immediately replace any ceiling tiles displaced during inspection.	• Clean areas by damp dusting with neutral detergent in warm water;. • Vacuum floor and damp mop.	Request via domestic supervisor. Request via domestic supervisor.
Class II	• Provide active means to prevent airborne dust from dispersing into atmosphere; • Water mist work surfaces to control dust while cutting; • Seal unused doors with duct tape; • Block off and seal air vents; • Place dust mat at entrance and exit of work area; • Remove or isolate HVAC system in areas where work is being performed.	• Dampwork surfaces and ledges with neutral detergent solution; • Contain construction waste before transport in tightly covered containers; • Damp mop and/or vacuum with HEPA filtered vacuum before leaving work area; • Remove isolation of HVAC system in areas where work is being performed.	Request via domestic supervisor. Estates staff. Request via domestic supervisor. Estates staff.
Class III	• **Remove or Isolate HVAC system in area where work is being done to prevent contamination of duct system;** • **Complete all critical barriers eg plasterboard, plywood, plastic, to seal area from non work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins;** • **Maintain negative air pressure within work site utilizing HEPA equipped air filtration units;** • **Contain construction waste before transport in tightly covered containers;** • **Cover transport receptacles or carts. Tape covering unless solid lid.**	• **Do not remove barriers from work area until completed project is inspected by the Board's Health & Safety representative and Infection Control Department and thoroughly cleaned by the Board's domestic services staff;.** • **Remove barrier materials carefully to minimise spreading of dirt and debris associated with construction;** • **Vacuum work area with HEPA filtered vacuums;** • **Damp mop area with neutral detergent and warm water;** • **Remove isolation of HVAC system in areas where work is being performed.**	**Request by Estates Dept.** **Contractor/Estates Staff.** **Request via domestic supervisor.** **Request via domestic supervisor.** **Contractor/Estates Staff.**

Table 4: Describes the required infection control precautions depending on class of risk

	During Construction Work	After Construction Work	By
Class IV	• Isolate HVAC system in area where work is being done to prevent contamination of duct system; • Complete all critical barriers eg plasterboard, plywood, plastic to seal area from non work area (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins; • Maintain negative air pressure within work site; • Seal holes, pipes, conduits, and punctures appropriately; • Construct anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site or they can wear cloth or paper coveralls that are removed each time they leave the work site; • All personnel entering work site are required to wear shoe covers. Shoe covers must be changed each time the worker exits the work area; Tack mats have to be used within containment area and at the entrance to the lift on the ground floor. A shoe dispenser should also be situated at the lift on the ground floor. • Do not remove barriers from work area until completed project is inspected. • Leave extractor running as a control measure to maintain negative pressure within work space and to maintain pressure from the lobby to the corridor.	• Remove barrier material carefully to minimise spreading of dirt and debris associated with construction; Builders Industrial clean also to be included in capital cost. • Contain construction waste before transport in tightly covered containers;. • Cover transport receptacles or carts. Tape covering unless solid lid; • Vacuum work area with HEPA filtered vacuums; • Damp dust area with neutral detergent and warm water; • Scrub floor area with neutral detergent in warm water; • Remove isolation of HVAC system in areas where work is being performed.	Contractor. Contractor. Contractor. Deep Clean by Contractor first then Request via domestic supervisor. Request via domestic supervisor. Contractor/Estates Staff.

Table 4 continued: Describes the required infection control precautions depending on class of risk

Construction and refurbishment Stage

Project particulars and checklists for Development Stage 3

Development stage 3: Construction and refurbishment work: Checklist to ensure all aspects have been addressed		
HAI-SCRIBE Name of Project	Ward 4B En-suite ceiling replacement (24 rooms)	
Name of Establishment	Queen Elizabeth University Hospital, Ward 4b	
National allocated number		
HAI-SCRIBE Review Team	As per attendance list	
HAI-SCRIBE Sign Off - As per attendance list		
Completed By (Project Manager) (Print Name) **Ian Powrie**		Date: 19/6/2017
Signature		Date
Stage 3		

Additional Notes

Works will be carried out in 5 stages:

Stage 1: Screen off & seal with zipped air locks both sides, 2 separate locations, of the corridor to rear of ward 4b (isolating 10 rooms) including sealing off:

- Fire escape route, core "H" (break out in emergency escape requirements only).
- The equipment store
- Disabled WC

Stage 2: Screen off & seal with zipped air locks 2 individual single rooms Doors (How-015 & How-017) Facing nurses station (maintaining N\Station & support room access)

Stage 3: Screen off & seal with zipped air locks 2 individual single rooms Doors (How-011 & How-012) Facing nurses station (maintaining N\Station & support room access)

Stage 4: Screen off & seal with zipped air locks 1 individual single rooms Door (How-009) Facing nurses station (maintaining N\Station & support room access)

Stage 5: Screen off & seal with zipped air locks both sides of the corridor to rear of ward 4b (isolating 10 rooms) including sealing off:

Stage 6: Replace all Terminal HEPA Filters (24 off) on completion of construction works.

Notes:

- **See attached zone plan detailing staged works and environmental control containment locations**.
- **Isolation room door to corridor to be closed and sealed during works in each room.**
- **Deep clean within each zone before sealed Environmental Control Barriers are removed**.

Development stage 3: HAI-SCRIBE applied to Construction and refurbishment work Prior to the commencement of work		
3.1.1	Brief description of the work being carried out.	QEUH Ward 4b, BMT: Remove existing suspended ceiling grid and replace with a Solid Gyproc construction sealed system.
3.1.2	Using the matrix above establish the type and extent of construction and refurbishment /repair work, patients at risk and level of control measures.	
	Type of work - Type 3	
	Patient risk group - Group 3	
	Risk class - Class 3-4	
3.1.3	Identify any potential hazards associated with this work.	Dust Exposure
3.1.4	Identify any risk associated with the hazards identified above.	Fungal Infection
3.1.5	Outline the control measures that require to be implemented to eliminate or mitigate the identified risks. Ensure these are entered on the project risk register.	
	Control measures: All control measures detailed under risk class 3 are to be fully adopted with the exception of Isolation of the ventilation system which is covered in point 1, 2 & 3 of the additional control measures detailed below: 1. Ventilation is common system to all ward isolation rooms therefore cannot be isolated, however the supplies are protected by Terminal HEPA filters which will protect the supply ductwork from dust. 2. Extract ducts will be sealed off to protect from dust contamination. 3. Mobile HEPA recirculation filtration units will be deployed in each room for the duration of the works in that space and over night on completion of the works. 4. Sealed work space: a. Zip Lock Environmental containment will be applied to each zone. b. Internal door faces to be tape sealed during dust generating works. c. See attached zone plan detailing staged works and environmental control containment locations. 5. Timber ceiling frames will be prefabricated off site. 6. Monitored work space Good housekeeping 7. Protective Clothing 8. Tack mats at work space entry & exit. 9. A domestic water flushing programme will also be implemented 10. Increased domestic cleaning programme access route to ward and ward corridor. (2 times per day).	

3.1.6	It has been recognised that control measures identified to address the project risk may have unintended consequences e.g. closure of windows can lead to increased temperatures in some areas. Such issues should be considered at this point, they should be noted and action to address these taken.	
	Potential problems • Failure of general ventilation in ward • Breach in work space containment	
	Control measures: • Stop work immediately & escalate as per SOP. • Monitoring & escalation arrangements - SOP to be developed	
3.1.7	**Actions to be addressed** **Action 1:** Preparation of Monitoring and escalation SOP (3.2.1, 2 ,4 & 3.3.3) **Action 2:** Definition and confirmation of access egress routes (3.2.3) **Action 3:** Terminal HEPA filters to be replaced on completion of works.(3.2.5) **Action 4:** Management programme for daily flushing regime to be put in place and recorded (3.2.6) **Action 5:** Routine ward cleans will be increased to 2 x daily for duration of works.(3.3.2)	
By: **Action 1**:- Ian Powrie\ Lynn Prichard **Action 2**:- Ian Powrie\David Brattey\Lynn Prichard **Action 3:-**David Brattey **Action 4**:- David Brattey **Action 5:** Pat Coyne.		**Deadline:** **Action 1:-** 10/7//2017. **Action 2:-** Prior to start date relative to patient group. **Action 3**:- 30/6/2017. **Action 4**:- **Start Date TBC.** **Action 5:- Start Date TBC.**

Development stage 3: In terms of infection risk confirmation that the following been addressed		
3.2.1	The population groups most susceptible to infection. Items to be considered: • Adjacent rooms, wards and departments • Relocation of susceptible patients Have these issues and actions to be taken been noted in actions to be addressed section?	Yes ✓ No N/A Yes ✓ No N/A
Comments		
3.2.2	The hours of operation of the construction work and the impact of this on the clinical area. Have these issues and actions to be taken been noted in actions to be addressed section?	Yes ✓ No N/A Yes ✓ No N/A
Comments 8am-6pm 7 days per week		
3.2.3	Separation of construction and healthcare activities including delivery and supply routes, removal of waste and patient transfers. Have these issues and actions to be taken been noted in actions to be addressed section?	Yes ✓ No N/A Yes ✓ No N/A
Comments Set of drawings to be produced for tender as per drawing 70520(57)01		
3.2.4	The construction of temporary barriers and/or sealing of doors and windows to minimise contamination of the environment by dust and potentially infectious particles created during the construction works. Have these issues and actions to be taken been noted in actions to be addressed section?	Yes ✓ No N/A Yes ✓ No N/A
Comments		

Development stage 3: In terms of infection risk confirmation that the following been addressed (continued)		
3.2.5	Airflow patterns including:	
	Internal and external ventilation systems	Yes ✓ No ☐ N/A ☐
	Exhaust ventilation	Yes ✓ No ☐ N/A ☐
	Sealing of doors and windows	Yes ✓ No ☐ N/A ☐
	Oxygen and Suction points	Yes ✓ No ☐ N/A ☐
	Air handlers, coils, fans and grilles	Yes ✓ No ☐ N/A ☐
	Have these issues and actions to be taken been noted in actions to be addressed section?	Yes ✓ No ☐ N/A ☐
Comments Fully Re-validation and air permeability tests in compliance with SHTM 03-01 requirements		
3.2.6	Work with sinks or plumbing which could give rise to aerosol water droplets in high risk areas.	Yes ☐ No ☐ N/A ✓
	Have these issues and actions to be taken been noted in actions to be addressed section?	Yes ✓ No ☐ N/A ☐
Comments Management programme for daily flushing regime to be put in place and recorded		
3.2.7	Impact on stock storage areas including:	
	Sterile and non-sterile items	Yes ✓ No ☐ N/A ☐
	Patient care equipment	Yes ✓ No ☐ N/A ☐
	Medications	Yes ☐ No ☐ N/A ✓
	Medical records and documentation	Yes ☐ No ☐ N/A ✓
	Linen and waste facilities including sharps	Yes ☐ No ☐ N/A ✓
	Have these issues and actions to be taken been noted in actions to be addressed section?	Yes ✓ No ☐ N/A ☐
Comments Ward partially occupied, Environmental Containment control issues reviewed and agreed...		

Development stage 3: During the construction phase have the following been addressed?		
3.3.1	Where external work is being carried out: Prevention of insect and rodent entry and prevention of weather/water entry to internal areas during the construction phase. Have these issues and actions to be taken been noted in actions to be addressed section?	Yes ☐ No ☐ N/A ☑ Yes ☐ No ☐ N/A ☑
Comments: **N\A**		
3.3.2	Cleaning of site and adjacent areas both during the construction phase and prior to handover. Have these issues and actions to be taken been noted in actions to be addressed section?	Yes ☑ No ☐ N/A ☐ Yes ☑ No ☐ N/A ☐
Comments Industrial deep clean to be completed by contractor at end of works. Routine ward corridor cleans will be increased to 2 x daily for duration of works.		
3.3.3	Enforcement of control and reporting system to ensure compliance with above issues. Have these issues and actions to be taken been noted in actions to be addressed section?	Yes ☑ No ☐ N/A ☐ Yes ☑ No ☐ N/A ☐
Comments Develop SOP and communication plan		
Additional notes - Stage 3		

Development stage 3: HAI-SCRIBE applied to the construction / redevelopment phase			
Certification that the following documents have been accessed and the contents discussed and addressed at the Infection Control and Patient Protection Meeting held on			
Venue	Laboratory Medicine, FRM Suite, Meeting room 5.	Date	19/6/2017
'Healthcare Associated Infection System for Controlling Risk in the Built Environment' *('HAI-SCRIBE) Implementation Strategy Scottish Health Facilities Note (SHFN) 30: Part B).*			
Declaration: We hereby certify that we have co-operated in the application of and where applicable to the aforesaid documentation.			
Present			

Print name	Signature	Company	Telephone Numbers	Email address
Teresa Inkster		Lead ICD	[redacted]	[redacted]
McColgan, Melanie		GM Regional Services	[redacted]	[redacted]
Lynn Pritchard		Lead IPCN	[redacted]	[redacted]
David Brattey		Senior Estates Manager	[redacted]	[redacted]

From: Devine, Sandra
To: Devine, Sandra
Subject: Fw: HAIRT
Date: 17 June 2024 10:43:55

From: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]
Sent: 12 August 2019 16:24
To: Devine, Sandra [redacted]
Subject: [ExternaltoGGC]Re: HAIRT

OK, thats fine

Dr Teresa Inkster
Lead Infection Control Doctor NHSGGC
National Training Programme Director Medical Microbiology
Dept of Microbiology
Queen Elizabeth University Hospital
Glasgow
[redacted]

From: Devine, Sandra [redacted]
Sent: 12 August 2019 16:21
To: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)
Subject: HAIRT

HI Teresa

Sorry had another go at this.

Two – three per month not three and I have put in HPS definitions.

Really hope this is the last version.

Sandra

OUTBREAKS / EXCEPTIONS June 2019 – present

(Reported are those that are assessed as AMBER or RED using the HPS Hospital Infection Incident Assessment Tool (HIIAT))

QEUH, Ward 6A (Paediatric Haematology/Oncology Unit). Three cases of unusual blood stream infections since 13th of April). HIIAT assessed as Red on the 8 August 2019.

NHS Greater Glasgow and Clyde closely monitor all blood stream infections in this vulnerable group of patients and the Lead Infection Control Doctor (LICD) reviews all cases as they occur. It is acknowledged that there will be a background level of bloodstream infections in this susceptible population. Since April there have been eleven cases of gram negative bacteraemias, this is in keeping with background rates which are approximately two-three per month, however, three of these cases were with an unusual organism and an Incident Management Team meeting was held to review all cases. Four of the cases are considered to be hospital acquired seven were considered to be healthcare associated in accordance with HPS definitions.

The three unusual cases referred to were identified by the LICD. None of the cases are linked to each other however one has been linked to the environment (water). As a result of this specific case, additional precautions were put in place, i.e. point of use filters have been added to outlets in all areas of RHC that this group of patients may visit during their stay. There is no evidence of contamination in the filtered water supply to the paediatric haematology/oncology ward. Even though published studies show this type bacteria can be found in public mains, household water systems and in public buildings such as hospitals, infections with this bacteria are very rare, and this type of

bacteria poses no danger to the majority of patients and the public. The part of the incident related to water was closed on the 8 August 2019.
Environmental sampling has been undertaken and at this time there have been no links to any of the cases and the environment in the haematology/oncology ward. It should be noted that this process is ongoing and environmental sampling has a number of pitfalls.
HPS and HFS are providing advice and support to the Incident Management Team
Many measures are used to prevent blood stream infections, e.g. hand hygiene, the use of gloves and aprons and the application of an aseptic technique when accessing patients intravenous devices. All of these measures have been reviewed by practice educators and the infection prevention and control team. Children are also now receiving antibiotics to protect them against this type of infection.

Sandra Devine
Acting Infection Control Manager
NHS Greater Glasgow & Clyde
[redacted]

Bundle of documents for Oral hearings commencing from 19 August 2024 in relation to the Queen Elizabeth University Hospital and the Royal Hospital for Children, Glasgow

Bundle 27 – Miscellaneous Document – Volume 7

A50002331