SCOTTISH HOSPITALS INQUIRY

Bundle 13 – Miscellaneous

Volume 10

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Parties. All references in this Agreement to any act, default, omission, breach or negligence of Project Co shall be construed accordingly to include any such act, default, omission, breach or negligence of a Project Co Party.

Safety

6.3 Project Co shall, in carrying out the Project Operations, have full regard for the safety of all persons on the Site, the Retained Site and/or Off-Site (whether lawfully or not) and keep the Site and/or Off-Site, the Works and the Facilities in an orderly state, appropriate in accordance with Good Industry Practice, to avoid danger to such persons.

7. BOARD'S DATA

No liability

7.1 Save where expressly provided otherwise pursuant to Clauses 10.3 to 10.5*,(Responsibility for Contamination),* the Board shall not be liable to Project Co for and Project Co shall not seek to recover from the Board (or from any Board Party) any damages, losses, costs, liabilities or expenses which may arise (whether in contract, delict or otherwise) from the adoption, use or application of the Disclosed Data by, or on behalf of, Project Co, the Independent Tester or any Project Co Party.

No warranty

7.2 The Board gives no warranty or undertaking of whatever nature in respect of the Disclosed Data and, specifically (but without limitation), the Board does not warrant that the Disclosed Data represents all of the information in its possession or power (either during the conduct of the tender process for the Project or at the time of execution of this Agreement) relevant or material to or in connection with the Project or the obligations of Project Co under this Agreement or under any of the Project Documents. In addition, the Board shall not be liable to Project Co in respect of any failure to disclose or make available to Project Co (whether before, on or after the execution of this Agreement) any information, documents or data, nor any failure to review or to update the Disclosed Data, nor any failure to inform Project Co (whether before, on or after execution of this Agreement) of any inaccuracy, error, omission, defects or inadequacy in the Disclosed Data.

7.3 Project Co acknowledges and confirms that:

7.3.1 it has conducted its own analysis and review of the Disclosed Data and has, before the execution of this Agreement, satisfied itself as to the accuracy, completeness and fitness for purpose of any such Disclosed Data upon which it places reliance; and

7.3.2 save where expressly provided otherwise pursuant to Clauses 10.3 to 10.5 *(Responsibility for Contamination),* it shall not be entitled to and shall not (and shall procure that no Project Co Party shall) make any claim against the Board or any Board Party whether in contract, delict or otherwise including, without limitation, any claim in damages, for extensions of time or for additional payments under this Agreement on

but, to avoid doubt, excluding:

(a) Indirect Losses; and

(b) any deductions levied by the Board and incurred by Consort pursuant to the payment mechanism within the RIE Project Agreement;

"Disclosed Data" means any Design Data and any other written information, data and documents made available or issued to Project Co or any Project Co Party in connection with the Project by or on behalf of the Board (or any Board Party) whether on, before or after the execution of this Agreement;

"Discriminatory Change in Law" means any Change in Law the effect of which is to discriminate directly against:

(a) hospitals whose design, construction, financing and operation are procured under the private finance initiative in relation to other similar projects; or

(b) companies undertaking projects procured by contracts under the private finance initiative in relation to other companies undertaking similar projects;

(c) the Facilities or the Retained Estate Handback Works in relation to other similar facilities; or

(d) Project Co in relation to other companies,

save:

(i) where such Change in Law is in response to any act or omission on the part of Project Co which is illegal (other than an act or omission rendered illegal by virtue of the Change in Law itself);

(ii) that such action shall not be deemed to be discriminatory solely on the basis that its effect on Project Co is greater than its effect on other companies; and

(iii) that a change in taxes or the introduction of a tax affecting companies generally or a change in VAT shall be deemed not to be discriminatory in any circumstances (to avoid doubt, such changes being given effect in accordance with Clause 35 (*VAT and Construction Industry*

APPENDIX 1

TABLE A

Approved RDD Item (by category)	**Scale**	**Meaning of "Level A - no comment" and "Level B – proceed subject to amendment as noted" endorsement of Reviewable Design Data under Schedule Part 8 (*Review Procedure*) (including both the actual and deemed endorsement).**
Room Data Sheets	n/a	A "Level A - no comment" endorsement or a "Level B - proceed subject to amendment as noted" endorsement of any room data sheet means that Project Co may proceed to construct in accordance with the Submitted Item and that the Board is satisfied that the design and other information in the relevant room data sheet satisfies Operational Functionality.
Drawings – Development Control Plan	1:1250	A "Level A - no comment" endorsement or a "Level B - proceed subject to amendment as noted" endorsement of any 1:1250 scale development control plan means that Project Co may proceed to construct in accordance with the Submitted Item and that the Board is satisfied that the design and other information contained in the relevant drawing satisfies Operational Functionality.
Drawings – Site Plan	1:500	A "Level A - no comment" endorsement or a "Level B - proceed subject to amendment as noted" endorsement of any 1:500 scale site plan means that Project Co may proceed to construct in accordance with the Submitted Item and that the Board is satisfied that the design and other information contained in the relevant drawing satisfies Operational Functionality.
Drawings – Floor Plans	1:200	A "Level A - no comment" endorsement or a "Level B - proceed subject to amendment as noted" endorsement of any 1:200 scale floor plan means that Project Co may proceed to construct in accordance with the Submitted Item and that the Board is satisfied that the design and other information contained in the relevant drawing satisfies the Operational Functionality.
Drawings – Room Layouts (including room elevations) & Reflected ceiling plans	1:50	A "Level A - no comment" endorsement or a "Level B - proceed subject to amendment as noted" endorsement of any 1:50 scale room layout and/or reflected ceiling drawing means that Project Co may proceed to construct in accordance with the Submitted Item and that the Board is satisfied (to the extent of the design and other information contained in the relevant drawing) that the design and other information in the relevant drawing satisfies Operational Functionality.

From: Currie, Brian [redacted]
Sent: 29 May 2018 09:02
To: 'Greer, Graeme'
Subject: RE: RHSC + DCN - Little France - Draft Tech Schedule

Indeed.

IHSL wish to seek closure on all issues as we do but not such that our rights under the PA are diluted or modified.

Suggest how this is protected is one for the authors of the "agreement" and that we should endeavour to capture the agreed alteration to the performance spec/ compliance requirement in technical terms and recording where this is evidenced.

No mean feat as you mention.

I have a meeting at eBQ at 10.30 this morning so might just miss one another.

Catch you later at Quench Pipe Matrix Review at 12.30 or earlier.

Brian

Brian Currie
Project Director - NHS Lothian
RHSC + DCN Site Office
Little France Crescent
Edinburgh
EH16 4TJ

[redacted]

PROUD HISTORIES | NEW CHAPTERS

From: Greer, Graeme [redacted]
Sent: 29 May 2018 08:49
To: Currie, Brian
Subject: FW: RHSC + DCN - Little France - Draft Tech Schedule

Interesting suggestions from Matthew.

The statements a and b might be difficult to agree with MPX.

Suggest need to be very careful with the confirmation statement, it could alter the longer term risk allocation?

From: Matthew Templeton [redacted]
Sent: 28 May 2018 11:40

To: Currie, Brian [redacted]
Cc: 'Darren Pike' [redacted]; Greer, Graeme [redacted]
Subject: RE: RHSC + DCN - Little France - Draft Tech Schedule

Brian (& Darren),

Thanks for the technical schedule (wip).

In reviewing the schedule I wonder if we should consider adding a column to the NHSL 'blue' section which provides a confirmation statement the original technical issue is either:

a. Resolved, and details through drawings/specifications the technical solution which the parties agree achieves the original requirements; or
b. The technical/performance requirements are being amended (or clarified). State the amended technical/performance requirements relative to BCRs; and state the works or amended works which achieve compliance (PCPs).

At present the schedule very briefly details a technical issue, and in response lists a number of drawings. However, there is no confirmation of what is being clarified or amended.

I wonder if a confirmation statement would help to provide clarity. For example, with Issue 9 in the attached schedule, the description of the technical solution may say "In Theatres, provision for equipment to be plugged into RCB protected outlets is to be provided in accordance with the following drawings:……. The Board confirms provision of RCB protected outlets in theatres in accordance with the drawings meets the requirements of the BCRs"

Or in issue 26, it may state " Parties confirm the ventilation in all IPS is as per the Environmental Matrix (Rev X, dated xx-xx-xxxx). Achievement of the environmental parameters removes the potential for any heat gain issues."
Question: is it clear the locations of ventilation in IPS?

Happy to discuss.

Regards

Matt

From: Currie, Brian [redacted]
Sent: 25 May 2018 15:08
To: Matthew Templeton [redacted]
Cc: 'Darren Pike' [redacted] 'Greer, Graeme' [redacted]
Subject: RHSC + DCN - Little France - Draft Tech Schedule
Importance: High

Matt

As just discussed, please find attached our wip half of the technical schedule. The RAG tracker is the current status of information available, as we see it.

A combined MPX/NHSL version will be developed next week and forwarded to you.

Regards

Brian

Brian Currie

Project Director - NHS Lothian
RHSC + DCN Site Office
Little France Crescent
Edinburgh
EH16 4TJ

[redacted]

PROUD HISTORIES | NEW CHAPTERS

Our Values Into Action

Quality | Dignity and Respect | Care and Compassion | Openness, Honesty and Responsibility | Teamwork

For more information visit: http://www.nhslothian.scot.nhs.uk/values

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From: Currie, Brian
Sent: 07 November 2016 10:29
To: 'Kolodziejczyk, Kamil K'
Cc: Henderson, Ronnie; Greer, Graeme
Subject: RE: Environmental Matrix - Status B

Kamil

We need to, as you have done, clearly identify all aspects of the current Environ Matrix that require further work and agreement and that Status B is only given on that basis.

The key line in the caveat is:

the Board still does not believe the Environmental Matrix and resultant design complies with the Project Agreement. Project Co's failure to comply with the BCR's / PCPs (as per MM-GC-002084), the Boar believes would result in a non-compliant Facility.

What we have to weigh up here is that no progress is likely to be made on all others aspects which we are comfortable with unless IHSL (or MPX more accurately) receive a status B.

The approval process is, no doubt, designed to avoid just such unfinished work accumulating and not being closed out but it fundamentally relies on all parties playing the game which IHSL's extended supply chain seem unable to do.

I think this issue merits an additional and separate communication from the Board to IHSL setting this out.

Will action when I have your final wording.

Many thanks

Brian

Brian Currie
Project Director - NHS Lothian
RHSC + DCN Site Office
Little France Crescent
Edinburgh
EH16 4TJ

[redacted]

PROUD HISTORIES | NEW CHAPTERS

From: Kolodziejczyk, Kamil K [redacted]
Sent: 07 November 2016 07:41
To: Currie, Brian
Cc: Henderson, Ronnie; Greer, Graeme
Subject: FW: Environmental Matrix - Status B

Brian,

Further to last weeks PMG, and the discussion on upgrading the Environmental Matrix to status B, please refer to Colin Grindlay's email below re-requesting the Board upgrade the Environmental Matrix to status B.

Following a review of our previous comments that led to a status C, the caveats we have drafted on an upgraded status B may not sufficiently protect the Board. FYI I have pasted the previous comments below that led to the status C, as follows;

The Board notes the following general comments:

1. The Board has highlighted cells in blue and red bubble on the hard copy which require PCo review.

2. The Environmental Matrix should be updated to reflect the Production Group drawings.

3. Currently the matrix doesn't reflect the clinical lights schedule submitted through Clinical Lights Specification and Clinical Lights Technical Submittal.

4. EM shall be updated to reflect all circulation areas as per SoA.

5. Some lux levels don't appear to align with LG2.

6. Some ventilation rates don't appear to comply with BCRs. The Board would like to point that is still awaiting response from PCo to the issues raised as per MM-RFI-000172 & MM-GC-002006 relating to ventilation rates.

Some specific comments as follows:

1. See example G-D1-015 in the table - confirm filtration to physical measurement rooms.

2. Areas off the circulation area / corridor, i.e. 1-D6-060 Resus Bay, indicates transfer air but not known from where. Same principles applies to all Bays and Receptions.

3. See example 1-D7-005 in the table - indicates area of 4m2 however General Arrangement drawing shows 4.8m2. Please review this and all other similar instances.

4. See example 3-D9-009 in the table - indicates no cooling and no ventilation but filtration. Please review this and all other similar instances.

5. See example 3-D9-016 in the table - contradiction, please confirm for this and all other similar instances.

6. See example G-F1-037 in the table – only extract and filtration, please confirm for this and all other similar instances.

7. See example 1-H2-013 in the table – confirm temperature and cooling requirements for this and all other similar instances.

8. See example 1-L1-015 in the table – "via bedroom and en-suite" confirm extract rates for bedroom and en-suite.

9. All Dirty Utility rooms – please confirm dirty utility heating type and control.

10. Changing Cubicles – will be supplied with 18 deg C fresh air with no option to increase temperature. Please confirm.

11. Dictation Rooms - will be supplied with 18 deg C fresh air with no option to increase temperature. Please confirm.

12. 1-P1-067 (see table) – please confirm proposal.

13. 1-P1-090 and 1-P1-005 – should this not be other way round? Please confirm.

Whilst the Board has noted general and specific comments above, the Board reminds Project Co that unless the Board has already accepted a derogation, it is Project Co's obligation to comply with the BCR's / SHTMS etc, and the Board not commenting, does not remove that obligation on Project Co.

As you can see from the comments above, the comments are extensive hence we think the status C still applies, however as requested, we have drafted the following caveat for an upgraded status B;

"The Board have serious concerns over the upgrading Environmental Matrix to Status B considering some of the issues raised (as per MM-GC-002084) being the same as the issues that had been raised since FC. There are also concerns over the potential inaccurate information being transferred to the Room Data Sheets being submitted through RDD.

However, as requested by Project Co, the Board have upgraded the Environmental Matrix to status B, noting the Board still does not believe the Environmental Matrix and resultant design complies with the Project Agreement. Project Co's failure to comply with the BCR's / PCPs (as per MM-GC-002084), the Boar believes would result in a non-compliant Facility.

The Board would suggest that Project resolve the non-compliant issues as a matter of urgency, and requests that Project Co issues a strategy for resolution of these issues".

Regards
Kamil

From: Colin Grindlay [redacted]
Sent: 03 November 2016 13:02
To: Kolodziejczyk, Kamil K [redacted]
Cc: Currie, Brian [redacted]; Ken Hall [redacted]; Darren Pike [redacted]
Subject: Environmental Matrix - Status B

Kamil,

As discussed in PMG, can you advise when we will receive confirmation of Environmental Matrix at Status B.

This would help us greatly.

Regards,

Colin Grindlay
Lead M&E Manager

MULTIPLEX

Multiplex Construction Europe Ltd
RHSC & DCN Project Office
Little France Crescent,
Edinburgh, EH16 4TJ, United Kingdom
[redacted]

Please note my email address has changed to [redacted]

Please consider the environment before printing this e-mail.

All standards, guidance, codes of practice and all other titled requirements that Project Co shall comply with are to be the current version of the requirement or its replacement requirement without the need for a Change. Refer also to paragraph 2.5 below.

2.3 NHS Requirements

In addition to the standards listed in paragraph 2.4 of this Sub-Section C, unless the Board has expressed elsewhere in the Board's Construction Requirements, a specific and different requirement, the Facilities shall comply with but not be limited to the provisions of the NHS Requirements as the same may be amended from time to time:

a) The themes, issues and recommendations in “Better by Design: Pursuit of Excellence in Healthcare Buildings” by the Department of Health;

b) New Policy on Design Quality for NHS Scotland published by SGHSCD;

c) Firecode;

d) HAI SCRIBE;

e) HBN;

f) HFN and SHFN;

g) HGN and SHGN;

h) HTM and SHTM;

i) SHTN;

j) SFPN;

k) HDL;

l) SHPN;

m) NHS publication 'Performance requirements for building elements used in healthcare facilities’;

n) NHS Scotland & NHS Policies;

o) Board Policies as scheduled and available in the Disclosed Data as such schedule and Board Policies may be amended from time to time;

p) Health Department Letters (or Management Executive Letters) as appropriate published by SEHD and SGHSCD;

q) Safety Action Notices published by NHS Scotland;

r) Healthcare Improvement Scotland (HIS);

s) NHS Model Engineering Specifications;

t) Department of Health publication “Better by Design”;

u) Corporate Greencode;

v) NHS Scotland Fire Safety Management, incorporating NHS Scotland Firecode;

w) Hazard Notices issued by NHS Scotland; and

x) HSC 1999/123;

bb) The requirements of the National Radiological Protection Board;

cc) Radiological Protection Act 1970;

dd) Radioactive Substances Act 1993;

ee) The Ionising Radiation Regulations 1999;

ff) The Ionising Radiation (Medical Exposure) Regulations 2000;

gg) All other bodies and authorities having jurisdiction;

Project Co shall as a minimum achieve the standards detailed in the Patient Rights (Scotland) Act 2011; and

For the avoidance of doubt, Project Co shall provide all fixed fire fighting equipment to comply with statutory requirements and the requirements and recommendations of NHS Scotland Firecode.

2.5 Hierarchy of Standards

If there is any inconsistency within the terms of this Section 3 of Schedule Part 6 *(Construction Matters)* and the Appendices then the provisions of Appendix A, Appendix B (Interface Output Specification), Appendix E (Initial Drainage Proposal), Appendix F (Access Strategy), Appendix G (Connection Proposal), Appendix H (Construction Access Proposal), Appendix I (Oversail Strategy), Appendix J (Service Proposal), Appendix K (Substation Proposal), Appendix L (Supplemental Drainage Proposal) and Appendix M (TMS) shall prevail.

Where contradictory standards / advice are apparent within the terms of this Section 3 of Schedule Part 6 *(Construction Matters)* and the Appendices then subject to the foregoing paragraph then (1) the most onerous standard / advice shall take precedence and (2) the most recent standard / advice shall take precedence. When the more onerous requirement is to be used the Board will have the right to decide what constitutes the more onerous requirement.

Where there is a conflict of interest resulting from the use of the standards / advice Project Co shall involve the Board in the decision making process. The Board shall be entitled to make the final decision regarding the standards / advice to be used for the Facilities including any contradictions that may arise between items (1) and (2) above.

NHS Scotland standards shall take precedence over equivalent NHS England and Wales's standards.

In certain instances, NHS publications include a number of options or alternative solutions. Where the Board has defined their preference specifically, Project Co shall adopt these preferences as a mandatory requirement. Where no Board preference is stated, Project Co shall engage the Board in the design development process to seek and incorporate the Board's preference within the Facilities.

While the Board has placed a clear obligation on Project Co in relation to NHS publications, it also wishes to acknowledge that in certain cases the subject matter, guidance and advice included therein may have been further developed and improved since the date of publication. In this regard, the Board does not wish to limit the use of current best practice or innovation in relation to the adoption of design standards.

means of any payment or transfer of assets, directly or indirectly, in cash or in any kind, whether by way of dividend, bonus or release of obligation or in any other way otherwise than:

(i) for full consideration; or

(ii) to the Board pursuant to Clause 36 (*Payment of Surpluses and Compliance with NPD Requirements*) or Article 12 or 13 of the Articles of Association); or

(iii) Project Co's Share of a Project Co Change; or

(iv) Project Co's Share of a Refinancing Gain;

(b) to comply with Clause 4.4 (*Changes to Funding Agreements and Refinancing*);

"Off-Site" means:

(a) the land made available to Project Co for the Works, the Off-Site Works and Services being:

(i) the Yellow Area, the Petrol Station Site, the Orange Area, the Connection Area and the Service Strip and

(ii) the Foul Service Strip; and

(iii) Not Used; and

(b) those parts of the RIE Facilities made available to Project Co for the Off-Site Works and Services; and

(c) the land procured by Project Co for the Substation Works.

"Off-Site Conditions" means the condition of the Off-Site (including but not limited to) hydrological, hydrogeological, ecological, environmental, geotechnical and archaeological conditions;

"Off-Site Works" means the RIE Works, Hospital Square Works, Cycle Path Works, Substation Works, Petrol Station Site Works and/or Surface Water Drainage Works;

"Operational Functionality" means

(a) the following matters as shown on the 1:500 scale development control plan and site plans;

(i) the point of access to and within the Site and the Facilities;

(ii) the relationship between one or more buildings that comprise the Facilities; and

(iii) the adjacencies between different hospital departments within the Facilities,

as indicated on the following drawings in Section 4 *(Project Co's Proposals)* of Schedule Part 6 *(Construction Matters)*

- HLM-Z0-00-PL-700-020 Rev 6;
- HLM-SZ-B1-PL-400-400 Rev 2;
- HLM-SZ-00-PL-400-400 Rev 3;
- HLM-SZ-01-PL-400-400 Rev 2;
- HLM-SZ-02-PL-400-400 Rev 2;
- HLM-SZ-03-PL-400-400 Rev 2;
- HLM-SZ-04-PL-400-400 Rev 2;

(b) the following matters as shown on the 1:200 scale plans:

(i) the points of access to and within the Site and the Facilities;

(ii) the relationship between one or more buildings that comprise the Facilities;

(iii) the adjacencies between different hospital departments within the Facilities; and

(iv) the adjacencies between rooms within the hospital departments within the Facilities,

as indicated on the following drawings in Section 4 *(Project Co's Proposals)* of Schedule Part 6 *(Construction Matters)*

- HLM-SZ-00-PL-220-001 Rev 6;

Q Yes. Thank you. Lord Brodie, I am conscious that that is one o'clock. I will definitely finish Mr Greer's evidence this afternoon, but I think I do have some time to go, so now may be an appropriate time to break for lunch.

THE CHAIR: We will take our break now, in that case. Mr Greer, we usually take an hour for lunch, so if you could be back for two o'clock? Perhaps Mr Greer could be taken out. We will sit again at two.

(Short break)

THE CHAIR: Good afternoon, Mr Greer. I think we are ready to resume. Mr MacGregor.

MR MACGREGOR: Thank you, my Lord. Mr Greer, before lunch we were looking at the approach to the assessment of tenders, and I just want to ask you a couple more questions about that before we move on. What I am really interested in is the approach that would be taken to the assessment of tenders. I appreciate, from what you have said, you were not involved in the minutiae of the actual assessment itself. That would have been for others. If we could look within the Board's Construction Requirements please, so bundle 2, page 839? So, this is within the Board's Construction Requirements which were going to be assessed on a pass or a fail basis. If we could look to subsection 5.2 at the bottom, "Infection Prevention & Control" and look to the second paragraph there, which says:

"Project Co shall ensure all aspects of the Facilities allow for the control and management of any outbreak and or spread of infectious diseases in accordance with the following:"

And then there is various guidance, and if we look over the page onto page 840, at letter F there's mentioned, "Ventilation and Healthcare premises (SHTM 03-01)". It's really just, in terms of the approach, if a bidder is being told that they have to show that they are going to manage an outbreak of infection in accordance with SHTM 03-01, how would the assessment team work out if a bidder was doing that in a satisfactory manner, or is that level of assessment simply not taking place when the bids come in?

A Yeah, I don't think that level of assessment would take place during the procurement phase of the project.

Q And is that essentially for the reasons that you have given

From: Bowman D (David)
Sent: 15 March 2019 16:17:42
To: Public Engagement Unit
Cc: Cabinet Secretary for Health and Sport
Subject: FW: QEUH Inquiry

AO - Charlotte Jack

PEU

Please could you scan this on to MACCS as an OR.

Thanks

David Bowman
Deputy Private Secretary
Ministerial Private Office (Health)
St Andrew's House
Edinburgh

All e-mails and attachments sent by a Ministerial Private Office to any other official on behalf of a Minister relating to a decision, request or comment made by a Minister, or a note of a Ministerial meeting, must be filed appropriately by the recipient. Private Offices do not keep official records of such e-mails or attachments.

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From: Hamilton T (Tracy)
[redacted] On Behalf Of Freeman J (Jeane), MSP
Sent: 15 March 2019 16:06
To: Cabinet Secretary for Health and Sport
[redacted]
Cc: Freeman J (Jeane), MSP
[redacted]
>; Hamilton T (Tracy)
[redacted]
Subject: FW: QEUH Inquiry

Hi Andy, David,

Please see email below for awareness/advice and draft response.

Thanks,
Tracy

Tracy Hamilton | Head of Office to Jeane Freeman MSP
46-48 Glaisnock Street, Cumnock, East Ayrshire, KA18 1BY
Constituency Office: [redacted]
Parliamentary Office:
[redacted] | FB: Jeane Freeman MSP

From: Penelope Redding
[redacted]
Sent: 12 March 2019 09:40
To: Freeman J (Jeane), MSP
[redacted]
>
Subject: QEUH Inquiry

Dear Jeane,

I have made some enquiries about the two chairs and while they do not have the building or infection control expertise I believe is required, they are well respected and trusted following previous inquiries. I hope that you will agree what external independent advice is required to support the process.

I was wondering what the precise status of the inquiry / inquiries is. Is it an independent external inquiry ordered by parliament / health committee or yourself? Or is it an internal inquiry by the board bringing in external independent chairs agreed with the yourself?
I understood that there were internal GGC inquiries and a separate full external independent inquiry requested by the Holyrood committee.
Is the inquiry being run in a formal panel setting?
Or are the investigators gathering evidence from people or witnesses themselves in an informal setting, with the intention of distilling down their findings?

The Herald article suggests that former members of the infection control management team are to project manage matters for the enquiry. If so, in my view, this impedes the inquiry's ability to receive unfiltered evidence and will impact public confidence, with perceptions of a cover up or whitewash because individuals are being asked to "mark their own homework."

I am happy to contribute to the enquiry and look forward to lessons being learnt for the Scottish NHS.

Kind Regards,

Penelope Redding

–

–

From: Bowman D (David)
Sent: 11 June 2019 16:06:10
To: Public Engagement Unit
Cc: Cabinet Secretary for Health and Sport, Birch J (Jason), Goodfellow M (Melanie)
Subject: FW: QE inquiry

PEU

Please could you scan this on to MACCS as an OR.

Thanks

David Bowman
Deputy Private Secretary
Ministerial Private Office (Health)
St Andrew's House
Edinburgh

All e-mails and attachments sent by a Ministerial Private Office to any other official on behalf of a Minister relating to a decision, request or comment made by a Minister, or a note of a Ministerial meeting, must be filed appropriately by the recipient. Private Offices do not keep official records of such e-mails or attachments.

Scottish Ministers, Special advisers and the Permanent Secretary are covered by the terms of the Lobbying (Scotland) Act 2016. See www.lobbying.scot

-----Original Message-----
From: Penelope Redding [redacted]
Sent: 11 June 2019 15:42
To: Cabinet Secretary for Health and Sport [redacted]
Subject: QE inquiry

Dear Ms Freeman

I am surprised and disappointed that I have not received any reply from the inquiry following the submission of my document that was forwarded to them through your office. I would have expected some kind of acknowledgement that the document had been received and taken into account during the inquiry.
Have any of the whistleblowers been interviewed? I have been told that the inquiry report will have been written weeks ago. This seems extraordinary to me, if it is true, as I do not understand how that can happen before all the evidence has been heard. It is of grave concern to me.
It does make sense though if there is going to be a cover up, which I believed is not what you were expecting to happen.
The Government also seems to be listening to advisors who have an involvement in the events at GGC, so certainly cannot be considered as impartial in their views. I have concerns that this could be uncovered later as not accurate.
The press seem to have a lot of senior sources within GGC and are looking for stories. As I have said before I think this is unhelpful and do not want to support this method of resolving the problems.

Could I please have the direct contact details for the inquiry, so that I do not need to bother you. I am sure you are very busy dealing with important issues.

Yours sincerely

Penelope Redding (Dr)
Retired GGC microbiologist

Sent from my iPad

From: Bowman D (David)
Sent: 02 May 2019 12:31:47
To: Public Engagement Unit
Cc: Cabinet Secretary for Health and Sport, Burgess E (Elizabeth)
Subject: FW: Dr Fraser Inquiry

Attachments: Fraser Inquiry submission_.pdf

PEU

Please could you scan this on to MACCs as an OR.

Thanks

David Bowman
Deputy Private Secretary
Ministerial Private Office (Health)
St Andrew's House
Edinburgh

All e-mails and attachments sent by a Ministerial Private Office to any other official on behalf of a Minister relating to a decision, request or comment made by a Minister, or a note of a Ministerial meeting, must be filed appropriately by the recipient. Private Offices do not keep official records of such e-mails or attachments.

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From: Penelope Redding [redacted]
Sent: 02 May 2019 12:25
To: Freeman J (Jeane), MSP [redacted]; Cabinet Secretary for Health and Sport [redacted]
Cc: Burgess E (Elizabeth) [redacted]
Subject: Dr Fraser Inquiry

Dear Jeane

Please find attached a document that I have prepared for the inquiry.
I understand that there will be a call for evidence, probably on Twitter.
Unfortunately, I do not follow Twitter.
I was admitted overnight to coronary care at the beginning of April, most likely associated with the stress in relation to my concerns surrounding the QEUH hospitals.
The clinicians have warned me that there is a risk of a recurrence of my problem while the trigger remains.

The document is not as perfect as I would like it to be but feel I should submit the document now and no longer worry about it. Could you please arrange for someone to forward my document to the inquiry and confirm this has been done. I have also been told that the report will be written before the evidence from whistle blowers and others have been heard. I hope that this is not the case.

I apologize for troubling you with this, but could not find another way of forwarding the document at this stage.

I need to feel that I have done all that I can at this stage and not have it on my mind. I need to minimize the risks of a re-admission to hospital and the need for more invasive treatment.

Will the evidence be made public as it was with the Health and Sports Committee inquiry?

I have copied this email to Elizabeth Burgess as she kindly replied to my earlier email.

My thanks in advance.

Kind Regards,

Penelope Redding

INQUIRY into QEUH, RCH, Neurology services

Submission from Dr P J Redding

[redacted]

April 2019

Executive Summary

The focus of the document is written from an infection control perspective.

Patient safety has to be the driving force in understanding and resolving the issues at the QEUH campus hospitals.

Careful investigation is needed to understand the complexities of the processes followed from the first planning decisions, the building, the procurement, the construction and installation, the commissioning and handover, the maintenance, the operational management and the organisational behaviours. There are a lot of questions that need to be answered and understood as well as the complexities of how they are linked together. These questions can be found throughout this document.

Was there a risk assessment undertaken to understand having a new hospital so close to a water treatment plant? Were the concerns in raised in 2002 for "sewage nuisance" followed up? Was this and the poor rating of Glasgow's sewage works a risk to the quality of the water available to the building?

Were the right people, with the right knowledge, involved in all stages of the project?

Were the published Standards available at the planning stages met; in particular ventilation, water and drainage?

Were the appropriate checks made during the construction and commissioning phases?

What have the issues been since the hospitals opened? This would include:

1. Were there failures in meeting the Standards in place at the planning stages
2. Were there failures in the construction; for example did any of these result in leaks causing outbreaks?
3. Were there appropriate isolation facilities for all categories of patient ?
4. What outbreaks have taken place since the opening of the hospitals?
5. Hospital acquired infections
6. Impact on patient care and safety; bed pressures, waiting lists, outcomes etc.
7. Were there any failures in the monitoring processes?
8. Were there any failures in the cleaning processes?

Are there problems in the organisational behaviours, leadership and culture that have contributed to the challenges that are now faced?

Is the failure of the ICE theatres to open on schedule another example of planning / construction failures?

Have similar problems been encountered in other hospital construction projects across Scotland?

Introduction

I am a retired microbiologist who worked as an infection control doctor within NHS Greater Glasgow and Clyde (GGC) for nearly 25 years. I was aware of a number concerns in relation to infection control during my employment and these were repeatedly raised over time before and after the opening of the new hospitals. Problems in relation to the original infra-structure, such as the neurology building were also identified.

Patient safety and restoring public confidence needs be the primary drive of the inquiry. I hope that lessons can be learnt to ensure positive changes across NHS Scotland. The public need to understand that all hospital acquired infections cannot be prevented. Incidents do happen that have to be managed appropriately. The challenge is to have processes in place to minimize incidents with a pro-active infection control service. This reduces the number of time-consuming reactive incidents. **(Appendix 4).**

This document discusses the review process and have asked questions that, in my professional opinion, need to be answered. This should include the questions within **Appendix 1.**

This document concentrates on ventilation, asking questions that need to be answered. It also touches on some of the questions related to water and drainage etc.. I felt the document would become too long if I referenced all the other STHM documents. They are easily available to the committee. Obviously the Standards that should only relate to those available at the planning stages of the project.

I have quoted from and included the three anonymous submissions sent to the Health and Sports Committee **(Appendix 2-3-4).** They are clearly written by professionals who understand the infection control challenges that are being faced and their evidence should be considered. **Appendices 2 and 3** are up to date with the current position.

This paper considers the following:

1. Review process(es)
2. The Building from the inception to operational management
3. Organisational Culture and Leadership

Some of the concerns raised in the SBAR (Situation,Background,Assessment,Recommendation), written for the whistleblowing in September 2017, are touched on in this document. GGC should be able to provide the inquiry with this document and the minutes from the meeting in October 2017. (I do not have a copy of this as I am no longer employed by GGC).

I do **not** believe any person or organisation, who has been involved in the decision-making process for the building specifications, commissioning, addressing the problems since the opening of the hospitals etc, can be part of the inquiry committee. They, obviously, have to give evidence, I am sure that those responsible for the inquiry will not want to be open to the criticism that the inquiry was a whitewash **(Appendix 4).**

Statements given must be supported by evidence to ensure confidence in the accuracy of the facts being presented. The whistle blowers, in particular, need to have the opportunity to give the evidence to the inquiry. Staff and the public must be given the opportunity to present their evidence in the inquiry setting to ensure a full understanding of problems can be achieved. They must not feel that there will be consequences if they give evidence. There will obviously be differences of opinion and interpretations of the Standards. This is where all the facts and supporting evidence, if necessary with the help of external experts, will enable people to be confident in any recommendations that are made. Lessons can then be learnt for NHS Scotland and rolled out to improve patient care and safety. I believe that the challenges may not be unique to NHS GGC.

What a good outcome might look like from an Infection Control Professional's perspective.

The Queen Elizabeth University Hospital (QEUH) Glasgow opened in 2015. Several issues have arisen at the hospital since it opened including water hygiene, external cladding, the ventilation system and glazing failures which have raised concerns regarding patient safety.

From an Infection Control Professional's perspective what is required is :- a comprehensive review with recommendations implemented to improve patient safety and public confidence in patient safety through enhanced participation, engagement, ownership and accountability in areas of :

- **Building – design, commissioning and maintenance**
- **Processes and Systems -compliance, suitability, improvement**
- **Behaviours leadership and culture – listening and learning –constructive improvement versus blame and defensiveness.**

1. **Review Process**

Currently it appears that a series of inquiries with different scopes and activities are being instigated or in progress. These are useful in setting out the foundations for improvement and their short-term nature allows speed to implement immediate improvements and remediation measures. However, these are piecemeal and fragmented and reactive especially as new cases continue to emerge.

The Health and Safety Executive

The Health and Safety Executive is currently investigating the circumstances surrounding the outbreak of Cryptococcus infection at Queen Elizabeth University Hospital. This commenced in January 2019 to examine the range of control measures in place to reduce and mitigate the risks of such infections and will include the adequacy of ventilation systems but further on the detail of this ongoing investigation is unknown. Will the HSE investigate other more recent deaths from other infections? To what extent will HSE investigations be conjoined?

Health and Sport Parliamentary Committee

The Cabinet Secretary informed the Parliament on 22 January of the Cryptococcus Infection at the hospital and the mucoraceous mould infection. The Committee agreed on 29 January to undertake a short inquiry to identify the scale of any health problems acquired from the healthcare environment in Scotland whilst also considering the wider implications for health facilities across Scotland. An Oral evidence session on 19 March included:

- Health Facilities Scotland
- Health Protection Scotland
- Healthcare Environment Inspectorate
- Health and Safety Executive

A series of anonymous submissions were made to the Scottish Parliament, as part of an inquiry into hazards in healthcare settings. It is expected the committee, after they have considered the content of submissions, will invite the Health Board to give evidence. The committee has requested further information from the organisations giving evidence.

Healthcare Improvement Scotland

On 5 February The Cabinet Secretary indicated Healthcare Environment Inspectorate would undertake an inspection of the hospital site to provide independent assurance of the safety of the patient care environment. The HIS report, released on 8 March, will feed into the independent review into the design, commissioning, construction, handover and maintenance of Glasgow's Queen Elizabeth Hospitals

Health Facilities Scotland (HFS) position is still unclear

Health Protection Scotland (HPS)position is still unclear

Both organisations, while giving evidence to the Health and Sports committee, explained that their role was purely advisory. The advisory role played in the planning stages and the investigation of problems encountered after the opening of the hospitals needs to be understood. Concerns have been raised about the HPS report on the water contamination in the Royal Children's Hospital not being comprehensive **(Appendix 4).**

The Government states "robust measures" were in place to monitor "infections and other harm" and that Healthcare Improvement Scotland, Health Protection Scotland and Health Facilities Scotland "provide a robust mechanism to monitor and learn from outbreaks and incidents". **The adequacy and effectiveness of such measures and systems however requires to be independently tested.** Two submissions to the Health and Sports Committee, written by infection specialists, raised their concerns about the adequacy of the reporting systems **(Appendix 2 and 3).**

"Independent Expert Review"

The Cabinet Secretary set up an "independent expert review" to be jointly chaired by Dr Brian Montgomery, former medical director and interim chief executive of NHS Fife, and Dr Andrew Fraser, the director of public health science at NHS Health Scotland to look at the hospital's design, commissioning, construction, handover and maintenance, including how these matters support effective infection prevention and any other areas the chairs consider necessary.

The review's recommendations will be made public and the Scottish Government will inform the Parliament of its response to the review recommendations. The Cabinet Secretary also stated that "it is essential that all relevant information is available to the reviewers to ensure a robust, evidence-based assessment can be provided. It is expected that individuals involved in the design, construction, commissioning and maintenance of the hospital, along those providing healthcare (staff) and relevant expertise will input into the review."

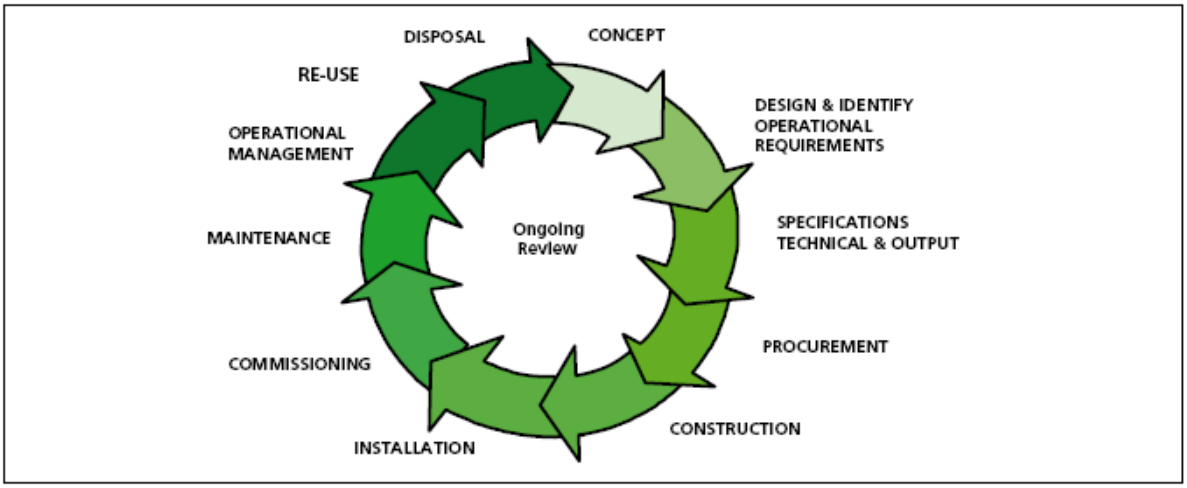
HIS inspectors, cited that "challenges in the working relationships between senior staff" must be resolved. It is reported that someone linked closely to infection control will be managing the health board's investigation into infection problems. This casts a shadow on the review being independent or balanced.

Further, while internal investigations are fully to be expected, it is good practice that this should be overseen by suitably experienced senior health professionals, not directly involved in the establishment. ***Otherwise it does NOT does constitute an "independent or expert inquiry"***. While both co -chairs are highly experienced and reputable individuals they are part of and employed by the healthcare system and ultimately answerable to the Cabinet Secretary. They can therefore never be truly independent or objective.

Conclusion: ***With continuing issues, deaths and complications involving infections linked to building issues occurring over a sustained period, even as recently as Thursday 14 March, in order to restore public confidence, I believe there must now be a full and comprehensive independent public inquiry chaired by a truly independent person such as a senior barrister/ judge or captain of industry.***

2. The Building Programme

A root and branch review is required into all aspects of the building from inception of new hospitals to its day to day operations ***to ensure the building is fit for purpose with flexibility to respond to changes and adaptability for future use.***



SHTM Healthcare building lifecycle

2.1 Site selection

General – usually an assessment of identified criteria with relevant weighting and an Environmental Impact Assessment is undertaken when choosing a site and especially if locating new large-scale hospitals in close proximity to a 'Bad Neighbour' such as industrial processes, sewage treatment works etc. The criteria would be ***assessed for potential impact on proposed use, patient safety and staff welfare.***

The impact of the proximity to the sewage works were identified in a report in 2002 (http://asrarchive.nhsggc.org.uk/Phase1/Report/11-south.htm for Glasgow NHS Board Revised 04/01/0202). –"-Sewage works nuisance being addressed by West of Scotland Water."

There are reports of 29 sewage plants across Scotland being rated as poor because of sewers overflowing, leaking and breaching environmental limits. Glasgow is included in this list. (www.robedwards.com/2014/11).

QEUH – what risk assessment and analysis was undertaken to understand the risks associated with the scale and proximity of Shieldhall WWTW when operating in optimal, normal or exceptional/ distressed conditions?

To what extent was it understood that natural ventilation might not be feasible thus increasing reliance on mechanical ventilation and the associated risks and cost when the site was selected?

2.2 Design specification

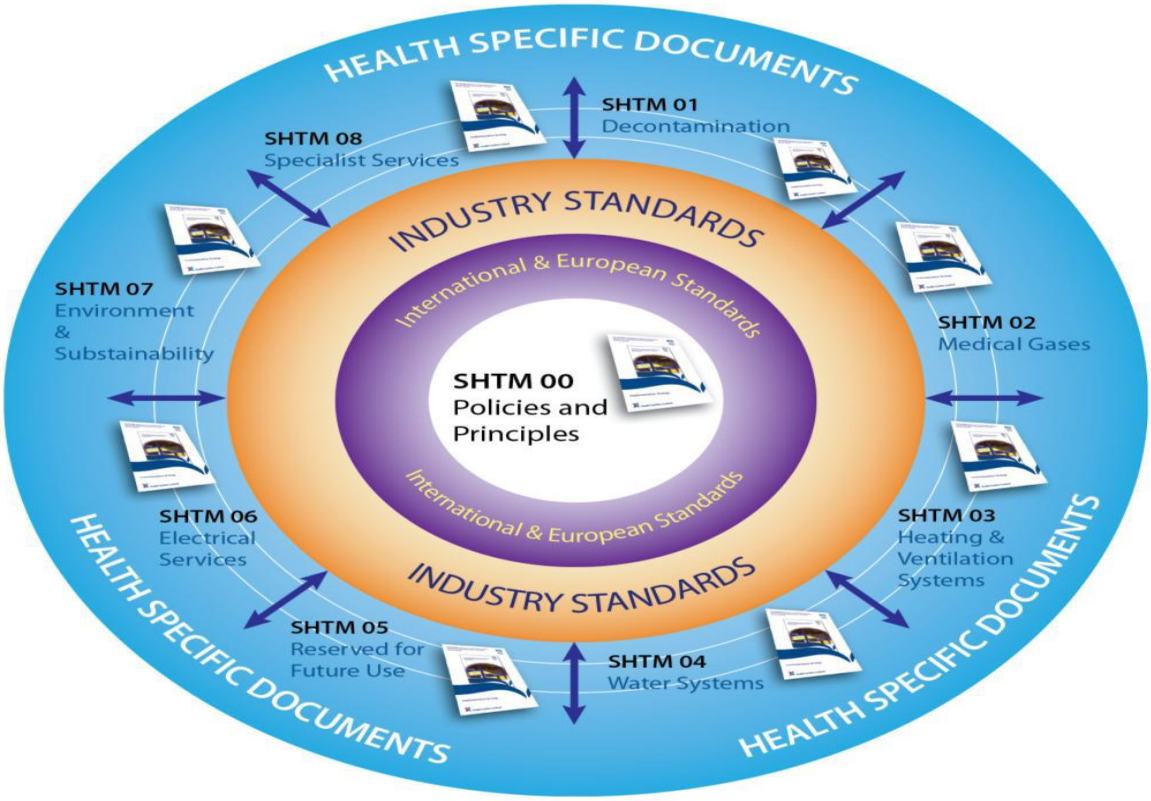
We live in an age of change. ***New buildings should be capable of adaptation to suit new technologies and changes in how the building might be used. There should be:***

- Ability to meet current known needs
- Flexibility to respond to emergency or temporary patterns in use.
- Future proofing to meet emerging and changing demands and needs from time to time.

What Design standards would the specification be expected to reflect? -

General: as a minimum Compliance with Building Standards Non-Domestic 2015 and SHTM guidelines (currently Version 2 2014)

The following process are extracted from SHTM guidelines:



SHTM 04 Water Systems 04 and SHTM 03 are particularly relevant.

Scottish Health Technical Memorandum 03-01 - Ventilation for healthcare premises
Part A – Design and validation
It is essential when undertaking the design of a specialised ventilation system that the project be considered as a whole. The process model set out below should ensure that all relevant factors are considered

Step	***Question***	***Design statement and information required***
1	*Why is the system required?*	*Healthcare applications* *Statutory elements* *Non-healthcare applications*
2	*What is the required system performance?*	*Room air flow pattern* *Air change rate* *Differential pressures* *Air quality* *Room air condition* *Noise limits*
3	*What are the constraints on the distribution system?*	*Location, Size, Materials* *Dampers, Access, Insulation* *Fire considerations* *Room terminals*
4	*What are the minimum requirements for the AHU(s)?*	*Intake / Discharge positions* *Legionella, Health and Safety* *Access, Fire, Electrical safety* *Leaks, Insulation, Cleanliness* *Filtration, Drainage*

5	*What control functions are required?*	*User control requirements* *Estates control functions* *Energy management* *Environmental conditions* *Control sequence logic* *Run, Set back, Off philosophy*
6	*How will the system performance be validated?*	*Validation methodology* *Instruments used* *Design information required* *[Design air flow rates* *Design air velocities* *Pressure differentials* *Noise levels* *Air quality* *Installation standard]*
7	*The system will only be acceptable to the client if at the time of validation it is considered fit for purpose and will only require routine maintenance in order to remain so for its projected life.*	
8	*Handover to client*	*Basic design information* *Commissioning results* *Validation report*

SHTM further states:

1.36 Ventilation will need to be provided:

- *as a requirement for patient care;*
- *in order to fulfil a statutory duty.*

1.37 In assessing the need for more specialised ventilation and the standards desired for patient care, ***managers will need to be guided by their medical colleagues and by information published by Health Facilities Scotland.***

1.38 The statutory need for ventilation falls into two categories:

- *in the first, the need for specialised ventilation and the standards to be adopted are clearly set out in specific pieces of legislation. An excellent example of this is the current legislation surrounding the manufacture of medicinal products in the European Community.* ***The managers of the departments affected by this type of legislative requirement should be aware of their needs and be able to advise on the standards to be achieved;***

- *the second type of statutory requirement arises due to the interpretation of both the Health and Safety at Work etc Act and the Control of Substances Hazardous to Health (COSHH) regulations. The person tasked with conducting COSHH assessments will be able to advise as to the need for, and standard of, ventilation in each particular case.*

QEUH : What was the extent of the consultation and engagement with relevant infection control professionals, clinicians, other health care professionals where appropriate, estates and contractors throughout the course of the design development? Was this sufficient?

Did the ventilation design meet the SHTM standard for standard patient's rooms, positive pressure ventilated lobbied rooms, negative pressure rooms?

Were HEPA filters fitted in all areas where they were required?

What additional design standards were included in the design specification from an infection control perspective?

Would an increased and more effective role for infection control professionals in the design and building of NHS facilities be an area where real improvements can potentially be made?
Should the project programme include additional time or resources to ensure adequacy of consultation of the relevant experts, including external experts where required?
Concerns about inadequate planning and design of the infrastructure of a hospital, which includes basic functions such as plumbing, ventilation and cleaning are fundamental for the safe and efficient working of all healthcare environments have been raised **(Appendix 2).** The risks of any derogation from the well established standards, such as STHM / SHBN, potentially increases the risk of infection acquisition **(Appendix 3).**

2.3 Procurement - Selection of contractor and specialist sub-contractors

General: Procurement assessments are well understood and the need for criteria and weightings to reflect the risks and desired outcomes in a project.

QEUH: To what extent was infection control expertise applied in the selection and assessment of contractors?
What weighting and thresholds were applied to the scoring of contractors and the ventilation aspects of the project?

Was there sufficient weighting attached to the importance of ventilation systems in the procurement phase?

2.4 Construction and installation phase

The lack of involvement by infection control in new medical projects was raised by BMA Scotland in submissions to the Scottish Government earlier this year, where they said:" It is an uncommon event for an infection control team to oversee a major build – although they are often consulted as the project progresses. However, there may not always be enough time and experience to optimally deliver this input despite expert knowledge clearly being needed. "Added to this, the NHS experts and the builder's experts often don't agree on points of design and how this may relate to infection risk."

General: It is not unusual for the client to instruct changes to the design in the course of construction to reflect changing requirements.

Contracts determine the transfer or retention of risk by the Client and contractor through means of input and /or output specifications and, until relatively recently, often determined the level of client supervision activity during the construction phase. The realisation that residual risk always remains with the client has meant the public sector has increased its level of oversight throughout construction to ensure that potential issues in course of construction can be identified and managed by clients more proactively. This requires the client to retain internal and external expert resources for this purpose.

QEUH: To what extent were infection control professionals and external experts, when required, actively consulted before changes were instructed which could impact of the adequacy of the ventilation system design?

How active was the Client in overseeing the requirements during the construction and installation phase? To what did extent did the client play an active role in the oversight of construction, for example checking the right size of ventilation pipes were installed to ensure the number of air changes and quality of the air met the Standards for all categories of patient?
Were the SHTM standards met for ventilation for standard patient rooms, positive and negative pressure room facilities where required?

Is the fact that the ICE theatres have not opened, after significant investment, another example of planning and construction failures?

2.5 Commissioning and handover

NHS Greater Glasgow and Clyde did not respond to specific enquiries regarding safety alarm failures or ducting being the wrong size.
SHTM states: 1.15 Records should be kept of equipment design and commissioning information. The Health and Safety Executive, Medicines Inspectorate and other interested bodies have a statutory right to inspect them at any time. All records should be kept for at least five years.

General: Commissioning and testing would normally take place over a period of time to ensure continual and consistent performance under different seasonal and other conditions.
SHTM states: *The system will only be acceptable to the client if at the time of validation it is considered fit for purpose and will only require routine maintenance in order to remain so for its projected life.*
A maintenance manual and training of maintenance staff would be made available during the commissioning phase.

QEUH: Was the testing and commissioning undertaken such that the system met the required performance standards?
What assurance was provided by the client before accepting the system?
When was it discovered that the sizing of the air ducts was incorrect? Would this be expected to have shown up at the time of commissioning?

A report into water contamination issues at the hospital site revealed there was "no documented evidence of NHSGGC Infection Prevention and Control Team involvement in the commissioning or handover process of the project" although infection control and prevention nurses had been seconded to work on the project team.

Were the risks associated with water, taps, shower heads, piping, bathrooms, sinks and drains understood? Were the Standards met? Any breakdown in design and commissioning will increase risks of waterborne infections (Appendix 2 and 3).

Were the correct taps fitted?

What processes were in place for the testing of water quality and were these adequate?

Were there testing failures during construction process of Edinburgh Children's hospital that resulted in construction being stopped? If so were they similar problems to those being identified at QEUH hospitals?

2.6 Maintenance

Systems and Processes must include inspection, sampling and maintenance regimes, audits, risk management, continuous review and compliance evidence, data and documentation.

General: The SHTM states:

Para 1.10 *Where specialised ventilation plant is provided as part of the protection measures there is a statutory requirement that it be correctly designed, installed, commissioned, operated and maintained. The local exhaust ventilation (LEV) section of the COSHH regulations requires that the plant be inspected and tested at least every 14 months by an independent organisation and that management maintain comprehensive records of its performance, repair and maintenance.*

Air Intake

*1.42 An uncontaminated air supply to the system is essential. In order to achieve this, the air intake will be positioned so that air discharged from extract systems or other dubious sources cannot be drawn in. Exhaust fumes from vehicles can present particular problems. The area surrounding the intake will need to be kept clean and free of vegetation and waste material in order to reduce the possibility of biohazards or fire**. The intake itself will be protected by a louvre and mesh screen to prevent rainwater, vermin and insects etc from entering the system***

A fully developed PPM and reactive maintenance system covering a suite of activities would be expected in all significant premises. As a minimum this would include prescribed activities to meet compliance with specific statutory requirements (eg LEV and Legionella etc) and general maintenance and inspection regimes relating to building fabric Health and Safety. It would be commonplace for ISO 9001 or other QMS standard to be met as a minimum. Specific statutory compliance regimes (eg Fire Risk, LEV, legionella and H&S) require to have a named duty holder and named responsible person(s) aimed at underpinning a culture of ownership and accountability throughout all organisations.

Building maintenance systems are becoming increasingly better developed throughout the UK in all sectors partly due to available technology to support such systems and processes and their ability to provide accurate data and reporting. More compelling however are the increased penalties and personal accountability of executives and officers in the courts for non-compliance with H&S requirements which serve to promote an enhanced conscious H&S culture nationally. Statutory regimes, with named duty holders and responsible persons, are designed that there is personal liability if resources are obstructed when risks are highlighted or where performance of maintenance processes and systems are inadequate. The plurality of persons who may be simultaneously prosecuted encourages team working between different layer of management, Board and maintenance teams.

What investigations have been undertaken by infection control since the hospitals opened, including any of the original infrastructure, such as the neurology building?
This should include both outbreaks and maintenance events. **(Appendix 2 and 3).**
Examples of any events associated with the following organisms should be investigated:

- *Serratia species*
- *Pseudomonas*
- *Non Tuberculous Mycobacteria*
- *Aspergillus species*
- *ESBLs*
- *Acinetobacter*
- *VRE*
- *Environmental gram positive and gram negative bacteraemias linked to water contamination*
- *Exophila dermatidis (a fungus)*
- *Cryptococcus*
- *Mucoraceous mould*

Examples of incidents include

- Contaminated water system resulting in bacteraemias
- Drain and backflow into sinks resulting in bacteraemias
- Fungal infections linked to contaminated showers and showers
- Water /dialysis point leaks on in intensive care linked to fungal /mould infections
- Construction work associated fungal infections
- *Legionella pneumophilla* contamination of water supply
- Sewage leaks in new and old hospital buildings

(as described in Appendices 2 and 3)

What remedial work has had to be undertaken in the new hospitals including poor installation and failure to meet Standards? In particular this should include ventilation, water and drainage.

Is there remedial work still to be undertaken?

Was has the cost been so far and what is the projected cost?

QEUH: What Building Management Systems (BMS) were put in place? Is there an overarching QMS? How are these systems and processes monitored and how frequently are they spot-checked or audited?
Is staff training adequate and are sufficient resources available?
Do statutory compliance regimes (eg Fire Risk, LEV, legionella and H&S) have named duty holders? Is the level of accountability understood?
To what extent do the Board actively seek out maintenance data, review and seek to update associated risks?

2.7 Operational Management
Para 1.17 of the SHTM states :.

Increased health risks to patients will occur if the more specialised ventilation systems installed to supply high quality air to operating departments do not achieve and maintain the required standards. The link between post-operative infection and theatre air quality has been well established. Plants serving conventional operating departments, for instance, will be required to ensure the separation of areas within the suite by maintaining a specific direction of air flow between rooms, even when doors are opened. They will also maintain the selected operating department environmental conditions regardless of changes in the outside air conditions or activities within the space. In addition ultra-clean operating ventilation systems that are designed to provide an effectively particle-free zone around the patient while the operation is in progress, have been shown to reduce significantly post-operative infection in patients undergoing deep wound surgery. Their use for other forms of surgery may well be required.

General: risk assessments should be undertaken to determine where to locate particular categories of patients in particular areas of the building and recognising that there will be changing demands and requirements from time to time.
The escalation and reporting processes need to be understood. This will ensure that appropriate remedial and control measures are put in place without delay.
There also needs to be clear monitoring and checking systems in place. Estates, domestic services and infection control need to work closely together. There needs to be clear embedded and auditable governance for all these areas within the organisation.

QEUH: For example to what extent was a risk assessment of the air quality undertaken prior to relocating the Children from the Royal Hospital for Children into QEUH?
Why are there ongoing problems with sewage leaks in the Neurology building?

3. Organisational behaviours, leadership and culture.

NHS Education for Scotland (NES) *Developing leadership and management capabilities and capacity across NHS Scotland is a key priority in the 2020 Workforce Vision. It is an integral part of improving quality to enhance patient safety and people's experience of services, as reflected in the NES Strategic Framework for 2014-19*

Does the organisation have accountability at the right level? Or, does it operate a blame culture in which there is a climate of fear?

To what extent are ownership, support, coaching and learning role modelled by all senior staff? Are there consequences for senior staff not adopting defined behaviours?

How is the duty of candour received by Senior Management?

Healthcare Improvement Scotland inspectors picked up on the problems in their report last week, citing "challenges in the working relationships between senior staff" which they say must be resolved.

How is progress reported and what level of oversight is there by the main Board?

Difficulties are encountered within the organisation where staff feel intimidated and afraid to raise their concerns. In part this resulted in three microbiologists feeling they had no alternative but to start the whistleblowing process. There were concerns about “events” not being addressed and communication pathways within infection control. This resulted in all members of the infection control team not being kept up to date with the issues within the organisation. Stage 2 of the whistleblowing process was reached because of ongoing concerns. This required a lot of courage on the individuals part.
The reasons why microbiologists resigning from their infection control duties on three occasions, with the loss of vital expertise, needs to be understood. **(Appendix 4).**

Conclusion

This is a very complex investigation. Some questions may never be fully answered. It is possible that there are failures at different levels within the organisation and over a long period of time. This inquiry should be looking forward, learning lessons and not apportioning blame. There may be similar challenges across NHS Scotland.

Appendix 1

Suggestions on what should be included in the Inquiry?

Any inquiry should not focus on the problems and publicity that has been precipitated by the Cryptococcal infections and the Mucor infections. The inquiry needs to be wide ranging and identify all the problems relating to the South Glasgow Hospital campus. This includes the old infrastructure as well as the new hospitals. We need to understand why there are so many issues that need to be addressed.

The SBAR produced for the whistleblowing process in September 2017 includes a lot of the concerns that have been raised for some time.

A. Understand the Planning process from the beginning

1.What were the roles within GGC of?

- Facilities
- Contractors; including architects and builders.
- Clinicians
- Nursing staff
- Others as appropriate
- Infection control
- Outside Experts; e.g. ventilation

2.Were the national standards, including infection control, met?

3. Where is the evidence of commissioning checks?

Were all the required checks undertaken?
Where is the evidence that this was done?
Were standards met?
Who signed them off?
What was the involvement of infection control?

B. Understanding the issues and challenges

1. Identify ALL the problems / issues that have had to be addressed since the opening of the building; ventilation, contaminated water, leaks, mould / fungal problems, fire doors, falling panels, sewage leak at main entrance etc..

2. What has the cost been in resolving the issues so far?

3. What is the projected cost in resolving the issues?

4. Can the issues be resolved?

5. Is there an Action Plan to address the issues?

6. What is the time frame for addressing the issues?

7. What has the role of Facilities and Infection Control been in managing the problems that have arisen since the hospital opened?

8. When were the concerns in relation to ventilation and water issues first raised?

9. What was the timeline between concerns first being raised and an action plan being drawn up?

This should include listening or not to the professional concerns about patient safety

C. Outbreaks and number Resistant Organisms

1. Identify all outbreaks; including those related to Cryptococcus and Mucor.

2. Identify all resistant organisms within QEUH and RCH

3. The outbreak linked to the contaminated water in 2A and 2B must also be fully reported on. This should include how many patients were infected/ colonised.

Are the numbers above higher than those seen prior to the hospital opening?

4. What infection control investigations took place and what measures were put in place?

5. Look at HEAT Targets

D. ICE Theatres

There has been a huge investment in the ICE theatres. They were due to be opened in 2018, but have failed the commissioning process. Why has this happened and is this another failure of design or implementation or both?

SUMMARY

The inquiry must ensure that there is evidence to support all the information given.

Any inquiry needs to be independent with no cover up, understanding the involvement of all organisations involved in the planning, maintenance and outbreaks/ incidents.

What long term impact have these problems had on the patients who have had delayed chemotherapy?

Has there been an impact on waiting times, including pressures on beds resulting from the ward closures?

Staff, patients and relatives must be given the opportunity to voice their concerns. People need to re-assured that there will be no consequences of speaking out. The fear of speaking out must not be a factor in understanding the facts and getting to the truth. There is a culture and belief that speaking out will have consequences.

There may be action plans in place to address the issues. The inquiry needs to be sure that all the issues are being prioritised and actioned, as well as understanding the timeline for resolving them.

PJ Redding . March 2019

Appendix 2

REF NO. HS/S5/19/HHHE/A2
HEALTH AND SPORT COMMITTEE
HEALTH HAZARDS IN THE HEALTHCARE ENVIRONMENT
SUBMISSION FROM xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

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.

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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.

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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.

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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]

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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 marcescens* (environmental Gramnegative 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 bacteraemia's. 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.
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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 carbapenemaseproducing
enterobacteriaceae (CPE) and other resistant Gram negatives such as *Acinetobacter* spp..These organisms, along with *Clostridium difficile* and vancomycinresistant
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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APPENDIX 3

REF NO. HS/S5/19/HHHE/A3
HEALTH AND SPORT COMMITTEE
HEALTH HAZARDS IN THE HEALTHCARE ENVIRONMENT
SUBMISSION FROM XXXXXXXXXXXXX

What is the scale of health problems acquired from the healthcare environment in Scotland?

I am not aware of any current system of data collection which would answer this crucial question, therefore I think the answer is "unknown" . However, based on experience and anecdotal evidence from peers it is my view that there is a significant, as yet unquantified, contribution of the environment to HAI rates in Scottish hospitals. Examples of outbreaks where the healthcare environment in Scotland has been *implicated* (not always *proven)* as a source or route of transmission include:

- Serratia
- Pseudomonas
- Non Tuberculous Mycobacterium species
- Aspergillus species
- Acinetobacter
- ESBLS
- Environmental gram positive and gram negative bacteraemia linked to water contamination
- Surgical site infections

In order to get a rapid idea of the burden of environmental outbreaks it may be possible to glean information from data already gathered - eg assess the reports to HPS of healthcare associated infection incidents which are graded green, amber, red to identify the cases that are deemed to have had an environmental element in the route of transmission. Numbers of cases and clinical impact could be quantified and reported. This would unfortunately miss cases that are not identified as part of an outbreak or "incident", and the detection of an outbreak relies on a high level of awareness of the importance of the environment as a reservoir by IPCTs and Estates teams; eg serratia and enterobacter may be mistaken as normal flora when they are also environmental organisms.

Unfortunately the nature of environmental source outbreaks is that they can rapidly cause infection to large numbers of patients (eg legionella) and therefore "steady state" statistics are not in themselves reassuring.

Evidence of compliance of the current NHS estate with standards that are already embedded in SHTMs and SHBN documents would be required for assurance that the

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healthcare environment is being built and maintained for reduction of infection risk. To my knowledge this is not readily available or systematically collected or reviewed nationally. There is a perceived difficulty in applying the building standards as there are different iterations with updates every few years. In my experience there are misconceptions that standards have radically changed and old estate is not expected to meet new standards. In terms of theatres for example the core parameters of pressure differentials, air exchange rates and clean to dirty air flow have remained static in guidance for many years, while it is true that the size and volumes of air have changed to accommodate ever more complex

procedures and increased sizes of surgical teams. Therefore the idea that old theatres do not require to meet current standards needs careful appraisal. In these circumstances it is absolutely critical that there is a clear understanding of public expectations with regard to risk mitigation in both old estate and upgrades, as well as new builds.

• **What/where are the main risks?**

Risk by Patient factors

It is important to note that patients have different levels of risk of infections based on immune status, procedures carried out, and medication, eg steroids and antibiotic use. Therefore different patients exposed to an identical environment will have different outcomes. Furthermore, minor changes to a stable environment can have large consequences depending on the setting. For example, pseudomonas colonisation of a tap in a standard ward may not cause immediate problems; however, pseudomonas at even low levels in a NICU tap could have rapid and serious consequences. Therefore strategies for prevention require a nuanced approach to risk and intervention - a purely guidelines based approach will not be sufficient for every setting. Efforts to mitigate risk should therefore be proportionate and directed to the patient specific risk status.

Main at risk patient groups requiring extra attention to risk management of the environment:

• Neutropenic and other immune suppressed states, can be stratified into very high, high and low risk groups
• Neonates
• Burns patients
• CF patients
• ITU
• Solid organ transplants
• All patients at time of surgery, especially “clean” procedures such as joint replacement

In addition patients can themselves present a risk of infection to others eg infectious TB, and the role in the environment in this setting is to prevent onward spread.

In order to understand the level of protection offered to these patient groups in NHS Scotland, evidence is required regarding patient placement policies and standards of environment for all these groups as well as audit data on infection rates in these particular patient groups.

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Risks of Environmental Routes of transmission

Airborne infections

Ventilation Systems

There are very well established parameters for ventilation in the health care environment that have been in place for decades. These cover all areas of the hospital and the most relevant areas are those where contaminated air causes significant risk of infection, which is mitigated by the provision of specialist ventilation:

• Theatres, including minor procedures and ultra clean technology
• Source isolation for infectious patients (requiring negative pressure rooms, and increased Air exchange rates)
• Protective isolation for immune compromised patients (requiring positive pressure rooms, HEPA filtration and increase Air exchange rates)
• NICU, ITU,
• Endoscopy suites

• Burns units
• Treatment rooms
• Clean rooms
• Decontamination suites
• Aseptic pharmacy
• Laboratories

Any derogation from SHTM/SHBN standards has the potential to increase the risk of infection acquisition and should be documented with rationale for the derogation.

In addition there are regional type services that have no UK Building standards, but which need specialist planning and design, using international guidance and evidence based data and first principles: infectious diseases units, bone marrow transplant units, and CF units. This requires a multi-disciplinary team of experts, and Infection Control should be central to this is already outlined.

Any breakdown in the design, commissioning or validation process poses a risk that the environment does not meet standards and therefore increases the risk of airborne infections.

Building works

Building work on a hospital premise is known to pose a risk of airborne fungal infections. The HAISCRIBE process which has been in place since 2007, is a critical tool for minimising risk of infections due to building work in the health care environment. There is anecdotal evidence that this process has been inconsistently applied and therefore this remains a priority area for monitoring and should be recognised as a patient safety issue.

Waterborne infections

Standards exist for water system commissioning, maintenance and microbiological testing, especially focussed on Legionella and pseudomonas. However, many organisms can

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contaminate and colonise water systems and the component parts eg taps and shower heads and piping especially if there is any stagnation, certain pipe materials are used, or if there is a contamination event due to a breach in the system.There is a body of scientific literature that can be referred to that documents the role of water system associated HAIs Any breakdown in the design, commissioning and maintenance of these complex systems will increase risks of waterborne infections.

Physical accommodation

A key to reducing infection in hospital is to have a clean and clean-able environment. The drive to “design out” infection has been ongoing for many years. Therefore choices of furnishings, fittings and materials are all crucial for minimising infection risk and a wealth of advice is readily available. Any lack of maintenance or cleaning will also increase risk. When the monitoring and management of cleanliness and the state of the environment is entirely segregated from infection control input, there is potential for risks to arise and remain unidentified.

• Are the current systems and processes in Scotland adequate for monitoring, reporting, eliminating or controlling these hazards?

My view is that the systems are NOT currently adequate, however there are resource implications for any planned measures for improvements.

Monitoring

As described there is no current system which will adequately determine epidemiology of environmental infections as a cohesive entity.

There is inconsistency in the implementation of Scottish Health Building standards and no systematic monitoring.
Possible ways to address this gap are
1. Monitoring rates of HAIs acquired from the environment.
A specific surveillance system is unlikely to be practical given that this would require every HAI to be assessed for a contributory role of the environment in transmission with clear definitions and a whole system of surveillance targeted specifically to these infections. Current surveillance targets only *C difficile*, MRSA , SABS, and *E coli* bacteraemias, and is already resource intensive. Furthermore there are complexities in setting up specific surveillance for environmentally acquired infections :
• Novel outbreaks occur and previously set up alerts will not detect them (note the recent additions to the “alert organisms” lists over past few years), initial detection often relies on alert Microbiology and infection control practitioners, as well as clinical staff, and this is not always acknowledged
• Point prevalence studies do not capture infection burden of outbreaks which are by nature episodic.
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• Organisms that can be environmentally acquired can also have other routes of transmission, eg *Enterobacter sp,* and so surveillance cannot be simply organism based (indeed C diff and MRSA both have environmental components to routes of transmission)
• Proof of an outbreak source is rare in terms of matching organism typing results of clinical isolates to environmental isolates, especially for gram negative organisms. The weight of proof required in order to initiate interventions is very different from that used for research purposes in which a pre conceived hypothesis is tested and predetermined data gathered. The concept of a balance of probabilities, as well as the precautionary principle, need to be invoked in order to have effective infection prevention interventions in a timely manner.
• HAI may not present until after discharge from hospital, especially when duration of admissions is shortening, therefore point prevalence studies of inpatients will miss cases
A pragmatic monitoring system would rely on empowered local teams having good knowledge and expertise and being listened to particularly with regard to novel situations , along with HPS assessment of all reports for possible environmental sources.
2. Targeted assessment of NHS Estate with regard to compliance with Building standards and maintenance
This would be a surrogate measure for the level of risk in hospitals posed by the environment, and would have the benefit of identifying areas of actions for risk mitigation . For example ventilation and water quality are not addressed in the HAI standards, but are critical in preventing infections. Examples of numerics that could be utilised:
• Number of theatres with validation fails, and tabulated key parameters such as ACH, pressure differentials and notes on layouts of theatres being publicly reported.
• Percentages of theatres out with validation timeframe
• Percentage Planned Programmed maintenance schedule being met
• Number of negative pressure rooms available and numbers of fails in pressure differentials and reasons for fails
• Number of sewage leaks into healthcare environment, number of closures of theatres due to environmental issues,
• Number of capital projects opening without IPCT sign off, or delayed opening due to

IC related concerns
• Numbers of HAISCRIBES carried out in hospitals and evidence of IPCT sign off
• Number of taps with TMVs and statistics on the maintenance programmes for these
Records of areas requiring specialist ventilation and water supplies could be examined and audit-able data presented to support a view that these are built and maintained to
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standards (eg Bone marrow transplant, renal transplant, renal dialysis units, ITU, neonatal units, treatment rooms, endoscopy suites)
It should be noted that the importance of the environment design, ventilation and water standards are not new concepts, on the contrary these are very well established in literature and building standards. The current challenge is moving towards an embedded and auditable
system of governance to implement and monitor these standards.

Reporting

Mandatory reporting of outbreaks is well embedded in Scotland. However formal lessons learned and sharing of the reports is less well established.
A formal system to report building issues prior to outbreaks occurring (which would be in the spirit of prevention being better than cure) is non-existent or at least, not obvious.
In my experience there are barriers to the reporting of environmental issues that need to be addressed, lack of clarity regarding the most appropriate reporting route (HIS/HPS/HFS/SG), fears regarding publicity, financial implications of remediation, highly politicised context, and staff uncertainty that these issues pose real patient safety risks.

Eliminating/Controlling

While absolute elimination of infection risk is unlikely, there is increasing evidence that key interventions, good leadership and cultural changes can dramatically alter the rates of HAI, as NHS Scotland and UK wide data have already proved with MRSA and C diff. At the peak of these infections only a decade ago, the idea that we would see the 80% or so reductions seemed laughable. The repeated lesson in infection control is that levels of reduction are often determined by level of prioritisation and co-ordination of effort.
With regard to the environment in hospitals there is already a body of evidence regarding good practice and NHS Scotland has already invested in the production of excellent building standards and HAISCRIBE documents which has included HFS led training days in different health Boards. This excellent work needs to be consolidated and progressed to ensure patients benefit from the investment.
The importance of infection and outbreak prevention is becoming even more critical in the current age of extreme antibiotic resistance. As antibiotics run out, any breakdown in infection control will have potentially catastrophic consequences and investment in controlling these risks can be viewed as a corner stone to any strategy to fight antimicrobial resistance.
My view that there is much room for improvement in the current approach to managing risks
posed by the healthcare environment is based observations including:
1. Time lag for implementation of good practice - eg TMV taps have been a known risk with warnings internationally post Belfast pseudomonas NICU outbreak in 2012, yet have been installed in new hospitals after this date including high risk areas
2. Resource implications used as a counter argument for control measures being implemented. In the age of realistic medicine, it is crucial that there are open discussions

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regarding which standards are basic enough to merit uncompromising enforcement, and which, if any, can be considered desirable but not necessary. Patient and public voice is critical in this.
3. Lack of planning for cost of implementing standards, Eg the cost of putting negative pressure in place as part of an HAI scribe should be detailed as a cost by contractors at the initial stages
4. Lack of clearly defined roles for members of IPCT, Public health, and Estates and HPS and HFS in managing and advising on these issues. Note: ICD job descriptions not nationally agreed to date, although this has been the subject of much discussion
5. Lack of timetabling of IPCT involvement in capital and estates projects,
6. Cleaning methodologies need rigorously monitored with regard to the details of the evidence for the methodology and the realities of the implementation,
7. Building validation is not comprehensive: eg PPVL isolation rooms require all the detailed parameters to be correct - not a pick and mix approach .The analogy a ventilation engineer once told me was if you got a car with a wheel missing, its not going to do the job is it?
8. The disbanding of the ICNETWORK a few years ago fragmented the Scottish IC community and that useful level of peer review, networking and discussion was not replaced with an alternative as was anticipated.

Conclusion

It should be noted that these issues are certainly not unique to NHS Scotland, however by building on the IPC infrastructure already in place we have an opportunity to excel in this area of patient safety and harm reduction by developing a national approach to this issue. An approach that puts prevention at the heart of policy could seek to quantify basic parameters regarding the Scottish healthcare estate in order to drive improvements and reduce the risk of outbreaks as well as sporadic infections.

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CEL 18 (2007) 13 December 2007 : HEALTHCARE ASSOCIATED INFECTION:SHFN 30 AND HAI-SCRIBE IMPLEMENTATION STRATEGY
REF NO. HS/S5/19/HHHE/A3
Health Building Note 00-01: General design guidance for healthcare buildings
SHPN 04: Supplement 1: Isolation Facilities in Acute Settings
Scottish Health Technical Memorandum 03-01:Ventilation for Healthcare premises
Scottish Health Technical Memorandum 04-01 Part A Water safety for healthcare premises.

SHFN 30 Part B: HAI-SCRIBE Implementation strategy

APPENDIX 4

HEALTH AND SPORT COMMITTEE

HEALTH HAZARDS IN THE HEALTHCARE ENVIRONMENT

INQUIRY into QEUH, RCH, Neuro-sciences (South Glasgow Hospitals)

I apologize for missing the 28th February deadline. However, having read the Sunday Herald report, I felt I needed to raise my concerns with the committee directly.

I am a retired microbiologist. I am prepared to provide further detailed information to the committee should I be invited to do so.

Concerns in relation to the building specifications and infection control were first raised in 2014 with senior management. Some of the issues were addressed, many others were not.

Microbiologists continued to highlight problems and concerns in 2015. There have been resignations of infection control doctors because of the difficulties faced. These resignations resulted in the loss of experienced infection control doctor expertise.

All microbiologists have some responsibility for infection control and need to communicate with the infection control team. Their workload and contribution to the infection control service cannot be considered in isolation from the duties of the infection control doctors. The resource pressures for clinical microbiology and infection control cannot be separated. Both are under pressure and the resource implications need to be looked at as a whole.

In September 2017, three microbiologists raised an SBAR and Stage 1 of the whistleblowing process raising some of our concerns. I will not outline any details here.

It was very disappointing that we felt we had no alternative but to go down the whistleblowing route. We felt this was a last resort option as a number of issues, some of which we felt to be critical, were not being fully addressed. The driving force was our concern for patient safety.

In February 2018 some microbiologists felt the need to go to Stage 2 of the whistleblowing process. NHS GGC could not provide us with the re-assurances and feedback that the concerns were being fully addressed. This was despite numerous requests for updates. We appreciated that some of the solutions were very challenging both from a practical and resource perspective. An action plan was required, including both short term and long-term plans. I believe this is being worked on by NHS GGC and I hope all the concerns are being examined.

After reading the article, I was astonished that the infection control manager is now the GGC project manager, involved in both the inquiry and internal investigations. He does have an important contribution to make and needs to provide information to any inquiry. However, I do not believe any person or organisation, who has been involved in the decision making process for the building specifications, commissioning, addressing the problems since the opening of the hospitals etc, can be part of the inquiry committee. I am sure that those responsible for the inquiry will not want to be open to the criticism that the inquiry was a whitewash.

I read the HPS report on the water contamination in the RCH. There were many good recommendations, but I believe the report was incomplete. It did not cover the period from the first case in 2016 until January 2018. The timeline for all cases needs to be understood. I would also have been interested to know if there were any bacteraemias with these organisms in the 12 months prior to the move into RCH. This is not difficult data to collect and analyse.

There will be many people who are frightened to speak out and raise their concerns because of the perception of the consequences that they will face. I hope that the committee will be able to re-assure staff, patients and relatives that they do not need to have any concerns. Staff have a professional responsibility to raise any concerns they might have for patient safety. Patients and their relatives have a lot of pressure to cope with but may feel it is helpful to discuss their concerns. As we know, patients sometimes feel that raising concerns may affect the treatment they receive and we must work to re-assure them.

This is a very difficult and worrying time for all involved. There are staff shortages at all levels within the organisation. This must be acknowledged. I believe that when the issues are understood it will uncover multi factorial problems across the organisation and probably not unique to NHS GGC.

While people need to understand what happened with the cryptococcal infections, this must not be at the expense of the other issues.

I hope the inquiry will be able to unravel this complex labyrinth of issues. It will be a challenge.

Patient safety and restoring public confidence needs be the primary drive of the inquiry. I hope that lessons can be learnt to ensure positive changes across NHS Scotland. The public need to understand that all hospital acquired infections cannot be prevented. Incidents do happen that have to be managed appropriately. The challenge is to have processes in place to minimize incidents with a pro-active infection control service. This reduces the number of time-consuming reactive incidents.

I hope the mistakes made during the planning, building, commissioning, maintenance etc of the QEUH and hospitals in south Glasgow will ensure that lessons are learnt and rolled out across NHS Scotland. This must also include a Board responding to concerns raised by experienced staff in a timely manner.

From: Christine Peters [redacted]
Sent: Saturday, February 23, 2019 4:14 pm
To: Freeman J (Jeane), MSP
Subject: Confidential re water incident

Dear Jeanne,

I am writing to express my concerns regarding the recently published HPS led report into the water incident at QEUH/RHC. From my knowledge of the situation there are a number of critical omissions in the report:

1. There is an impression given that between the 2016 cupriavadis case and the January 2018 cupriavadis case , there was only one environmental bacteraemia in the paediatric oncology unit ie the September 2017 cupriavadis case. In fact there were many cases of bacteraemias with organisms mentioned in the report as well as other environmental organisms not mentioned. This is highly significant as any outbreak investigation needs to have a phase of case ascertainment and this involves retrospective data. This may not happen immediately, but once the hypothesis of water borne infections becomes established it is a basic logical step in the investigation. I am utterly astonished that the peak in cases in 2017 particularly are not alluded to at all. I myself produced a document for the IMT which charted all the cases since 2014 . The epidemiology of environmental organisms in blood stream infections prior to jan 2018 has been ignored in the report and causes me to have serious misgivings about the validity of the inquiry as a comprehensive look into the water issues. Conclusions drawn regarding the extent of the consequences of the water contamination are significantly limited by this omission.

2. There is a reference to microbiology results of water testing which showed widespread contamination before the building opened. As ICD at the time I was not aware of the results despite asking for them. Therefore for this report to be comprehensive and informative of what has happened , the details of when these results were available, as well as the names of the organisms isolated and,critically, evidence of actions taken at the time (we are talking four years ago , actions should not have waited four years) are of paramount importance . If it is the case that for example cupriavadis or pseudomonas were found but remedial actions not taken, this would be the most critical and defining finding of the inquiry. This is not clear when reading the report as it stands.

3. There is only mention of gram negative organisms. A complete report would include gram positives, fungi and mycobacterium.

4. The report states that there was no mortality. What it fails to delineate is the significant morbidity - admissions to hospital, extended days in hospital, lines inserted/removed , number of extra imaging , surgery, admission to ITU, resuscitation, as well as pain and illness and anxiety. Furthermore there is no comment of the long term morbidity or quantification of the effects of delayed chemotherapy - a critical cornerstone of cancer treatment . The one line on no mortality seems superficial in this context.

5. The issues pertaining to taps with flow straighteners as well as thermal mixing valves were well known years before the 2015 iteration of the Scottish health building documents. (Post Belfast NICU Pseudomonas outbreak 2012 especially) This raises serious issues around the decision making re the tap choices that is not adequately dealt with. Furthermore the key to any decision to use taps with TMVs is the installation and maintainence . Were there deficiencies in this regard? Again a critical and defining issue not adequately dealt with.

5. There is no comment on conflict of interests. It should be stated whether any of the authors had involvement in any decisions regarding the choices of sinks, taps, water testing or the design and commissioning process of these buildings (either as GGC employees at the time or as part of advice given by HPS and HFS)in order for this to be a transparent process.

In conclusion, my own declaration of interest is that I was ICD for the first couple years of the QEUH, I cover the paediatric microbiology service, I have taken my concerns re the building including infection rates in paediatric cancer unit through a whistleblow process within GGC and I have been the author of reports for the water incident IMT on the microbiology of the taps (as alluded to in the report) as well as the epidemiology of bacteraemias in the unit in relation to antibiotic use.

Perhaps the correct place for the report itself to be probed is the enquiry which you have set up. I look forward to being able to submit the reports I refer to to the enquiry team , but think that you should be aware of these limitations of the report in a timely manner as I think there is a serious risk of confidence in HPS being undermined by this incomplete report which would not be a good outcome .

Regards

Christine Peters

Microbiology Consultant

QEUH

Please note: Currently on sick leave

From: Bowman D (David)
Sent: 21 March 2019 13:37:36
To: Public Engagement Unit
Cc: Cabinet Secretary for Health and Sport
Subject: FW: Ref - 2019/0002332

Attachments: Letter to Cabsecmarch2019.pdf

Townsend J (Julie)

PEU

Please could you scan this on to MACCs as an MR.

Thanks

David Bowman
Deputy Private Secretary
Ministerial Private Office (Health)
St Andrew?s House
Edinburgh

All e-mails and attachments sent by a Ministerial Private Office to any other official on behalf of a Minister relating to a decision, request or comment made by a Minister, or a note of a Ministerial meeting, must be filed appropriately by the recipient. Private Offices do not keep official records of such e-mails or attachments.

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From: Christine Peters
[redacted]
Sent: 21 March 2019 13:36
To: Cabinet Secretary for Health and Sport
[redacted]
Subject: Re: Ref - 2019/0002332

On 21 Mar 2019, at 13:32, CabSecHS[redacted] wrote:

Hi Christine

Are you able to send this document as a word/pdf document? Unfortunately I am unable to access the one you have sent.

Regards

David Bowman
Deputy Private Secretary
Ministerial Private Office (Health)
St Andrew?s House

Edinburgh

All e-mails and attachments sent by a Ministerial Private Office to any other official on behalf of a Minister relating to a decision, request or comment made by a Minister, or a note of a Ministerial meeting, must be filed appropriately by the recipient. Private Offices do not keep official records of such e-mails or attachments.

Scottish Ministers, Special advisers and the Permanent Secretary are covered by the terms of the Lobbying (Scotland) Act 2016. See www.lobbying.scot<http://www.lobbying.scot/>

From: Christine Peters
[redacted]
Sent: 21 March 2019 13:29
To: Cabinet Secretary for Health and Sport
[redacted]
Subject: Re: Ref - 2019/0002332

Dear David,
Thank you for forwarding the letter from the Cabinet Secretary Jeanne Freeman dated 13th March 2019.

Please find attached my reply,
Regards,

Christine Peters
On 13 Mar 2019, at 16:56, CabSecHS[redacted]
wrote:

Dr Peters

Please find attached a response letter from the Cabinet Secretary for Health and Sport.

Regards

David Bowman
Deputy Private Secretary
Ministerial Private Office (Health)
St Andrew?s House
Edinburgh

All e-mails and attachments sent by a Ministerial Private Office to any other official on behalf of a Minister relating to a decision, request or comment made by a Minister, or a note of a Ministerial meeting, must be filed appropriately by the recipient. Private Offices do not keep official records of such e-mails or attachments.

Scottish Ministers, Special advisers and the Permanent Secretary are covered by the terms of the Lobbying (Scotland) Act 2016. See www.lobbying.scot<http://www.lobbying.scot/>

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the sender immediately by return.
Communications with the Scottish Government may be monitored or recorded in order to secure the effective operation of the system and for other lawful purposes. The views or opinions contained within this e-mail may not necessarily reflect those of the Scottish Government.

Tha am post-d seo (agus faidhle neo ceanglan c?mhla ris) dhan neach neo luchd-ainmichte a-mh?in. Chan eil e ceadaichte a chleachdadh ann an d?igh sam bith, a? toirt a-steach c?raichean, foillseachadh neo sgaoileadh, gun chead. Ma ?s e is gun d?fhuair sibh seo gun fhiosd?, bu choir cur ?s dhan phost-d agus lethbhreac sam bith air an t-siostam agaibh agus fios a leigeil chun neach a sgaoil am post-d gun d?il. Dh?fhaodadh gum bi teachdaireachd sam bith bho Riaghaltas na h-Alba air a chl?radh neo air a sgr?dadh airson dearbhadh gu bheil an siostam ag obair gu h-?ifeachdach neo airson adhbhar laghail eile. Dh?fhaodadh nach eil beachdan anns a? phost-d seo co-ionann ri beachdan Riaghaltas na h-Alba.
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<Letter from Jeane Freeman MSP.pdf>

Dr Christine Peters

[redacted]

21 March 2019

Dear Jeanne,

Thank you for your letter dated 13 March 2019 and for your time taken to consider and respond to my correspondence with you regarding infection control and the built environment in Glasgow.

It is excellent that there is a review into the design, commissioning and maintenance of the QEUH and that chairs have been appointed and I appreciate the advice regarding submission. I will write to Elizabeth Burgess to confirm that I am content for my correspondence to be forwarded in confidence to the review committee.

I also thank you for your advice regarding current concerns that my colleague has and I have advised her of the possibility of meeting with Professor Fiona McQueen , as you have helpfully suggested. If that is something she feels she would like to take up she will follow up with your officials.

With regard to the whistleblowing service - I have availed myself of the service on a number of occasions over the past few years, as well as taking GMC, MDDUS and BMA advice and unfortunately have not found it useful in directing me to the most appropriate course of action. It is more of a listening service than a route to alert appropriate bodies of serious failings or patient safety concerns. The real nub of today's problem is that when the normal systems like line management fail, what should a doctor do to protect patients? Certainly a press bonanza does more harm than good in my opinion, and should be avoided as much as possible by having rigorous and transparent governance.

I eagerly anticipate the review and trust that this will be a learning opportunity for NHS Scotland , and I thank you for ensuring that this learning opportunity has not been missed.

Kind regards,

Christine Peters

From: Downie J (Jack)
Sent: 23 January 2019 10:49:28
To: Public Engagement Unit
Cc: Cabinet Secretary for Health and Sport, Goodfellow M (Melanie), Birch J (Jason), Dunk R (Rachael), DG Health & Social Care, McQueen F (Fiona)
Subject: FW: Confidential QEUH

PEU

For a ministerial response. I?d appreciate if this could be allocated today to Melanie Goodfellow.

Many thanks,
Jack

From: Christine Peters
[redacted]
Date: 23 January 2019 at 07:39:13 GMT
To:
Jeane.Freeman.msp[redacted]
Subject: Confidential QEUH

Dear Jane Freeman,

I am writing to you as a Consultant Microbiologist and current employee of NHSGGC who has been raising concerns regarding infection control risks associated with defects in the design, construction and commissioning of the QEUH and RHC with management since 2015 when the buildings opened and I was the Infection control doctor for the adult service (having had no role in the building project till it opened).

I was very encouraged to see reports in the media yesterday that there is to be an external review of the design , construction commissioning and maintenance of the building.
In my view this is long overdue.

I am seeking assurance that I will be given the opportunity to submit four years worth of evidence to the review body without fear of bullying or harassment from the GGC management. This will include details of faults in the design and construction and commissioning that I identified and raised as issues, culminating in a detailed whistleblow to the board in 2017.

I am concerned that key people will not be invited to contribute including clinical teams who have been raising concerns as well as infection control doctors . I suggest that for this review to achieve its stated aims, there needs to be wide involvement of many grades of staff as well as strongly worded reassurance to all staff at GGC that bullying of those who submit evidence will not be tolerated . The ?independence? of the experts cited will be critical for trust in the integrity of the process .

I am very willing to expand on this if required in writing or in person, but aim simply to assist the review body to the best of my ability so that mistakes that have been made will never happen again to the detriment of patient wellbeing.

Thank you for taking this important step for the future of the NHS safety in Scotland.

Sincerely

Dr Christine Peters
Consultant Microbiologist
QEUH
Sent from my iPhone

Louise Mackinnon

Subject: FW: Confidential re water incident

Begin forwarded message:

From: Christine Peters <[redacted]
Date: 25 February 2019 at 13:42:36 GMT
To: Jason.Birch[redacted]
Subject: Re: Confidential re water incident

Dear Jason,

Thank you for your rapid response which I appreciate, and for offering to raise my concerns with HPS directly.

Thank you also for your time to discuss this on the phone.

On reflection I think I will rephrase my questions to be taken forward to the enquiry which will be independent and will have an opportunity to examine all the issues in context.

Therefore the new questions :
1. What is the epidemiology of environmental organism bacteraemias in the paediatric haematology /oncology patients since the opening of the RHC? In total how many patients have been affected since the unit was opened? This should include fungi , gram positives and mycobacterium.

2. Review of all the Water company (DMA)water testing and water system assessment reports, as well as GGC microbiology testing results including names of organisms isolated prior to opening of building.

3. Dates and details of all actions taken with regard to follow up of deficient water results or water system issues identified.

4. Review of all Legionella risk assessments and follow up actions and escalation through water groups. This is relevant as legionella risk mitigation overlaps with other environmental organisms.

5. What were the clinical consequences of the environmental bacteraemias with regard to:

-Days of Extended hospital admission
-Numbers of Intravenous Lines replaced
-Excess Antibiotic days
-Toxicity events associated with antibiotic use
-Days of ITU admission due to sepsis
-numbers of patients requiring Ventilation/Resuscitation due to sepsis
-Long-term morbidity and mortality compared with non bacteraemia patients

6. What was the decision making process with regard to the choice of taps with associated risk assessment and risk mitigation processes? Evidence of installation and maintenance in keeping with this risk mitigation.

7 what were the barriers to rapid incident detection?

8 what were the barriers for rapid incident management and elimination of HAI risk posed by contaminated water?

Please do not hesitate to contact me if further clarification is required.

Thanks again for your time and consideration .

Kind regards,

Christine Peters
Sent from my iPhone

On 25 Feb 2019, at 11:29, Jason.Birch@[redacted] wrote:

> Dear Ms Peters,
>
> Thank you for your message to Jeane Freeman MSP, Cabinet Secretary for Health and Sport, regarding the water incident at the QEUH, I have been asked to reply on her behalf. You raise a number of detailed points in your message and I would be grateful if you could confirm that you are content for me to liaise with HPS so they can respond as soon as possible.
>
> I look forward to hearing from you.
>
> Kind regards
>
> Jason
>
> **Jason Birch** | Unit Head | Directorate for Chief Nursing Officer | Scottish Government | St Andrew's House | Regent Road | Edinburgh | EH1 3DG | T [redacted] | M [redacted]

From: Christine Peters [redacted]
Sent: Saturday, February 23, 2019 4:14 pm
To: Freeman J (Jeane), MSP
Subject: Confidential re water incident

Dear Jeanne,

I am writing to express my concerns regarding the recently published HPS led report into the water incident at QEUH/RHC. From my knowledge of the situation there are a number of critical omissions in the report:
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have a phase of case ascertainment and this involves retrospective data. This may not happen immediately, but once the hypothesis of water borne infections becomes established it is a basic logical step in the investigation. I am utterly astonished that the peak in cases in 2017 particularly are not alluded to at all. I myself produced a document for the IMT which charted all the cases since 2014 . The epidemiology of environmental organisms in blood stream infections prior to jan 2018 has been ignored in the report and causes me to have serious misgivings about the validity of the inquiry as a comprehensive look into the water issues. Conclusions drawn regarding the extent of the consequences of the water contamination are significantly limited by this omission.

2. There is a reference to microbiology results of water testing which showed widespread contamination before the building opened. As ICD at the time I was not aware of the results despite asking for them. Therefore for this report to be comprehensive and informative of what has happened , the details of when these results were available, as well as the names of the organisms isolated and,critically, **evidence** of actions taken at the time (we are talking four years ago , actions should not have waited four years) are of paramount importance . If it is the case that for example cupriavadis or pseudomonas were found but remedial actions not taken, this would be the most critical and defining finding of the inquiry. This is not clear when reading the report as it stands.

3. There is only mention of gram negative organisms. A complete report would include gram positives, fungi and mycobacterium.

4. The report states that there was no mortality. What it fails to delineate is the significant morbidity - admissions to hospital, extended days in hospital, lines inserted/removed , number of extra imaging , surgery, admission to ITU, resuscitation, as well as pain and illness and anxiety. Furthermore there is no comment of the long term morbidity or quantification of the effects of delayed chemotherapy - a critical cornerstone of cancer treatment . The one line on no mortality seems superficial in this context.

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5. There is no comment on conflict of interests. It should be stated whether any of the authors had involvement in any decisions regarding the choices of sinks, taps, water testing or the design and commissioning process of these buildings (either as GGC employees at the time or as part of advice given by HPS and HFS)in order for this to be a transparent process.

In conclusion, my own declaration of interest is that I was ICD for the first couple years of the QEUH, I cover the paediatric microbiology service, I have taken my concerns re the building including infection rates in paediatric cancer unit through a whistleblow process within GGC and I have been the

author of reports for the water incident IMT on the microbiology of the taps (as alluded to in the report) as well as the epidemiology of bacteraemias in the unit in relation to antibiotic use.

Perhaps the correct place for the report itself to be probed is the enquiry which you have set up. I look forward to being able to submit the reports I refer to to the enquiry team , but think that you should be aware of these limitations of the report in a timely manner as I think there is a serious risk of confidence in HPS being undermined by this incomplete report which would not be a good outcome .

Regards

Christine Peters

Microbiology Consultant

QEUH

Please note: Currently on sick leave

Sent from my iPhone

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Communications with the Scottish Government may be monitored or recorded in order to secure the effective operation of the system and for other lawful purposes. The views or opinions contained within this e-mail may not necessarily reflect those of the Scottish Government.

Tha am post-d seo (agus faidhle neo ceanglan còmhla ris) dhan neach neo luchd-ainmichte a-mhàin. Chan eil e ceadaichte a chleachdadh ann an dòigh sam bith, a' toirt a-steach còraichean, foillseachadh neo sgaoileadh, gun chead. Ma 's e is gun d'fhuair sibh seo gun fhiosd', bu choir cur às dhan phost-d agus lethbhreac sam bith air an t-siostam agaibh agus fios a leigeil chun neach a sgaoil am post-d gun dàil. Dh'fhaodadh gum bi teachdaireachd sam bith bho Riaghaltas na h-Alba air a chlàradh neo air a sgrùdadh airson dearbhadh gu bheil an siostam ag obair gu h-èifeachdach neo airson adhbhar laghail eile. Dh'fhaodadh nach eil beachdan anns a' phost-d seo co-ionann ri beachdan Riaghaltas na h-Alba.
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**

Louise Mackinnon

From: Peters, Christine
Sent: 03 December 2021 14:32
To: [redacted]cno; Inkster, Teresa
Subject: RE: Follow up

Tracking:

Recipient	Delivery	Read
[redacted]		
cno	Delivered: 03/12/2021 14:32	
Inkster, Teresa		Read: 03/12/2021 14:34

Thankyou.

Have a lovely weekend

Kr
Christine

From: Douglas.Imrie@[redacted] **On Behalf Of** CNO[redacted]
Sent: 03 December 2021 14:20
To: Peters, Christine <[redacted] Inkster, Teresa
[redacted]
Subject: [ExternaltoGGC]RE: Follow up

Dear Dr Peters

Thank you for your email. Please accept this as acknowledgement of receipt and thank you for the clarification of the purpose of the request to meet. We are looking into the points you raise and will be back in touch as soon as possible with advice on how best to follow up your request.

Kind regards

Douglas Imrie | Executive Assistant for Deputy Chief Nursing Officer |
Chief Nursing Officer's Directorate | Scottish Government | 2ER St Andrew's House |
Regent Road | Edinburgh | EH1 3DG | [redacted]

From: Peters, Christine [redacted]
Sent: 26 November 2021 16:53
To: Chief Nursing Officer [redacted]; Chief Nursing Officer [redacted]; Inkster, Teresa
[redacted]
Subject: RE: Follow up

Dear Gaye,

Thank you for your email.

To clarify, the meeting we had with Amanda in June was not in relation to the Public Inquiry. I am very clear about the PI process and will be asked to give a witness statement in due course. The outcomes from the Public Inquiry I understand will take years and is unlikely to be the appropriate route for acute problem solving in infection control in the interim.

It is rather the key learning and implementation of critical changes that was the subject of the dialogue we had over the past 2 years with various members of the Oversight Board and CNOs.

Originally Fiona McQueen and Jeanne Freeman had indicated to us that we would be part of the OB to ensure our input would not be side lined as it had been in the run up to the whistle blow, in recognition of the fact that we had correctly been raising concerns about the building and infections, but had not been listened to. This did not in fact occur and we were not involved in any OB committees or meetings. We understood because GGC Board were not happy for us to attend. Therefore we contacted Fiona McQueen and asked to be able to respond to her directly regarding the findings of the OB and CNR reports.

The issues we raised with Amanda were to do with the then current and ongoing actions. We commented on risks that we had assessed as continuing - within the scope of our expertise and experience. These had also been discussed repeatedly with Marion Bain and Angela Wallace, and finally in relation specifically to the Oversight Board and the Case Note Review reports. The final meeting therefore covered a combination of outstanding actions and new observations/concerns.

The action/outcome was simply that CNO would

1. speak to the organisation regarding how our input into IPCT would be embedded going forward
2. Gain answers to specific questions re patient risks
3. Think of a process seeking to alter the situation we found ourselves in within GGC at the time - being disbelieved and expertise being repeatedly ignored – perhaps as a result of being whistle blowers and despite having correctly raising concerns.

That is the follow up we are waiting for.

I hope this clarifies the history for you and I await to hear who is best placed to take this forward and how,

Kind regards and hope you have a pleasant weekend.

Christine

Dr Christine Peters
Clinical Lead
Consultant Microbiologist
QEUH
[redacted]

From: Gaye.Williamson@[redacted] **On Behalf Of** CNO[redacted]
Sent: 25 November 2021 13:23
To: Peters, Christine [redacted]; cno <cno@[redacted] Inkster, Teresa [redacted]
Subject: [ExternaltoGGC]RE: Follow up

Good afternoon Christine

Thank you for your emails, my apologies that a response has not been forthcoming before now.

Professor McMahon is excluded from any correspondence relating to the inquiry due to a potential conflict of interest. The directorate continues to work on the Public Inquiry under the appropriate governance, but I would not be able to arrange a discussion regarding inquiry matters with the interim CNO. I do not have any confirmed detail

of the actions that you had discussed with Professor Croft, are you able to provide these and thereafter it can be determined who may be best placed to respond?

Thanks and regards

Gaye

Gaye Williamson *(she/her)* | Private Secretary to Chief Nursing Officer | Chief Nursing Officers Directorate | Scottish Government | [redacted] | Teams |
I am working from home

From: Peters, Christine [redacted]
Sent: 10 November 2021 09:53
To: Chief Nursing Officer [redacted]; Chief Nursing Officer [redacted]; Inkster, Teresa [redacted]
Subject: RE: Follow up

HI Gaye,

I am resending in case this was not received.

It would be helpful to have a formal note from CNO to terminate the communications we were invited to take part in.

Kr

Christine

Dr Christine Peters
Clinical Lead
Consultant Microbiologist
QEUH
[redacted]

From: Peters, Christine
Sent: 28 October 2021 11:52
To: 'CNO@[redacted] cno[redacted]; Inkster, Teresa [redacted]
Subject: RE: Follow up

Dear Gaye,

I am sure you have been incredibly busy over the past few weeks.

In listening to the testimony at the public inquiry yesterday I was reminded of the fact that we have not had a follow up meeting since our meeting with the previous CNO at the start of June when it was suggested that we would be contacted within a couple of weeks to further the conversation of a number of issues that continued despite all the various strands of work that had been put in place and of relevance irrespective of the ongoing Public Inquiry.

There were a number of outstanding issues at that time which we were given to understand would be explored, followed up and we would have a further opportunity to discuss.

It would be very helpful to have a clear communication from yourselves regarding the formal termination of this line of communication following the publication of the Oversight Board Report, the Case Note Review and our communications regarding outstanding issues from whistle blow and issues arising since. That would leave us in no doubt as to next step options.

Kind regards,

Christine

Dr Christine Peters
Clinical Lead
Consultant Microbiologist
QEUH
[redacted]

From: Gaye.Williamson@[redacted] **On Behalf Of** CNO[redacted]
Sent: 30 September 2021 16:43
To: Peters, Christine[redacted]; cno <[redacted]; Inkster, Teresa <[redacted]
Subject: [ExternaltoGGC]RE: Follow up

Good afternoon Christine

Thank you for your email. I hope you are well.

Firstly, Kathryn has moved on with Scottish Government, I have since replaced in this role - it is lovely to 'meet' you ☺.

Professor Alex McMahon will take up duty on the 4th October as Interim CNO and as you can imagine, the diary is a little full at the moment with first meetings/briefings and introductions.

I have added this to my agenda for the forward look with our diary manager next week, where we can look to give you the relevant detail. Your patience is greatly appreciated.

Thanks and regards

Gaye

Gaye Williamson *(she/her)* | Private Secretary to Chief Nursing Officer | Chief Nursing Officers Directorate | Scottish Government | [redacted] | [redacted] | Teams |
I am working from home

From: Peters, Christine[redacted]
Sent: 30 September 2021 11:21
To: Chief Nursing Officer[redacted]; Inkster, Teresa[redacted]
Cc: Chief Nursing Officer[redacted]
Subject: RE: Follow up

Hi Kathryn,

I understand that there is a new CNO in post now. It would be helpful, as the Public Inquiry is ongoing with fresh revelations each day , to have an update on all the issues Teresa and I raised with the CNO at our last meeting as promised.

Kr

Christine

Dr Christine Peters
Clinical Lead
Consultant Microbiologist
QEUH
[redacted]

From: Kathryn.Stewart[redacted] **On Behalf Of** CNO[redacted]
Sent: 18 June 2021 15:12
To: Peters, Christine[redacted]; Inkster, Teresa[redacted]
Cc: cno[redacted]
Subject: [ExternaltoGGC]Follow up

Dear Drs Peters and Inkster

Amanda has asked me to email you, just to let you know that she is still following up on the issues you discussed at your last meeting and she will be back in touch in due course.

Best wishes
Kathryn

Kathryn Stewart| Private Secretary to Chief Nursing Officer|Chief Nursing Officer's Directorate
[redacted]

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STRCITLY CONFIDENTIAL

2/12/19

Dear Cabinet Secretary ,

We write to you in response to calls in Parliament last week for individuals with information regarding the QEUH to come forward. We are both currently Consultant Microbiologists in the QEUH .We have previously been in the roles of Infection Control Doctor for the site and the Lead ICD There are a number of issues we wish to bring to your attention ;

When referring to hospital acquired infection it is important to differentiate between endogenous (own patient flora) and exogenous (environmental) sources of infection. Whilst we acknowledge that' zero tolerance' is unlikely to be achieved particularly in immunosuppressed patients both types of infection are preventable, employing different strategies. To benchmark against older hospitals or other units when there are clear environmental risks present is not commendable.

1) Ward 6A

We note with interest recent media statements which refer to the QEUH being 'safe'. In the large part we do believe that to be the case. The clinical care provided at the QEUH is indeed world class and for the vast majority of patients the environment does not pose a risk. However, for a small subset of immunosuppressed paediatric patients we do believe there is current risk remaining despite all remedial measures put in place to date.

We enclose in our Appendix details of an SBAR signed by all QEUH microbiologists delineating current environmental risks in ward 6A, which was sent to the Incident team. It is important to differentiate between no evidence of an environmental link versus evidence of ongoing environmental risk. The pitfalls of environmental screening are well documented (CDC, Atlanta) and reliance on surface swabs to prove environmental safety in the presence of obvious risks is not recommended. Evidence from our own laboratory and that of an external lab demonstrate that in fact there have been positive swabs (email in Appendix). Whether these have been discussed in an open and transparent fashion at the Incident Management Meetings is unclear.

Furthermore we are aware of air sampling results that indicate poor air quality in ward 6A , again there has been no transparency in relation to these or adequate explanation given to parents as to why their children are on antifungal prophylaxis.

Reference has been made to similar rates in units elsewhere; in fact what is important here is the 'type' of infection not the rate. The predominant bacteria are environmental organisms and not those considered part of normal flora.

Ward 2A patients were moved to ward 6A on a temporary basis last year to enable remedial works to begin on the water system. However that move became more permanent following reports on the 2A ventilation system which demonstrated it to be suboptimal and a risk for this patient

group. Due to the requirement for a retrofit of 2A the 6A move became more permanent. Requests by the lead ICD for a repeat options appraisal as to the safest place to house these at risk children were not undertaken and the suggestion of a temporary portable unit ignored.

2) Paediatric Intensive Care Unit (PICU)

We note yesterdays media reports regarding the death of a child last week. The cause of death has yet to be elucidated however this child did have a hospital acquired bloodstream infection from Serratia marsecens an organism linked to the environment. We are aware of additional patient deaths in the PICU setting within the last few weeks, both with the same water related organism (Pseudomonas aeruginosa). In one of these patients 'Pseudomonal sepsis' is reported on the death certificate, in the 2nd the result was positive after the death certificate issued. We do not believe these cases have been reported in an open and transparent fashion and have ongoing concerns regarding the current environmental burden in PICU (email in Appendix)

3. Ventilation/Water

We do not believe that all issues that have been raised since 2015 have been adequately dealt with, contrary to the repeated claims in the public statements both from NHS GGC and SG .

Ventilation

1) There are outstanding issues in relation to ventilation and particularly with regard to patient placement. While negative pressure rooms have now been implemented (April 2019) there was confusion just last week regarding whether they are fit for use when an XDRTB case required admission .This is not an area where there should be any dubiety whatsoever regarding suitability of accommodation given the serious health and safety risks posed to both staff and patients.

2)PPVL isolation rooms have not been built to specification and remain unvalidated to the SHTM – this has been brought up repeatedly following confirmation of these findings in an HFS report.They have yet to be addressed .

3) Validation for PICU was undertaken for the first time in 2019, with a failure to meet SHTM standards and remedial work required.

4) Ongoing issues with air quality and specifications in adult haematology wards including bone marrow transplantation.

Water

In 2015 site infection control doctors were requesting access to water results from the time of opening. Despite repeat requests to managers these were ignored and referred to as having been 'dealt with'.

Despite risk assessments being on the agenda and for discussion at local water groups reports from external companies were never made available.

During 2017 several microbiologists raised concerns regarding the number of bloodstream infections in ward 6A children and had difficulty obtaining water sampling including specific requests

for stenotrophomonas testing prior and after a child's death from Stenotrophomonas sepsis. There had been 6 cases of stenotrophomonas bacteraemia within 4 months, when previously one per year was the norm in this patient group.

In October 2017 water testing was one of the issues raised by three Consultant Microbiologists as part of Stage 1 of a whistleblowing process. They highlighted the difficulties encountered in both requesting and accessing results of water tests, in addition to raising concerns regarding infection rates.

Following a case of Cupriavidus bacteraemia in Feb 2018, the lead ICD chaired the Incident management teams whereby various different hypotheses were shared. Details of the external risk assessment reports were not made available. Details only emerged in a subsequent Health Facilities Scotland report at the end of Dec 2018. In this HFS report reference was made to high TVCs in water at the time of opening and the presence of bacteria detected subsequently. This report also gave a detailed technical analysis of the water system.

It is our belief that had these water results and external risk assessments been made available to ICDs in 2015 the decision would have been to defer opening of the hospital or at the very least not move immunosuppressed patients across. The clear course of action at that point would have been to install a chlorine dioxide dosing system. As such we consider many of the subsequent bloodstream infections in children to have been preventable.

We note with interest comments that all actions identified in these external risk assessments have been put in place .The water technical group continues to meet with input from external experts but has not yet completed all actions .For example regarding the decision to replace taps in other high risk areas , this work has not yet been undertaken.

Whilst the water continues to be described as 'wholesome' the presence of fungi and atypical mycobacteria which persist after chlorine dioxide and are difficult to eradicate represent an risk to immunosuppressed patients, hence why filters must remain.

4) Whistle Blowing Process

GGC have claimed that the internal whistleblowing process is robust and confidential. Three Microbiologists wrote an SBAR delineating long standing concerns regarding infection control in September 2017.

This was far from a confidential process, with a meeting organised to respond to the issues with a very wide group of senior managers, some of whom the whistle blowing attempt was pertinent to. The process was intimidating and there was no opportunity to input into the assessment of the issues, while those who were responsible for the situation requiring the i WB oversaw all investigations and continue to do so. The whistle blowers were not informed that their names would be circulated to the Board and the Acute Infection control committee. Certainly it is not a process that has inspired confidence or one that could be recommended as a safe process.

Two Microbiologists took the whistle blow to stage 2 in February 2018 as the response that was sent regarding all the issues did not reflect accurately the issues raised, nor was it accurate in terms of

actions taken for resolution of the issues. They were then told that the issues were on the risk register and would be sorted – with no evidence provided to back this.

There is a culture in GGC that whistleblowers should “be hounded” and the statements made to press reiterated our impression that whistle blowers are considered to be the real problem, being referred to frequently as “trouble makers”, while the evidence based problems they point to are belittled.

We have no confidence in the stringency, confidentiality or transparency of the Board to undertake and manage internal whistle blows. From our experience the external whistle blowing routes approved by GMC also inevitably lead back to the board to resolve. The internal reviews on several matters, including the Cryptococcus case has excluded entirely the expertise and views of the ICDs involved throughout and we have no confidence in the process at all.

We have raised many issues over the last 4 years, for the purpose of this letter, we have chosen to focus on the most pertinent and current risks. The priority in all of this must be patients and their families as well as public confidence in what is largely an excellent hospital. There is a need for infection control to become an open and transparent process with duty of candour at the very heart of it. We feel that you need to know the full information in order to inform families and the public of the facts.

Kind regards,

Dr Christine Peters, MBChB, BSc, DTMH, FRCPath,

Dr Teresa Inkster, MBChB, BSc, FRCP, DTMH, MPH, FRCPath

Fw: Environmental links 6A

Inkster, Teresa
Wed 27/01/2021 16:05

To: mike.stevens[redacted]
Cc: Peters, Christine <[redacted]

Dear Prof Stevens,

Ahead of the meeting on Friday I thought it might be useful for you to see the email trail below ,as it highlights some of the themes in relation to the 2019 ward 6A IMT. Happy for you to share with your colleagues if you think it is relevant.

kr
Teresa

Dr Teresa Inkster
Consultant Microbiologist
QEUH

From: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)[redacted]
Sent: 23 September 2019 15:37
To: Peters, Christine[redacted]; Crighton, Emilia[redacted]
Cc: Williams, Arwel[redacted]; GREEN, Rachel (NHS GREATER GLASGOW & CLYDE)[redacted] Harvey-Wood, Kathleen[redacted] Gibson, Brenda[redacted]; RITCHIE, Lisa (NHS NATIONAL SERVICES SCOTLAND)[redacted] Balfour, Alison[redacted] Deshpande, Ashutosh[redacted] Inkster, Teresa[redacted] Khanna, Nitish[redacted] Valyraki, Kalliopi[redacted]; Wright, Pauline[redacted] Sastry, Jairam[redacted]
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); [redacted] Deshpande, Ashutosh; [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 ,

Re: Meeting on 4 September

INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]

Tue 24/09/2019 14:14

To: Ives J (Josephine) <J[redacted]

Cc: Fiona.McQueen@[redacted]

Confidential

Thanks for your email and thanks to both of you for taking the time to meet with me

It was indeed reassuring to hear about the public inquiry. I have not yet been asked for evidence for the external review but plan to submit what evidence I have over the next few days.

I do remain concerned regarding cultural issues . I have very recent concerns with respect to a Salmonella outbreak in the Clyde sector . I was surprised to see this (6 cases) rated as a HIIAT Green and that HPS/SG were not informed straightaway particularly in light of the historical Salmonella outbreak and subsequent Watt report.

The situation with ward 6A paediatric haemato-oncology remains unresolved with clear difference of opinion between the local QEUH microbiologists and those brought in to advise from elsewhere. A concerned clinician spoke with me this morning regarding the change of meeting title from IMT to information sharing meeting. Apparently information sharing meetings do not require minutes to be taken or the presence of an ICD, yet important discussions regarding epidemiological data and reopening of the ward are taking place.

I remain concerned that the culture is not one of openness and transparency and have yet to decide how best to take this forward

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: Josephine.Ives[redacted]
Sent: 20 September 2019 13:12
To: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)
Cc: Fiona.McQueen[redacted]
Subject: RE: Meeting on 4 September

Dear Teresa,

I hope you are well.

Fiona McQueen, Chief Nursing Officer, asked me to get in touch and thank you again for taking the time to meet with her on 4 September.

I thought it might be helpful to note that, on 12 September, a Government Initiated Question was published requesting a progress update on the work of the Independent Review of the Queen Elizabeth University Hospital. In response, the Cabinet Secretary for Health and Sport confirmed that the co-chairs of the Independent Review are now assessing a significant amount of evidence received and this autumn they will proceed to interview key stakeholders and take statements. The full response is available here.

In addition, you will have seen this week that the Cabinet Secretary has announced a public inquiry which will cover both the Royal Hospital for Children and Young People in Edinburgh and the Queen Elizabeth University Hospital in Glasgow.

I hope this reassures you that all concerns raised are being taken very seriously.

Kind regards,
Jo

Jo Ives | Team Leader – HCAI/AMR | Chief Nursing Officer's Directorate | Scottish Government | 2 ER St Andrew's House | Regent Road | Edinburgh | EH1 3DG | [redacted] Mobile: [redacted]

Re: [ExternaltoGGC]Fw: IPC Sector Reports - 22/11/19

Leanord, Alistair [redacted]
Tue 26/11/2019 13:25

To: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted];Peters, Christine [redacted];DESHPANDE, Ashutosh (NHS GREATER GLASGOW & CLYDE) [redacted];Wright, Pauline [redacted];Khanna, Nitish [redacted];Balfour, Alison [redacted];Valyraki, Kalliopi [redacted];KHALSA, Kamaljit (NHS GREATER GLASGOW & CLYDE) [redacted]

Cc: Gardiner, Robert [redacted];Devine, Sandra [redacted]

Teresa

Thanks for this.

We will look into it.

Cheers

Al

Sent from my BlackBerry 10 smartphone on the EE network.

From: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)
Sent: Tuesday, 26 November 2019 12:02
To: Leanord, Alistair; Peters, Christine; Deshpande, Ashutosh (NHSmail); Wright, Pauline; Khanna, Nitish; Balfour, Alison; Valyraki, Kalliopi; KHALSA, Kamaljit (NHS GREATER GLASGOW & CLYDE)
Cc: Gardiner, Robert
Subject: [ExternaltoGGC]Fw: IPC Sector Reports - 22/11/19

Hi Al,

I note on the Friday report reference to the Pseudomonas incident in PICU and the HIIAT reporting. I am confused as to why the situation in PICU would not in fact be a Red

I was covering PICU the other week and I am aware of these cases and others

There have been two HAI Pseudomonal bacteraemias with one patient having this listed on part 1b of the death certificate. The other patients DC was completed before knowledge of the bacteraemia.

In addition there are recent BAL samples from 2 other patients growing Pseudomonas

There are also BAL samples from a number of patients with Acinetobacter , two of which were last week confirmed by typing to be the same

I am aware today of a hospital acquired Serratia in blood cultures from a 2A patient in PICU who has sadly passed away, by definition an HAI attributable to PICU

Whilst I am aware separate PAGS and IMTs have been held this picture suggests an environmental issue on the unit, and perhaps it would make sense to deal with it as one incident. It feels similar to

the NICU Serratia incident(2015) in which there was a high colonisation pressure with subsequent Serratia and Pseudomonal bacteraemias.

There looks to be a potential issue with BALs but clearly other commonalities would also need explored including drains, given recent issues on this site

Also, just so you are aware there is typing back today from a child who passed away after presenting unwell to A+E. This looks like a HCAI . Typing shows similarities to strains isolated back in 2017, details have been sent to local IPCT

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: Hamilton, Pauline [redacted]
Sent: 22 November 2019 15:38
To: BAGRADE, Linda (NHS GREATER GLASGOW & CLYDE); alison.balfou[redacted] Bowskill Gillian (NHS GREATER GLASGOW & CLYDE); COTTOM, Laura (NHS GREATER GLASGOW & CLYDE); DESHPANDE, Ashutosh (NHS GREATER GLASGOW & CLYDE); Devine, Sandra; Dhillon, Raje; Hamilton Catriona (NHS GREATER GLASGOW & CLYDE); INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE); IRVINE, Sharon (NHS GREATER GLASGOW & CLYDE); JAMDAR, Sara (NHS GREATER GLASGOW & CLYDE); Joannidis Pamela (NHS GREATER GLASGOW & CLYDE); Khanna Nitish (NHS GREATER GLASGOW & CLYDE); Leanord Alistair (NHS GREATER GLASGOW & CLYDE); MACLEOD, Mairi (NHS GREATER GLASGOW & CLYDE); MAREK, Aleksandra (NHS GREATER GLASGOW & CLYDE); McConnell, Donna; McDaid, Kirsty; Mills Gillian (NHS GREATER GLASGOW & CLYDE); Murphy, Michael E; Peters, Christine; POLUBOTHU, Padmaja (NHS GREATER GLASGOW & CLYDE); Pritchard Lynn (NHS GREATER GLASGOW & CLYDE); Smith, Andrew; SMITH, Andrew (NHS NATIONAL SERVICES SCOTLAND); Valyraki, Kalliopi; Weinhardt, Barbara; Wright Pauline (NHS GREATER GLASGOW & CLYDE); Arbuckle William (NHS GREATER GLASGOW & CLYDE); Boyd Luanne (NHS GREATER GLASGOW & CLYDE); Cassidy Annemarie (NHS GREATER GLASGOW & CLYDE); Crawford Louise (NHS GREATER GLASGOW & CLYDE); Doherty Denise (NHS GREATER GLASGOW & CLYDE); Donnelly Michael (NHS GREATER GLASGOW & CLYDE); Douglas Kirsty (NHS GREATER GLASGOW & CLYDE); Fleming Alistair (NHS GREATER GLASGOW & CLYDE); Glancy Joan (NHS GREATER GLASGOW & CLYDE); Henderson Karen (NHS GREATER GLASGOW & CLYDE); Love Elizabeth (NHS GREATER GLASGOW & CLYDE); Macleod Alison (NHS GREATER GLASGOW & CLYDE); Mathieson David (NHS GREATER GLASGOW & CLYDE); Moore Marie (NHS GREATER GLASGOW & CLYDE); Murphy Deborah (NHS GREATER GLASGOW & CLYDE); O'neill, Julie Anne; Ozegemen Margaret (NHS GREATER GLASGOW & CLYDE); Smyth, Elaine; Spalding Jane (NHS GREATER GLASGOW & CLYDE); Wilson Gary (NHS GREATER GLASGOW & CLYDE); Hamilton Pauline (NHS GREATER GLASGOW & CLYDE); Lang Ann (NHS GREATER GLASGOW & CLYDE); Robertson, Angela
Subject: IPC Sector Reports - 22/11/19

Please find attached the IPC Weekly Sector Reports dated 22 November 2019.

Kind Regards
Pauline [redacted]

Pauline Hamilton
PA to Pamela Joannidis, Acting Associate Nurse Director Infection Prevention and Control

FW: Mucor case

BAIN, Marion (NHS NATIONAL SERVICES SCOTLAND)

Sat 21/12/2019 17:06

To: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]

Cc: PETERS, Christine (NHS AYRSHIRE AND ARRAN) [redacted]; Craig.White[redacted]
[redacted]

Dear Dr Inkster

Fiona McQueen has sent your recent email on to me. As you may be aware, I will be taking on the role of Director for Infection Prevention and Control in NHS Greater Glasgow and Clyde, starting on 6 January. I am keen to meet with both you and Dr Peters at the earliest opportunity and will look to get this put in place.

Kind regards
Marion

Professor Marion Bain

Mob: [redacted]
Web: www.nhsnss.org

From: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]
Sent: 20 December 2019 11:40
To: McQueen F (Fiona) [redacted]; Shepherd L (Lesley) [redacted]
Birch J (Jason) [redacted]
Cc: PETERS, Christine (NHS AYRSHIRE AND ARRAN) [redacted]
Subject: Mucor case

Hi,

I am concerned to read in the press this morning a statement from GGC regarding the Mucor case. Whilst I do not dispute that it was not the cause of death I am concerned regarding the following inaccuracies;

' During the IMT investigations there was a number of areas inspected for sources of mould with nil found'

' If there had been an ongoing unidentified source we would have expected to see more patient cases'

Fw: [ExternaltoGGC]Fw: IPC Sector Reports - 22/11/19

PETERS, Christine (NHS AYRSHIRE AND ARRAN) [redacted]
Mon 23/12/2019 10:41

To: BAIN, Marion (NHS NATIONAL SERVICES SCOTLAND) [redacted];Shepherd L (Lesley) <[redacted];Jason.Birch@[redacted];INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted];Fiona.McQueen[redacted]

Dear Prof Bain,

I am writing in the wake of the confusing media coverage over the weekend regarding the PICU deaths .

Please see Teresa's email below which she wrote nearly a month ago having assessed the cases . I am gravely concerned that GGC state that one was community acquired and one died of unrelated causes .

We may be missing something - I am acutely aware of being in the dark about much that is going on - but it would be useful to understand the basis for both these conclusions to be satisfied and confident In the statements being released . Teresa is extremely experienced in IMTs and HAI definitions and to overturn her assessment I suggest would require very sound reasoning especially given the context of other non bacteraemia cases and environmental sampling , including a leaking roof , which have grown pseudomonas and serratia among other organisms. The broader typing results are also important to consider.

Having seen inaccuracies in a number of statements last week , my concern is that public confidence will be further undermined should these cases end up being re defined, and most importantly that the families do not suffer additional pain .

I am not at work today but am working tomorrow and Thursday Friday this week.

Kind regards ,

Christine Peters

From: PETERS, Christine (NHS AYRSHIRE AND ARRAN)
Sent: 13 December 2019 12:33:23
To: Jason.Birch[redacted]
Subject: Fw: [ExternaltoGGC]Fw: IPC Sector Reports - 22/11/19

Hi Jason, sorry to bombard you but since this email from Teresa there have been more samples positive for Serratia and Pseudomonas .

kr
Christine

From: Peters, Christine[redacted]
Sent: 13 December 2019 12:32
To: PETERS, Christine (NHS AYRSHIRE AND ARRAN)
Subject: FW: [ExternaltoGGC]Fw: IPC Sector Reports - 22/11/19

From: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]
Sent: 13 December 2019 12:29
To: Peters, Christine
Subject: [ExternaltoGGC]Fw: [ExternaltoGGC]Fw: IPC Sector Reports - 22/11/19

Dr Teresa Inkster
Consultant Microbiologist, QEUH
National Training Programme Director Medical Microbiology
Dept of Microbiology
Queen Elizabeth University Hospital
Glasgow
Direct dial : [redacted]

From: Leanord, Alistair [redacted]
Sent: 26 November 2019 13:25
To: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE); Peters, Christine; DESHPANDE, Ashutosh (NHS GREATER GLASGOW & CLYDE); Wright Pauline (NHS GREATER GLASGOW & CLYDE); Khanna Nitish (NHS GREATER GLASGOW & CLYDE); alison.balfou[redacted]; Valyraki, Kalliopi; KHALSA, Kamaljit (NHS GREATER GLASGOW & CLYDE)
Cc: Gardiner Robert (NHS GREATER GLASGOW & CLYDE); Devine, Sandra
Subject: Re: [ExternaltoGGC]Fw: IPC Sector Reports - 22/11/19

Teresa

Thanks for this.

We will look into it.

Cheers

Al

Sent from my BlackBerry 10 smartphone on the EE network.

From: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)
Sent: Tuesday, 26 November 2019 12:02
To: Leanord, Alistair; Peters, Christine; Deshpande, Ashutosh (NHSmail); Wright, Pauline; Khanna, Nitish; Balfour, Alison; Valyraki, Kalliopi; KHALSA, Kamaljit (NHS GREATER GLASGOW & CLYDE)
Cc: Gardiner, Robert
Subject: [ExternaltoGGC]Fw: IPC Sector Reports - 22/11/19

Hi Al,

I note on the Friday report reference to the Pseudomonas incident in PICU and the HIIAT reporting. I am confused as to why the situation in PICU would not in fact be a Red

I was covering PICU the other week and I am aware of these cases and others

There have been two HAI Pseudomonal bacteraemias with one patient having this listed on part 1b of the death certificate. The other patients DC was completed before knowledge of the bacteraemia.

In addition there are recent BAL samples from 2 other patients growing Pseudomonas

There are also BAL samples from a number of patients with Acinetobacter , two of which were last week confirmed by typing to be the same

I am aware today of a hospital acquired Serratia in blood cultures from a 2A patient in PICU who has sadly passed away, by definition an HAI attributable to PICU

Whilst I am aware separate PAGS and IMTs have been held this picture suggests an environmental issue on the unit, and perhaps it would make sense to deal with it as one incident. It feels similar to the NICU Serratia incident(2015) in which there was a high colonisation pressure with subsequent Serratia and Pseudomonal bacteraemias.

There looks to be a potential issue with BALs but clearly other commonalities would also need explored including drains, given recent issues on this site

Also, just so you are aware there is typing back today from a child who passed away after presenting unwell to A+E. This looks like a HCAI . Typing shows similarities to strains isolated back in 2017, details have been sent to local IPCT

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: Hamilton, Pauline [redacted]
Sent: 22 November 2019 15:38
To: BAGRADE, Linda (NHS GREATER GLASGOW & CLYDE); alison.balfou[redacted] Bowskill Gillian (NHS GREATER GLASGOW & CLYDE); COTTOM, Laura (NHS GREATER GLASGOW & CLYDE); DESHPANDE, Ashutosh (NHS GREATER GLASGOW & CLYDE); Devine, Sandra; Dhillon, Raje; Hamilton Catriona (NHS GREATER GLASGOW & CLYDE); INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE); IRVINE, Sharon (NHS GREATER GLASGOW & CLYDE); JAMDAR, Sara (NHS GREATER GLASGOW & CLYDE); Joannidis Pamela (NHS GREATER GLASGOW & CLYDE); Khanna Nitish (NHS GREATER GLASGOW & CLYDE); Leanord Alistair (NHS GREATER GLASGOW & CLYDE); MACLEOD, Mairi (NHS GREATER GLASGOW & CLYDE); MAREK, Aleksandra (NHS GREATER GLASGOW & CLYDE); McConnell, Donna; McDaid, Kirsty; Mills Gillian (NHS GREATER GLASGOW & CLYDE); Murphy, Michael E; Peters, Christine; POLUBOTHU, Padmaja (NHS GREATER GLASGOW & CLYDE); Pritchard Lynn (NHS GREATER GLASGOW & CLYDE); Smith, Andrew; SMITH, Andrew (NHS NATIONAL SERVICES SCOTLAND); Valyraki, Kalliopi; Weinhardt, Barbara; Wright Pauline (NHS GREATER GLASGOW & CLYDE); Arbuckle William (NHS GREATER GLASGOW & CLYDE); Boyd Luanne (NHS GREATER GLASGOW & CLYDE); Cassidy Annemarie (NHS GREATER GLASGOW & CLYDE); Crawford Louise (NHS GREATER GLASGOW & CLYDE); Doherty Denise (NHS GREATER GLASGOW & CLYDE); Donnelly Michael (NHS GREATER GLASGOW & CLYDE); Douglas Kirsty (NHS GREATER GLASGOW & CLYDE); Fleming Alistair (NHS GREATER GLASGOW & CLYDE); Glancy Joan (NHS GREATER GLASGOW & CLYDE); Henderson Karen (NHS GREATER GLASGOW & CLYDE); Love Elizabeth (NHS GREATER GLASGOW & CLYDE); Macleod Alison (NHS GREATER GLASGOW & CLYDE); Mathieson David (NHS GREATER GLASGOW & CLYDE); Moore Marie (NHS GREATER GLASGOW & CLYDE); Murphy Deborah (NHS GREATER GLASGOW & CLYDE); O'neill, Julie Anne; Ozegemen Margaret (NHS GREATER GLASGOW & CLYDE); Smyth, Elaine; Spalding Jane (NHS GREATER GLASGOW & CLYDE); Wilson Gary (NHS GREATER GLASGOW & CLYDE); Hamilton Pauline (NHS GREATER GLASGOW & CLYDE); Lang Ann (NHS GREATER

Ward 4C QEUH

INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)

Mon 30/12/2019 11:59

To: lesley.shepherd@[redacted] keith.morri[redacted] Fiona.McQueen[redacted]

Cc: PETERS, Christine (NHS AYRSHIRE AND ARRAN) [redacted]; BAIN, Marion (NHS NATIONAL SERVICES SCOTLAND) <[redacted]

4 attachments

SBAR 4C.doc; vent email.doc; vent email 2.doc; Specialist Critical Vent meeting 310719 - Minutes (1).pdf;

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 .

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 [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;

[redacted]

Re: Pseudomonas bacteraemias

INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]
Mon 06/01/2020 10:44

To: Shepherd L (Lesley) [redacted];PETERS, Christine (NHS AYRSHIRE AND ARRAN) [redacted];BAIN, Marion (NHS NATIONAL SERVICES SCOTLAND) [redacted]

Hi Lesley , it would be good to catch up . Free Tuesday afternoon or Wednesday if either suit.

The child had a normal CXR on admission with changes developing post op which progressed to consolidation on the 23rd.

I also note media coverage yesterday regarding Stenotrophomonas in 2017 and I note inaccuracies in the GGC response. I was off sick then but I do know that the lab did not take 6 weeks to develop a test for Stenotrophomonas. We were testing for this organism before this time and had isolated it in from the water in 2016, along with rarer Gram negatives such as Cupriavidus and Elizabethkingia sp.

I note that there is continued emphasis in media responses regarding different strains of organisms isolated , translated to mean no problem or source. We know from environmental incidents that this is not in fact the case .All this tells us is that there is no patient to patient cross transmission . I have stated this many times over the past decade and have this opinion supported in writing by water experts . Despite this the local IPCT refuses to acknowledge this point, which is most frustrating.

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: Lesley.Shepherd[redacted]
Sent: 05 January 2020 21:58
To: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE); PETERS, Christine (NHS AYRSHIRE AND ARRAN); BAIN, Marion (NHS NATIONAL SERVICES SCOTLAND)
Subject: RE: Pseudomonas bacteraemias

Hi Theresa/ Christine

Sorry I haven't got back to you but have been off work. Back tomorrow.

This is really helpful and I would also agree that case one from PICU is an HCAI however GGC are refuting that as the child had changes on the chest xray on admission apparently.

Would be good to catch up next week if possible? Are you meeting with marion this week?

Kind regards,

Lesley

Lesley Shepherd
Professional Advisor
Scottish Government

From: "INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)" [redacted]
Sent: 30 Dec 2019 15:50
To: "PETERS, Christine (NHS AYRSHIRE AND ARRAN)" [redacted] "Shepherd L (Lesley)" [redacted]; "BAIN, Marion (NHS NATIONAL SERVICES SCOTLAND)" [redacted]
Subject: Re: Pseudomonas bacteraemias

Hi,

Agree with all of that.

I remain confused as to why one is classed as community onset;

Patient 1 was admitted 18th Sept and positive on BAL on 21st and blood culture 23rd Sept. No prior colonisation. Clear HAI by definition. Typing clustering with an appendicectomy case, further evidence of a hospital strain

Patient 2 - inpatient since birth, blood culture and peritoneal fluid positive 7/11. HAI by definition

Also, I note on authorising lab results two possible environmental sources, the drains and water from a recent leak ? from sprinkler system. I'm not sure why these would not be sent for typing but that has been the instruction from IPCT.

Kr
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: PETERS, Christine (NHS AYRSHIRE AND ARRAN)
Sent: 30 December 2019 12:41
To: Lesley.Shepherd[redacted] BAIN, Marion (NHS NATIONAL SERVICES SCOTLAND)
Cc: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)
Subject: Pseudomonas bacteraemias

Hi Lesley

I had a quick look at pseudomonas bacteraemia cases last week. The data I have from Telepath has been gathered by new IT staff so I am not 100% confident in it but Kathleen Harvey wood said it didn't sound far out, and she keeps her finger very much on the pulse.

I did a gather on pseudomonas from all sites and sample types since July 2015 - September 2019 from laboratory LIMs system. This excludes the recent 3 cases which were all deaths.

Interestingly since the childrens hospital opened there have been only 9 patients with Pseudomonas aeurginosa bacteraemias ie rare.

1 was the NICU death in 2015
3 were part of 2A/ 6A water incidents
5 were PICU cases

All have been HAIs to date as far as I can briefly deduct. With only one death with sepsis as noted in NICU.

My conclusions - if this data is verified, :

1, PA bacteraemia is NOT common in any patient group
2. Death from PA bacteraemia has been rare till september 2019 in-fact one death in 4.5 years in a neonate which triggered a red HIATT and SG intervention in the serratia outbreak.
3. All have been HAI till September 2019

Of note 2 of the 5 in PICU were also isolated from BAL , and 3 were post cardiac patients.
Therefore the three deaths with PA bacteraemia recorded since then would represent the first 2 PA bacteraemias classified as non HAI, and include the first deaths with Pseudomonas aeruginosa since 2015. This clustering also represents an increase in frequency and occurs at a time of other environmental gram negative cases very similar to the patterns previously experienced in NICU, PICU and haem onc.

I would interested if HPS have looked atthe PA epidemiology in RHC and come up with similar numbers.

Again just to reiterate this is a very quick and inbetween calls kind of look at the data.
kr

Christine

Re: Follow up Confidential

PETERS, Christine (NHS AYRSHIRE AND ARRAN)

Mon 20/01/2020 21:15

To: BAIN, Marion (NHS NATIONAL SERVICES SCOTLAND) [redacted]; INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]

Thanks Marion for responding to all points raised. I appreciate it is early days in the process of improving the situation and look forward to tomorrow's discussions.

Kr

Christine

From: BAIN, Marion (NHS NATIONAL SERVICES SCOTLAND)
Sent: 20 January 2020 20:43:48
To: PETERS, Christine (NHS AYRSHIRE AND ARRAN); INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)
Subject: RE: Follow up Confidential

Thanks both for your emails.

Teresa's question is one of those that I have been following up. I had some feedback today that the report is close to being finalised – so I will be clarifying when that will be.

Thanks Christine too for the comments on the media statement, and I appreciate your concerns. I am meeting with GGC comms leads this week to discuss.

I am also thoughtful about the Whistle-blower report, and how that has felt – and very sorry that has been upsetting. It will be good to discuss that tomorrow too.

Overall I am keen, as I know you both are, that we can get GGC back into a positive and collaborative place for the benefit of patients. And will welcome working with you further to achieve that.

Kind regards
Marion

Professor Marion Bain
Director of Infection Prevention and Control
NHS Greater Glasgow and Clyde

Senior Medical Consultant
NHS National Services Scotland

Mob: [redacted]

From: PETERS, Christine (NHS AYRSHIRE AND ARRAN) [redacted]
Sent: 20 January 2020 17:05
To: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]; BAIN, Marion (NHS NATIONAL SERVICES SCOTLAND) [redacted]
Subject: Re: Follow up Confidential

Hi Marion,

As a follow up to Teresa's email below , I was taken aback yesterday by publication in teh media of a statement by GGC regarding the Expert panel's conclusions regarding the Cryptococcus cases and pigeons links

.

Specifically :

To date this expert panel has identified:
Who is on the expert panel ? I fail to understand how the membership are considered not to have conflict of interest when Teresa and myself have been barred from involvement due to conflict of interest and possibility of influencing outcome. In fact we are the least conflicted as we had no part in the design or sign off of the building and proposed a number of hypothesis from the outset. We also were present and involved at the time of the cases.

- *As Cryptococcal fungi are widespread naturally occurring in the environment, a specific source has not been found*
- *Cryptococcus neoformans (not var Gatti which is different) is considered a zooinosis linked to birds, particularly pigeons and specifically pigeon guano.*

D espite extensive testing of the hospital environment, we have found no evidence of Cryptococcus neoformans in or around the hospital
Cryptococcus neoformans is fairly diffiuclt to isolate from environmental samples, particularly air sampling. the vast majority of samples were taken post clearance of the plant room .Even in areas of high levels o f cryptococcosis such as Iran, the percentage of positive cultures of hundreds of pigeon faeces samples is as low as 2.5% . this does not undermine the already well established link of pigeon guango and clinical cases. Of note there are CDC BMT guidelines that specify the need to ensure no pigeon nesting near units housing immune compromised patients.

If cryptococcus is widespread in the environment does this lack of isolation mean that it is infact NOT widespread in and around QEUH ? Which is it? Either it is and the testing is immaterial and not worth quoting, or the testing proves that it is not widespread. This is an inconsistency that many have pointed out to me since the public statement was made.

- *The plant room – initially thought to be the source – has been ruled out*
- *the plant room was found to be infested with pigeons and contaminated with faeces at the time that patients contracted cryptococcus neoformans , this was the obvious main hypothesis for a source. However a number of hypotheses were considered even at the outset as my report from the time illustrates . Perhaps robust and conclusive evidence exists that justifies this very strong claim .to say that a more likely hypothesis has been found would be interesting and valid if evidence exists, but "ruled out" suggestes extremely strong empirical evidence which I have to say has not even been hinted at in any of our conversations. Any future scrutiny would require overwhelming empirical evidence to support such a strong statement in the context of the epidemiological evidence.*

- *There have been no further cases since last year.*

The key measure put in place was the rapid cleaning up of the pigeon mess in the plant room and pest control activities. No cases since then strongly supports the plant room hypothesis, The case mix is the same, prophylaxis the same, accomodation the same and if C neoformans is all around all the time , one would expect more cases both prior to the incident and since given the numbers of patients treated.

This panel continues to meet and their full report will be published in due course.
On harm to human health –
Our public health team with special responsibility for environmental concerns has confirmed that the risk to healthy humans from pigeons is low.
For those who are vulnerable to infection from environmental bacteria or fungi because of their illness or treatment, NHSGGC have clinical protocols to protect them from infection – including the option to place patients in facilities with specialist ventilation and treatment with a range of prophylaxis antibiotics and antifungals.

the specialist facilities referred to are not sufficient to protect against air borne cryptococcus or other fungi and its disappointing to see such a suggestion in the public domain in light of the HSE improvement notice on 4C , the reality of the 6A accomodation and the 4B air sampling results and air movements as described by John Hood.

In conclusion I find the statement highly uncomfortable, bordering on the embarrassing to read and believe that it will not stand the test of time.

kr
Christine

From: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)
Sent: 15 January 2020 10:47
To: BAIN, Marion (NHS NATIONAL SERVICES SCOTLAND); PETERS, Christine (NHS AYRSHIRE AND ARRAN)
Subject: Re: Follow up

Thanks Marion

One of the issues I am particularly concerned about it is the governance in relation to the Cryptococcal advisory group. This group was established as a subgroup of the Cryptococcal IMT and the report commissioned by myself as the chair of that IMT.

I am aware that parts of the report have been discussed at board meetings and submitted to HSE. This is failed governance as the report should come back to the IMT for comment and discussion before being disseminated elsewhere. Also it is misleading to submit sections of an incomplete report to external agencies without the full picture, particularly when it does not make reference to epidemiology

It would be useful for me as the Chair of the IMT to have an estimated date of report completion as this work has now gone on for a year .

I would also like to point out that this group is not independent, several members of the Crypto IMT sit on this group

Kr
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: BAIN, Marion (NHS NATIONAL SERVICES SCOTLAND)
Sent: 15 January 2020 09:20
To: PETERS, Christine (NHS AYRSHIRE AND ARRAN); INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)
Subject: RE: Follow up

Dear Christine and Teresa

Just wanted to give you a quick update. I have meetings in the diary over the next couple of weeks with relevant people to discuss the points below, and will get back to you once I've had those discussions.

All the best
Marion

Professor Marion Bain
Director of Infection Prevention and Control
NHS Greater Glasgow and Clyde

Senior Medical Consultant
NHS National Services Scotland

Mob: [redacted]

From: PETERS, Christine (NHS AYRSHIRE AND ARRAN) [redacted]
Sent: 13 January 2020 11:20
To: BAIN, Marion (NHS NATIONAL SERVICES SCOTLAND) [redacted]
Cc: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]
Subject: Re: Follow up

Hi Marion, Thanks for your response and I look forward to future discussions .
Kr
Christine

From: BAIN, Marion (NHS NATIONAL SERVICES SCOTLAND)
Sent: 13 January 2020 10:24:12
To: PETERS, Christine (NHS AYRSHIRE AND ARRAN)
Cc: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE)
Subject: RE: Follow up

Hello Christine, and thank you to you and Teresa for your time too.

On the other issues:

I will liaise with colleagues on the outstanding issues you mention and get back to you.
On the public statements - Craig White and I have been discussing this and I am checking how these have been informed. Once I have some more details I would welcome another discussion.

Best wishes
Marion

Professor Marion Bain
Director of Infection Prevention and Control
NHS Greater Glasgow and Clyde

Senior Medical Consultant
NHS National Services Scotland

Mob: [redacted]

From: PETERS, Christine (NHS AYRSHIRE AND ARRAN) [redacted]
Sent: 10 January 2020 16:46
To: BAIN, Marion (NHS NATIONAL SERVICES SCOTLAND) [redacted]

Cc: INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]
Subject: Follow up

Dear Marion,

Thankyou for meeting with us both yesterday and for taking the time to listen to the history that we related.

On reflection there are a couple of issues that we would also like to raise:

1. Outstanding actions from investigating groups with in the organisation:
- HPS whistle blow investigation chaired by Dr De Casteker - was due to update us on documentation of meeting as well as outcomes in early Novemeber with nothing communicated since our interviews in Spetember - covering Clinical Governance, Minutes being inaccurate and changing , Sick leave management and IMT demission process
- Meetings with senior management regarding infection issues - patient placement polcy was to be provided to Microbiology consultants - outstanding

2. Public statements - we have been raising our deep concerns with members of the Oversight Committee regarding accuracy of media statements (as read in the press) as well as comminications to parents. We wondwer how this is being progressed..

thanks again for your time and hope you have a good weekend,
kr
Christine

Consultant MIcrobiologist
QEUH

Concerns raised about accuracy of statements

BAIN, Marion (NHS NATIONAL SERVICES SCOTLAND)

Tue 11/02/2020 13:46

To:Bustillo Sandra (NHS GREATER GLASGOW & CLYDE) [redacted]

Cc:PETERS, Christine (NHS AYRSHIRE AND ARRAN) [redacted]; INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted];

5 attachments

Walther2019_Article_OutbreaksOfMucoralesAndTheSpec (1).pdf; Incident Report Mucor Final.docx; SBAR 4C.doc; FW: Follow up Confidential ; FW: Responses to Parents Question 6A ;

Dear Sandra

As you are aware, some concerns have been raised with me by Dr Peters and Dr Inkster about the accuracy of the published responses to the questions raised by the families of children treated on the haemato-oncology wards at QEUH and RHC, and also the responses from GGC cited in the media relating to recent stories that have been published.

The areas of concern are set out below along with emails and relevant other documents which relate to these concerns, which I have Drs Peters and Dr Inksters' agreement to share.

1. Concerns with the published answers to the parents' questions - Dr Peters' email of 11 Dec 2019 to Fiona McQueen and Craig White details these.

2. Four particular areas of concern in recent GGC responses in the media, namely:
   - The GGC statement 20 Dec 2019 on the Mucor case – a related scientific paper and IMT report are attached
   - The GGC statement 5 Jan 2020 regarding Stenotrophomonas in 2017 in particular the stated time taken to develop a test
   - The GGC statement Dec 2019 responding to the HSE improvement notice for 4C – a relevant SBAR attached
   - The GGC statement 19 January regarding Cryptococcus– Dr Peters email to me of 20 January is attached

I will call you within the next few days to discuss next steps. A meeting to discuss in more detail looks like it would be the best way forward.

Kind regards
Marion

Professor Marion Bain
Director of Infection Prevention and Control
NHS Greater Glasgow and Clyde

Senior Medical Consultant
NHS National Services Scotland

Mob: [redacted]

Responses to families questions and media responses

BAIN, Marion (NHS NATIONAL SERVICES SCOTLAND)

Sun 09/02/2020 16:51

To:PETERS, Christine (NHS AYRSHIRE AND ARRAN) [redacted]

Cc:INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]

5 attachments

FW: Responses to Parents Question 6A ; Fw: Mucor case; FW: Pseudomonas bacteraemias; Fw: Ward 4C QEUH; FW: Follow up Confidential ;

Hello Christine

I have attached the emails that I intend to share with Sandra Bustillo in order to take forward the areas where you and Teresa have concerns. I have deleted parts of the email trails that are not relevant but just wanted to do a final check before sending that you are happy for me to send these on to Sandra.

I have copied Teresa in but conscious that she is on leave so am hoping you will be able to confirm on behalf of you both so we can progress this – but if we need to wait until Teresa is back then we can do so.

Best wishes
Marion

Professor Marion Bain
Director of Infection Prevention and Control
NHS Greater Glasgow and Clyde

Senior Medical Consultant
NHS National Services Scotland

Mob: [redacted]

Re: Thurdsay meeting

BAIN, Marion (NHS NATIONAL SERVICES SCOTLAND)

Tue 25/02/2020 19:27

To:INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted];

Cc:PETERS, Christine (NHS AYRSHIRE AND ARRAN) [redacted];

Thanks Teresa, and it will be good to work through these in our discussion.

On one specific we did cover the Crypococcus hypothesis reference (3.4.5) at the Board today (following John Hood's message to me) and there will be an amendment to the QEUH and RHC Update in the minute.

Kind regards
Marion

On 25 Feb 2020, at 10:22, INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted] wrote:

Hi Marion, thanks for your email. In addition to what you suggested can we discuss the board papers on Thursday. We noted the following;

Paper No 20/04 (attached)

Section 3.3 Facilities and Estates

Section 3.3.2 states that the opportunity was taken to upgrade the ventilation. In fact this upgrade is essential due to the external ventilation report highlighting major concerns with the ventilation strategy which puts patients at risk. This is supported by the HPS situational assessment published in relation to wards 2A/B and concern that the number of outbreaks experienced was due to inadequate ventilation.

Section 3.3.3. Again states the opportunity is to be taken to upgrade shower rooms. Again essential due to the presence of extensive black mould behind IPS panels which presents a risk to immunosuppressed patients (some of the pictures attached)

Section 3.4. This section and subsections that follow summarise findings from the Cryptococcal advisory group. This group is a sub group of IMT and reports to IMT. We have previously highlighted the governance failure and the fact that the IMT has not had a chance to consider and comment on findings which are now already in the public domain. We have previously raised concern that the chair of the IMT was requested not to sit on this group as it had to be independent but note that there are several other members of the IMT on the group

Section 3.4.2 Should state 'one of the hypotheses at the time' as there were several considered

Section 3.4.5 States that the plant room has been categorically ruled out. It is not possible to categorically rule out any hypotheses on a retrospective basis. There is a strong epidemiological link to the plant room and given the emergence of new photographs just last week taken in November which show contamination with bird faeces and dead birds, this investigation is not concluded. The chair of the group has in fact arranged to revisit the plant room in light of this new evidence. It is of huge concern that these photographs and a subsequent set from the first week in December were not shared with the IMT at the time or the expert advisory group until now. (pictures and email below)

There is no mention in this section of the fundamental issue which is a lack of suitable accommodation for immunosuppressed patients

This leads us on to part 5.0 HSE investigation and ward 4C.

Section 5 HSE investigation

It states that haemato-oncology patients do not require specialist ventilation . This is in fact not the case and this ward does not meet the SHTM 03-03 standards for either neutropenic rooms or a general medical ward (given the low air change rate). Information pertaining to this including an SBAR has already been sent to SG

Minutes of the meeting of finance , planning and performance committee 3/12/19 (attached)

Section 99

Again this relates to Cryptococcus and information from the advisory group. It states that the likely source was Cryptococcal spores entering the building from the outside air. There is no evidence of Cryptococcal spores coming in from outside air, it has not been found in either internal or external air samples. This phenomenon should it be occurring would be a constant and therefore we would expect to see cases of Cryptococcus in hospitals country wide given the increasing number of susceptible individuals.

Again regardless of what actually took place in terms of a transmission event the key is that there are insufficient rooms for immunocompromised patients and again this is not described.

There are comments in another paper regarding whistleblowers not going via appropriate channels and it would be good to understand what is meant be that.

We would welcome further discussion

Kind regards

Teresa and Christine

r Teresa Inkster
nsultant Microbiologist, QEUH
tional Training Programme Director Medical Microbiology
pt of Microbiology
een Elizabeth University Hospital
sgow

comments on statement

INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]

Mon 17/02/2020 12:17

To: BAIN, Marion (NHS NATIONAL SERVICES SCOTLAND) [redacted]

Cc: PETERS, Christine (NHS AYRSHIRE AND ARRAN) [redacted]

HI Marion,

Please find attached our comments on the summons statement. We are very concerned regarding this statement and its accuracy. Issues were identified by us in 2015, outlined in the attached letter to Dr Stewart. They were not dealt with as they arose. They required a lot of persistence as evidenced by the attached SBARs and there are still areas of work outstanding that do not meet requirements of the relevant SHTM

Kind regards

Teresa and Christine

Dr Teresa Inkster
Consultant Microbiologist, QEUH
National Training Programme Director Medical Microbiology
Dept of Microbiology
Queen Elizabeth University Hospital
Glasgow
Direct dial : [redacted]

CONFIDENTIAL

Draft

Statement on Summons

NHS Greater Glasgow and Clyde has served summons on Multiplex, Capita and Currie and Brown for loss and damages incurred due to a number of technical issues with the Queen Elizabeth University Hospital and the Royal Hospital for Children.

These technical issues relates to defects identified since the hospitals opened in 2015, the majority of which have since been addressed or are currently being addressed.

Given the public interest in the hospitals and legal proceedings, the summons are being published today (xx February 2020) [link to summons].,

This legal action is being taken following a review commissioned by NHSGGC to consider how the technical issues arose and any further actions required.

Jane Grant, Chief Executive, said: "We would assure patients and their families that patient safety is paramount and that patient care at the two hospitals is of a high standard.

"Whilst we are now taking legal action on a number of design and installation issues that have affected the hospitals, it is important to stress that the buildings are safe and that they fully meet the necessary building standards regulations.

"The issues have emerged over the four years since the hospitals opened. We addressed each issue as soon as it arose and, with the exception of the energy centre which continues not to achieve the required efficiencies, have now made the necessary improvements or are in the process of doing so.

"As the matters are now the subject of court proceedings, we are not in a position to comment further."

Ends.

Background

The current estimation of damages and losses is approximately £73 m, which include the costs incurred to date and an estimate of future anticipated costs.

It should be noted that because this sum is an estimate it may be subject to change.

Action taken to address technical issues

- Water system - Issues with the water system were first detected in 2018 and there have previously been two independent reviews of organisms in the water supply. The control of bacteria within the water systems has been achieved by the installation of Chlorine Dioxide dosing plant by NHS GGC. The water supply to the hospital has since been assessed by the independent authorising engineer as 'wholesome'.

Commented [I1]: What has been addressed ? and what is outstanding?

Commented [I2]: We disagree with this statement with regard to PPVL rooms, ward 4C. PICU, NICU, Adult critical care , ID unit

Commented [I3]: No they were not. These issues were detailed in our letter to David Stewart in 2015 . SBARs we issued by TI in role as lead in 2016 but took significant time to be addressed e.g. negative pressure rooms only complete in May 2019.

Commented [I4]: No. Issues were identified in 2015. The lead ICD at the time has confirmed he was taking water samples and this is in the HPS report. We are aware of the DMA reports that were sent to GGC recipients.

Commented [I5]: Who undertook these and what was the conclusion?

Commented [I6]: Fungi and mycobacteria have not been controlled

Commented [I7]: This is a term used for drinking and not relevant to the immunocompromised setting

- Ventilation – An upgrade was carried out in four paediatric Bone Marrow Transplant (BMT) isolation rooms in 2015. Testing confirmed full compliance with the appropriate technical building requirements. Work was carried out on the adult BMT in 2017 unit to ensure optimal air quality purification levels for this group of patients. We are proactively investing £2 million to upgrade the ventilation system in Ward 2A and 2B of the RHC to provide optimal, state of the art facilities for all our young haemato-oncology patients.
- Glazing - A protective canopy is being installed.
- Doors – the doors required to be repaired and replaced frequently and have been as and when required.
- Roof – a section has been replaced.

Commented [I8]: No this upgrade was in 2017 .

Commented [I9]: Still doesn't meet spec and only the bedrooms are hepa filtered. Air testing highlights less than desirable air quality in 4b due to lack of hepa in corridor and other areas

Thurdsay meeting

INKSTER, Teresa (NHS GREATER GLASGOW & CLYDE) [redacted]

Tue 25/02/2020 10:22

To: BAIN, Marion (NHS NATIONAL SERVICES SCOTLAND) [redacted]

Cc: PETERS, Christine (NHS AYRSHIRE AND ARRAN) [redacted]

5 attachments (4 MB)

item-11-paper-20_04-qeuh-and-rhc-update.pdf; item-19b-fppc-m-19_06-final.pdf; mould 1.png; mould 2.png; mould 3.png;

Hi Marion, thanks for your email. In addition to what you suggested can we discuss the board papers on Thursday. We noted the following;

Paper No 20/04 (attached)
Section 3.3 Facilities and Estates

Section 3.3.2 states that the opportunity was taken to upgrade the ventilation. In fact this upgrade is essential due to the external ventilation report highlighting major concerns with the ventilation strategy which puts patients at risk. This is supported by the HPS situational assessment published in relation to wards 2A/B and concern that the number of outbreaks experienced was due to inadequate ventilation.

Section 3.3.3. Again states the opportunity is to be taken to upgrade shower rooms. Again essential due to the presence of extensive black mould behind IPS panels which presents a risk to immunosuppressed patients (some of the pictures attached)

Section 3.4. This section and subsections that follow summarise findings from the Cryptococcal advisory group. This group is a sub group of IMT and reports to IMT. We have previously highlighted the governance failure and the fact that the IMT has not had a chance to consider and comment on findings which are now already in the public domain. We have previously raised concern that the chair of the IMT was requested not to sit on this group as it had to be independent but note that there are several other members of the IMT on the group

Section 3.4.2 Should state 'one of the hypotheses at the time' as there were several considered

Section 3.4.5 States that the plant room has been categorically ruled out. It is not possible to categorically rule out any hypotheses on a retrospective basis. There is a strong epidemiological link to the plant room and given the emergence of new photographs just last week taken in November which show contamination with bird faeces and dead birds, this investigation is not concluded. The chair of the group has in fact arranged to revisit the plant room in light of this new evidence. It is of huge concern that these photographs and a subsequent set from the first week in December were not shared with the IMT at the time or the expert advisory group until now. (pictures and email below)

There is no mention in this section of the fundamental issue which is a lack of suitable accommodation for immunosuppressed patients

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It states that haemato-oncology patients do not require specialist ventilation . This is in fact not the case and this ward does not meet the SHTM 03-03 standards for either neutropenic rooms or a

From: Bowman D (David)
Sent: 29 May 2019 11:18:06
To: Public Engagement Unit
Cc: Cabinet Secretary for Health and Sport, Hutchison D (David)
Subject: FW: QEUH and Sunday Herald article

Goodfellow M (Melanie)

PEU

Please could you scan this on to MACCS as an OR.

Thanks

David Bowman
Deputy Private Secretary
Ministerial Private Office (Health)
St Andrew's House
Edinburgh

All e-mails and attachments sent by a Ministerial Private Office to any other official on behalf of a Minister relating to a decision, request or comment made by a Minister, or a note of a Ministerial meeting, must be filed appropriately by the recipient. Private Offices do not keep official records of such e-mails or attachments.

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From: Hamilton T (Tracy)
<[redacted] On Behalf Of Freeman J (Jeane), MSP
Sent: 29 May 2019 11:11
To: Cabinet Secretary for Health and Sport
[redacted]
Cc: Freeman J (Jeane), MSP
[redacted]
>; Hamilton T (Tracy)
[redacted]
Subject: FW: QEUH and Sunday Herald article

Hi Andy, David,

Please see email below from Ms Redding which has been copied to Anas Sarwar MSP, for awareness and advice to Jeane.

I will return to Ms Redding and Mr Sarwar advising that her correspondence has been sent on for your attention.

Thanks,
Tracy

Tracy Hamilton | Head of Office to Jeane Freeman MSP
46-48 Glaisnock Street, Cumnock, East Ayrshire, KA18 1BY

Constituency Office: [redacted]
Parliamentary Office: [redacted] | FB: Jeane Freeman MSP

From: Penelope Redding [redacted]
Sent: 28 May 2019 22:52
To: Freeman J (Jeane), MSP [redacted]
>
Cc: Sarwar A (Anas), MSP [redacted]
Subject: QEUH and Sunday Herald article

Dear Ms Freeman

I read Hannah Rodgers well written article in the Sunday Herald and have been concerned that some of the responses from GGC are inaccurate. I have decided not to contact H Rodgers feeling that it was better for you to understand what I am worried about.

I was working as a microbiologist for GGC at the time of the Exophiala incident and to say that no patients were affected is inaccurate. The reason the incident was put in the whistleblowing SBAR was because there were concerns that the patient group affected were the cystic fibrotic patients. Both children and adults were affected. I am not sure if any patients required antifungal treatment. The long term consequences of this fungus being in the lungs of a patient with CF is a concern as it creates a more hostile lung environment for the bacteria that infect these patients and complicates their prospects of a lung transplant. It is worrying that the spoke person for GGC appears not to be fully informed and does not understand the concerns that were raised by the whistle blowers. There is good scientific literature to support the whistle blower's opinion of this significant event. The dishwashers were sampled once the outbreak was identified as they are recognised as a potential source of Exophiala.

I hope the Scottish Government and the inquiry have been correctly briefed. Are there any other inaccurate statements and reports being produced?. As I no longer work for GGC I do not know who is writing the statements, but believe inaccurate information will not be helpful to the inquiry if it comes to light later. I have been involved in the press accusing GGC of a cover up and it makes regaining public confidence even more difficult. It just plays into the hands of the press. Rebuilding trust is essential. The priority for the GGC should be resolving the issues, not covering things up, not bullying the people who raise concerns and listening to the experts who understand the issues. I do not think it is helpful to have a continuous flow of stories in the press. The energy of the people having to respond to FOIs and the need to put out statements would be better spent addressing the problems.

As I raised my concerns about the problems within GGC with Anas Sarwar some time ago I am copying him into this email.

Kind Regards,

Penelope Redding

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QEUH Oversight Board

Whistle blowers correspondence - Key issues raised – 2019/2020

Background information
Dr Theresa Inkster: Currently Consultant Microbiologist – was Lead ICD previously TBC

Dr Christine Peters: Consultant Microbiologist. She has been raising IPC risks associated with defects in the design, construction and commissioning of the QEUH and RHC since 2015. She was ICD from 2015 to 2017. Cf reports for water incident at the IMT on the microbiology of the taps and epidemiology of bacteraemias.

Dr Penelope Redding: Retired microbiologist. She worked as an infection doctor in NHS GGC for nearly 25 years.

Dr Inkster and Dr Peters worked together at the end of 2019.

Dr Inkster
Email from Dr Inkster to Lesley Morris, Keith Morris and Fiona McQueen of 30 December 2019 where she raised her concerns on the media coverage regarding the HSE improvement notice for ward 4C and the GGC statement which she says was inaccurate. She also forwarded info from the lead haematology clinician in December 2018 which confirms that high risk haematology patients are housed in this ward.

Her views on the GGC statement is that it is inaccurate as the same haematology patient population in the north of the city is housed in a fully HEPA filtered ward (B7, Beatson Oncology Centre). The SHTM is very clear on the requirements for neutropenic rooms. Current situation at the time was that ward 4B was not fully HEPA filtered as stated in the media response. Only the rooms were. At the time of the email the corridor and other spaces were not HEPA filtered, hence why they 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 reflected this.

She also added that she "raised concerns regarding 4C then, which was **before** she was aware of the Cryptococcal case in the ward, in response to the engineering report from ward 2A/B."

In the email to the lead haemato-oncology lead, she added that "When the paediatric haemato-oncology ward was decanted (2018?) there was a review the ventilation as there were some concerns. A number of issues were identified which had implications for other wards on the site, one of which was 4C".

Dr Peters replied to Dr Inkster's email on 30 December and all copy list supporting the above. She added that "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".

Background
Ward 4C was escalated along with other ventilation issues to the ICM and HAI exec lead in the first half of 2019. Subsequently Dr Inkster wrote a SBAR which was sent to the Critical Ventilation Steering Group and the Facilities Director for the SG meeting on 31 July 2019. The minutes state that the group endorsed the SBAR:

SBAR for Ward 4C – extract from Specialist Critical Ventilation Steering Group – 31 July 2019 – from Dr Inkster
TI advised that she had circulated the SBAR for Ward 4C to the group for feedback. The group agreed that they endorse the recommendations in the SBAR. AG will discuss with Tom Steele, Director of Estates & Facilities what the escalation path should be to progress these recommendations.

Patients in 4C 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.

Dr Peters
Email of 23 January 2019 from Dr Peters to JF raising issues from IPC risks and stating she will send a submission of 4 years of evidence as part of the QEUH IR. The submission was to include details of faults in the design and construction and commissioning that she identified and raised as issues, culminating in a detailed whistle blow to the board in 2017.

Email from Dr Peters to JF of 23 February raising credibility concerns about the HPS report.

Letter of 21 March 2019 to JF raising issue of management responsibility and action and governance in the context of patient safety.

Dr Redding
Email of 12 March 2019 to JF asking questions about the IR credibility given some IPC evidence is provided from staff.

Email of 28 May 2019 to JF about the Exophiala incidence, saying there was good scientific literature to support the whistle blower's opinion of this significant event. The dishwashers were sampled once the outbreak was identified as they are recognised as a potential source of Exophiala.

Email of 11 June 2019 to JF asking why didn't receive acknowledgement from the IR of receipt of her report. Reiterating her concerns over the impartiality of the IR, also asking for contact details for the IR.

Email of 2nd of September 2019 to JF about LICD resignation – concerns over IPC culture - part of this culture has been the exclusion / side lining of the infection control doctors in the decision-making process.

Letter from Dr Inkster and Dr Peters to JF – marked strictly confidential providing full details of all concerns raised – 2nd of December 2019.

16 July 20: Letter from two of the QEUH doctors wrote to the review (Dr T Inkster and Dr C Peters), calling for the QEUH Independent Review to be redacted because they believe it is inaccurate and causes them reputational damage. The two doctors had previously written to the Cabinet Secretary and she had urged them to share their concerns with the review.

16 July 2020: email to the Cabinet Secretary about the above and reply sent on 29 July, with reference to contacting the Lord Advocate.

31 July 2020: reply from the doctors to Cabinet Secretary, reference to meetings with CNO and access to the KPMG report and timeline and opportunity to comment.

10 August: further response from Cabinet Secretary to the above.
24 July 2020: Phil Raines meeting with Dr Inkster to discuss concerns, shared KPMG report and timeline.

27 July 2020: Dr Inkster sent feedback on the documents (including Dr P Redding's), mentioning inaccuracies and questioning the fact they were not asked to advise at the time of the report being produced. This led to the need for a further extension to the KPMG contract and delay of the final draft of the OB report.

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Dr Christine Peters

[redacted]

21 March 2019

Dear Jeanne,

Thank you for your letter dated 13 March 2019 and for your time taken to consider and respond to my correspondence with you regarding infection control and the built environment in Glasgow.

It is excellent that there is a review into the design, commissioning and maintenance of the QEUH and that chairs have been appointed and I appreciate the advice regarding submission. I will write to Elizabeth Burgess to confirm that I am content for my correspondence to be forwarded in confidence to the review committee.

I also thank you for your advice regarding current concerns that my colleague has and I have advised her of the possibility of meeting with Professor Fiona McQueen , as you have helpfully suggested. If that is something she feels she would like to take up she will follow up with your officials.

With regard to the whistleblowing service - I have availed myself of the service on a number of occasions over the past few years, as well as taking GMC, MDDUS and BMA advice and unfortunately have not found it useful in directing me to the most appropriate course of action. It is more of a listening service than a route to alert appropriate bodies of serious failings or patient safety concerns. The real nub of today's problem is that when the normal systems like line management fail, what should a doctor do to protect patients? Certainly a press bonanza does more harm than good in my opinion, and should be avoided as much as possible by having rigorous and transparent governance.

I eagerly anticipate the review and trust that this will be a learning opportunity for NHS Scotland , and I thank you for ensuring that this learning opportunity has not been missed.

Kind regards,

Christine Peters

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.

.

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.

From: Corr A (Andrew) on behalf of Cabinet Secretary for Health and Sport
Sent: 10 August 2020 15:09
To: McQueen F (Fiona); Cabinet Secretary for Health and Sport
Cc: White C (Craig)
Subject: RE: Priority: URGENT: Independent Review
Attachments: u417168_10-08-2020_15-00-01.pdf

Kathryn,

Many thanks for the revised letter. The Cab Sec has considered this and is content. Please find attached a signed copy for your records. I will issue this shortly.

Many thanks,
Andy

From: Stewart K (Kathryn) [redacted] **On Behalf Of** McQueen F (Fiona)
Sent: 06 August 2020 16:30
To: Cabinet Secretary for Health and Sport [redacted]; McQueen F (Fiona) [redacted]>
Cc: White C (Craig) [redacted]
Subject: RE: Priority: URGENT: Independent Review

Andy

Please find attached a revised letter for Ms Freeman's consideration.

thanks
Kathryn

Kathryn Stewart| Private Secretary to Fiona McQueen, Chief Nursing Officer|Chief Nursing Officer's Directorate| [redacted]

PLEASE NOTE I AM WORKING FROM HOME

From: Corr A (Andrew) [redacted] **On Behalf Of** Cabinet Secretary for Health and Sport
Sent: 05 August 2020 13:48
To: McQueen F (Fiona) [redacted]; Cabinet Secretary for Health and Sport [redacted]
Subject: RE: Priority: URGENT: Independent Review

Fiona,

As discussed just now with the Cab Sec – grateful if you could consider the attached letter and re-draft this to make it less defensive.

Many thanks,
Andy

From: Stewart K (Kathryn) [redacted]> **On Behalf Of** McQueen F (Fiona)
Sent: 03 August 2020 15:56
To: Cabinet Secretary for Health and Sport [redacted]

Cc: McQueen F (Fiona) [redacted]
Subject: RE: Priority: URGENT: Independent Review

David

Sorry, another small typo… one of those days ☺

Kathryn

Kathryn Stewart| Private Secretary to Fiona McQueen, Chief Nursing Officer|Chief Nursing Officer's Directorate| [redacted]

PLEASE NOTE I AM WORKING FROM HOME

From: Stewart K (Kathryn) **On Behalf Of** McQueen F (Fiona)
Sent: 03 August 2020 15:07
To: McQueen F (Fiona) [redacted]; Cabinet Secretary for Health and Sport [redacted]
Cc: White C (Craig) [redacted]>; Mooney S (Sharon) [redacted]; Bell D (Donna) [redacted]; Hutchison D (David) [redacted]; Mair S (Suzi) [redacted] Bain MB (Marion) [redacted]>; DCMO Health COVID19 [redacted]; Campariol-Scott C (Carole) [redacted]; DG Health & Social Care [redacted]; Mitchell E (Elinor) [redacted]; Lunt A (Aislinn) [redacted]; Gosling J (James) [redacted]>; Murray D (Diane) [redacted]; Allan L (Lara) [redacted]; Ives J (Josephine) [redacted]; Shepherd L (Lesley) [redacted]; Chalmers G (Greig) [redacted]; McLean P (Phillip) [redacted]; Raines P (Philip) [redacted]; Paterson J (John) [redacted]; Garland A (Ailsa) [redacted]; Birch J (Jason) [redacted]; Glass G (Gill) [redacted]; Communications Covid-19 [redacted]; Watters R (Rona) [redacted]; First Minister Covid Briefing Unit [redacted] Hegarty L (Lee) [redacted]; Noble G (Greg) [redacted]; Dunk R (Rachael) [redacted]; Morrison A (Alan) [redacted]
Subject: RE: Priority: URGENT: Independent Review

David

Apologies, typo in the previous version please use this version.

Kathryn

Kathryn Stewart| Private Secretary to Fiona McQueen, Chief Nursing Officer|Chief Nursing Officer's Directorate| [redacted]

PLEASE NOTE I AM WORKING FROM HOME

From: Stewart K (Kathryn) [redacted] **On Behalf Of** McQueen F (Fiona)
Sent: 03 August 2020 14:49
To: Cabinet Secretary for Health and Sport [redacted]
Cc: White C (Craig) [redacted]; McQueen F (Fiona) [redacted]; Mooney S (Sharon) [redacted]; Bell D (Donna) [redacted]; Hutchison D (David) [redacted]; Mair S (Suzi) [redacted]; Bain MB (Marion) [redacted]; DCMO Health COVID19 [redacted]; Campariol-Scott C (Carole) [redacted]; DG Health & Social Care [redacted]; Mitchell E (Elinor) [redacted]; Lunt A (Aislinn) [redacted]>; Gosling J (James) [redacted]; Murray D (Diane)

[redacted]; Allan L (Lara) [redacted]; Ives J (Josephine) [redacted]; Shepherd L (Lesley) [redacted]; Chalmers G (Greig) [redacted]; McLean P (Phillip) [redacted]; Raines P (Philip) [redacted]; Paterson J (John) [redacted]; Garland A (Ailsa) [redacted]; Birch J (Jason) [redacted]; Glass G (Gill) [redacted]; Communications Covid-19 [redacted]; Watters R (Rona) [redacted]; First Minister Covid Briefing Unit [redacted]; Hegarty L (Lee) [redacted]; Noble G (Greg) [redacted]; Dunk R (Rachael) [redacted]; Morrison A (Alan) [redacted]
Subject: RE: Priority: URGENT: Independent Review

David

With thanks to colleagues, please find attached a draft response to Drs Peters and Inkster for Ms Freeman's consideration. To note CNO has cleared this draft.

thanks
Kathryn

Kathryn Stewart| Private Secretary to Fiona McQueen, Chief Nursing Officer|Chief Nursing Officer's Directorate| [redacted]

PLEASE NOTE I AM WORKING FROM HOME

From: Bowman D (David) [redacted] **On Behalf Of** Cabinet Secretary for Health and Sport
Sent: 31 July 2020 16:32
To: Mooney S (Sharon) [redacted]
Cc: Bell D (Donna) [redacted]; Hutchison D (David) [redacted]; Mair S (Suzi) [redacted]; Bain MB (Marion) [redacted]; DCMO Health COVID19 [redacted]; Campariol-Scott C (Carole) [redacted]; DG Health & Social Care [redacted] Mitchell E (Elinor) [redacted]; Lunt A (Aislinn) [redacted]>; Gosling J (James) [redacted]; Murray D (Diane) [redacted]; Allan L (Lara) [redacted]>; Ives J (Josephine) [redacted]; Shepherd L (Lesley) [redacted]; Chalmers G (Greig) [redacted]; McLean P (Phillip) [redacted]; Raines P (Philip) [redacted]; Paterson J (John) [redacted]; Garland A (Ailsa) [redacted]; Birch J (Jason) [redacted] Glass G (Gill) [redacted]; Communications Covid-19 [redacted]; Watters R (Rona) [redacted]; First Minister Covid Briefing Unit [redacted]; White C (Craig) [redacted]; McQueen F (Fiona) [redacted]; Hegarty L (Lee) [redacted]; Noble G (Greg) [redacted]; Dunk R (Rachael) [redacted]; Morrison A (Alan) [redacted]; Cabinet Secretary for Health and Sport [redacted]
Subject: RE: Priority: URGENT: Independent Review

Hi Sharon

Please find attached a response letter from Dr Inkster and Dr Peters.

Grateful for your advice on this.

Thanks

David Bowman
Deputy Private Secretary
Ministerial Private Office (Health)
St Andrew's House
Edinburgh

All e-mails and attachments sent by a Ministerial Private Office to any other official on behalf of a Minister relating to a decision, request or comment made by a Minister, or a note of a Ministerial meeting, must be filed appropriately by the recipient. Private Offices do not keep official records of such e-mails or attachments.

Scottish Ministers, Special advisers and the Permanent Secretary are covered by the terms of the Lobbying (Scotland) Act 2016. See www.lobbying.scot

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From: Bowman D (David) **On Behalf Of** Cabinet Secretary for Health and Sport
Sent: 29 July 2020 10:50
To: Mooney S (Sharon) [redacted]
Cc: Bell D (Donna) [redacted] Hutchison D (David) [redacted]; Mair S (Suzi) [redacted]; Bain MB (Marion) [redacted]; DCMO Health COVID19 [redacted]; Campariol-Scott C (Carole) [redacted]; DG Health & Social Care [redacted]; Mitchell E (Elinor) [redacted]; Lunt A (Aislinn) [redacted]; Gosling J (James) [redacted]; Murray D (Diane) [redacted]; Allan L (Lara) [redacted]; Ives J (Josephine) [redacted] Shepherd L (Lesley) [redacted]; Chalmers G (Greig) [redacted]; McLean P (Phillip) [redacted]; Raines P (Philip) [redacted]; Paterson J (John) [redacted]; Garland A (Ailsa) [redacted]; Birch J (Jason) [redacted] Glass G (Gill) [redacted]; Communications Covid-19 [redacted]; Watters R (Rona) [redacted]; First Minister Covid Briefing Unit [redacted]; White C (Craig) [redacted]; McQueen F (Fiona) [redacted]; Hegarty L (Lee) [redacted]; Noble G (Greg) [redacted]; Dunk R (Rachael) [redacted]; Morrison A (Alan) [redacted]; Cabinet Secretary for Health and Sport [redacted] >
Subject: RE: Priority: URGENT: Independent Review

Hi Sharon

Thank you for drafting this letter.

I have now sent it out, copying in Anas Sarwar MSP and the BMA. Signed copy attached for reference.

Regards

David Bowman
Deputy Private Secretary
Ministerial Private Office (Health)
St Andrew's House
Edinburgh

All e-mails and attachments sent by a Ministerial Private Office to any other official on behalf of a Minister relating to a decision, request or comment made by a Minister, or a note of a Ministerial meeting, must be filed appropriately by the recipient. Private Offices do not keep official records of such e-mails or attachments.

Scottish Ministers, Special advisers and the Permanent Secretary are covered by the terms of the Lobbying (Scotland) Act 2016. See www.lobbying.scot

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From: Mooney S (Sharon) [redacted]
Sent: 23 July 2020 16:46
To: Cabinet Secretary for Health and Sport [redacted]
Cc: Bell D (Donna) [redacted]; Hutchison D (David) [redacted]; Mair S (Suzi) [redacted]; Bain MB (Marion) [redacted] DCMO Health COVID19 [redacted]; Campariol-Scott C (Carole) [redacted]; DG Health & Social Care [redacted]; Mitchell E (Elinor) [redacted]; Lunt A (Aislinn)

[redacted]; Gosling J (James) [redacted]; Murray D (Diane) [redacted]; Allan L (Lara) [redacted]; Ives J (Josephine) [redacted] Shepherd L (Lesley) [redacted]>; Chalmers G (Greig) [redacted]; McLean P (Phillip) [redacted]; Raines P (Philip) [redacted]; Paterson J (John) [redacted]; Garland A (Ailsa) [redacted]; Birch J (Jason) [redacted]; Glass G (Gill) [redacted]; Communications Covid-19 [redacted]; Watters R (Rona) [redacted]; First Minister Covid Briefing Unit [redacted] White C (Craig) [redacted]; McQueen F (Fiona) [redacted] Hegarty L (Lee) [redacted]; Noble G (Greg) [redacted]; Dunk R (Rachael) [redacted]; Morrison A (Alan) [redacted]
Subject: RE: Priority: URGENT: Independent Review

Good afternoon Jack,

Thank you for your email.

There is a section in the draft which advises that the Doctors should submit information more generally to the Inquiry. But after reflection, we think that the specific mention of evidence relating to ongoing investigations requires an additional sentence to be added. As such, I have inserted a short paragraph which addresses this point for the Cabinet Secretary's consideration.

I am off on leave tomorrow and Monday, but if you need any further assistance or clarification, our Unit Head, Lee Hegarty will be available to advise.

Kind regards,

Sharon

#hello my name is...
Sharon Mooney | Policy Manager | QEUH Independent Review and QEUH & RHCYP/DCN Public Inquiry Sponsor Team | Scottish Government | 2.ER St Andrew's House | Regent Road | Edinburgh | EH1 3DG | Work Mobile [redacted]

I am currently working from home, but can be contacted via email, skype or on the mobile number above.

From: Downie J (Jack) [redacted] > **On Behalf Of** Cabinet Secretary for Health and Sport
Sent: 23 July 2020 14:05
To: Mooney S (Sharon) [redacted]; Cabinet Secretary for Health and Sport [redacted]
Cc: Bell D (Donna) [redacted]; Hutchison D (David) [redacted]; Mair S (Suzi) [redacted]; Bain MB (Marion) [redacted]; DCMO Health COVID19 [redacted]; Campariol-Scott C (Carole) [redacted]; DG Health & Social Care [redacted]; Mitchell E (Elinor) [redacted] Lunt A (Aislinn) [redacted]; Gosling J (James) [redacted]; Murray D (Diane) [redacted]; Allan L (Lara) [redacted]; Ives J (Josephine) [redacted] Shepherd L (Lesley) [redacted]; Chalmers G (Greig) [redacted]; McLean P (Phillip) [redacted]; Raines P (Philip) [redacted] Paterson J (John) [redacted]; Garland A (Ailsa) [redacted]; Birch J (Jason) [redacted] Glass G (Gill) [redacted]; Communications Covid-19 [redacted]; Watters R (Rona) [redacted] First Minister Covid Briefing Unit [redacted] White C (Craig) [redacted] McQueen F (Fiona) [redacted]; Hegarty L (Lee) [redacted]; Noble G (Greg) [redacted]; Dunk R (Rachael) [redacted]; Morrison A (Alan) [redacted]
Subject: RE: Priority: URGENT: Independent Review

Sharon,

The Cabinet Secretary has considered and recalls that in their most recent letters they asked about submitting information to the Lord Advocate. This draft response doesn't touch on that therefore she would welcome your views on whether we should include a line into the reply that covers this point. Grateful for a revised letter as soon as practically possible.

Many thanks,
Jack

From: Mooney S (Sharon) [redacted]
Sent: 17 July 2020 15:55
To: Cabinet Secretary for Health and Sport [redacted]
Cc: Bell D (Donna) [redacted] Hutchison D (David) [redacted]; Mair S (Suzi) [redacted]; Bain MB (Marion) [redacted]; DCMO Health COVID19 [redacted]; Campariol-Scott C (Carole) [redacted]>; DG Health & Social Care [redacted]; Mitchell E (Elinor) [redacted]; Lunt A (Aislinn) [redacted]; Gosling J (James) [redacted]; Murray D (Diane) [redacted]; Allan L (Lara) [redacted]; Ives J (Josephine) [redacted]; Shepherd L (Lesley) [redacted]; Chalmers G (Greig) [redacted]; McLean P (Phillip) [redacted]; Raines P (Philip) [redacted]; Paterson J (John) [redacted]>; Garland A (Ailsa) [redacted]>; Birch J (Jason) [redacted]; Glass G (Gill) [redacted]; Communications Covid-19 [redacted]; Watters R (Rona) [redacted]; First Minister Covid Briefing Unit [redacted]; White C (Craig) [redacted]; McQueen F (Fiona) [redacted]; Hegarty L (Lee) [redacted]; Noble G (Greg) <[redacted]>; Dunk R (Rachael) [redacted]>; Morrison A (Alan) [redacted]>
Subject: Priority: URGENT: Independent Review

Good afternoon,

PS/Cabinet Secretary for Health and Sport

Priority: Urgent

Purpose

- To provide the Cabinet Secretary with a response to the email of 16 July 2020 from Dr Teresa Inkster and Dr Christine Peters.
- For information, the CNO is content with the draft response.

Background

- Dr Peters and Dr Inkster wrote to the Cabinet Secretary on 18 June 2020 and 20 June 2020 respectively regarding their concerns with the QEUH Independent Review Report.
- The Cabinet Secretary responded to these letters (as well as a response to Dr Redding), on 30 June 2020.
- The response by the Cabinet Secretary had advised that as the IR was entirely separate from SG, they should raise their concerns directly with the co-Chairs of the Review.
- This advice was followed by Dr Peters and Dr Inkster and the further correspondence from the Doctors, concerns the response received back from the co-Chairs.

SG Response to QEUH Independent Review Findings (CNOD)

- The response to the findings of the Report is being led by the Chief Nursing Officer Directorate who will advise separately on this aspect.

Recommendation

- That the Cabinet Secretary notes:
  - The draft response to Dr Inkster and Dr Peters, and if content to sign and issue to the signatories and those copied in.
  - If consent given by Dr Inkster and Dr Peters, Officials in the Sponsor Team will pass on their contact details to the Inquiry Team.
  - That colleagues in CNOD will provide separate advice on the proposal to bring forward the SG response to the QEUH IR Report findings.

If I can be of any further assistance, please let me know.

Kind regards,

Sharon

#hellomynameis...

Sharon Mooney | Policy Manager | QEUH Independent Review and QEUH & RHCYP/DCN Public Inquiry Sponsor Team | Scottish Government | 2.ER St Andrew's House | Regent Road | Edinburgh | EH1 3DG | Work Mobile [redacted]

I am currently working from home, but can be contacted via email, skype or on the mobile number above.

From: Corr A (Andrew) [redacted] **On Behalf Of** Cabinet Secretary for Health and Sport
Sent: 16 July 2020 16:12
To: Cabinet Secretary for Health and Sport [redacted]; Hegarty L (Lee) [redacted]; McQueen F (Fiona) [redacted]; White C (Craig) [redacted]; Raines P (Philip) [redacted]
Cc: Bell D (Donna) [redacted] Hutchison D (David) [redacted]; Mair S (Suzi) [redacted]; Bain MB (Marion) [redacted]; DCMO Health COVID19 [redacted]>; Campariol-Scott C (Carole) [redacted]; Mooney S (Sharon) [redacted]; DG Health & Social Care [redacted] Mitchell E (Elinor) [redacted]; Lunt A (Aislinn) [redacted]; Gosling J (James) [redacted]; Murray D (Diane) [redacted] Allan L (Lara) [redacted]; Ives J (Josephine) [redacted] Shepherd L (Lesley) [redacted]; Chalmers G (Greig) [redacted]; McLean P (Phillip) [redacted]; Paterson J (John) [redacted]; Garland A (Ailsa) [redacted]; Birch J (Jason) [redacted] Glass G (Gill) [redacted]; Communications Covid-19 [redacted]; Watters R (Rona) [redacted]; First Minister Covid Briefing Unit [redacted]>
Subject: URGENT: Independent Review
Importance: High

CNO,

Please find below (and attached) an email we have received from Dr Inkster today. I would be grateful if this could be looked at as a matter of urgency and advice prepared on how the Cab Sec should respond to this (noting that Anas Sarwar has been copied in). Apologies for the quick turnaround however given the Cab Sec is on leave next week I would be grateful for advice by 4pm tomorrow afternoon.

Further to this I know that officials were discussing how they should respond to the Review's recommendations and that a date of w/c 10/08 was given as a proposed deadline for this. Given the interest in this I would be grateful if we could set a hard deadline of 4pm on 3rd August as a delaine for this response. This will give the Cab Sec time to consider before Parliament recommences.

Thanks,
Andy

From: teresa inkster [redacted]
Sent: 16 July 2020 15:33
To: Cabinet Secretary for Health and Sport [redacted]
Cc: chrispeaters[redacted]; anas.sarwar.msp[redacted]; Martyn Bma [redacted]
Subject: Independent Review
Importance: High

Dear Cabinet Secretary,

It is with much regret that we must write to you again regarding our experience with the Independent Review. Following your response to us we contacted the Chairs of the review as you had suggested. We sent them an initial letter encompassing the main themes of our concerns and we followed this up with a 31 -page document of commentary (both attached). We also requested retraction of Chapters 8 and 9 due to omissions and inaccuracies.

We received a letter of response last night at the review close of play (also attached). It is clear from this that the review does not wish to further engage with us or consider our comments or indeed the scientific evidence that underpins them. It is most disappointing that as a public body they have declined to engage with us.

We therefore felt that we must write to you again as the Commissioner of the review to highlight our ongoing concerns.

Dr Inkster has been told that emails between herself and the review were undelivered and that the review were informed that she was off sick or had left her organisation. Efforts to investigate these issues thus far have not been fruitful and it is astonishing that the review purged an IT system just 10 days after publication of the report.

As you will be aware neither of us received a right to reply. We quote the review itself 'a person made subject to an adverse finding will be provided a fair opportunity to respond to it' (section 1.4.5). We are both identifiable and subject to adverse findings but have had no explanation as to why we did not receive a right to reply. As such there is potential for us to suffer career detriment and one could argue that has already started given comments to the Herald newspaper at the weekend suggesting disciplinary action for infection control staff.

We would welcome your advice on how to take this further and whether we should submit further evidence we have directly to the Lord Advocate. We have evidence pertaining to cases being investigated and neither the police or procurator fiscal have contacted us.

Kind regards,

Dr Teresa Inkster and Dr Christine Peters

Cabinet Secretary for Health and Sport
Jeane Freeman MSP

Scottish Government
Riaghaltas na h-Alba
gov.scot

T: 0300 244 4000
E: [redacted]

Drs Inkster and Peters

By email: [redacted]

10 August 2020

Dear Teresa and Christine

Thank you for your letter of 31 July 2020 and your further email received today. The Public Inquiry was launched on Monday 03 August 2020 and details of the arrangements for making contact the Inquiry Team are now online at www.hospitalsinquiry.scot

I do appreciate you taking the time to meet with Professor McQueen and note that you are being sent drafts of documents prepared by the Oversight Board in order that your comments and feedback on accuracy and process can inform Professor McQueen's further work within the Oversight Board. She has agreed with me that she will continue to work with you to ensure all your concersn are addressed.

I am sorry that you have not been as involved as you would have thought appropriate in the work of the Oversight Board, however I have discussed this with Professor McQueen and she has assured me she will ensure all your concerns are acted upon within the overall remit of the Oversight Board. Fiona is also aware of the need to ensure that the concerns about the previously issued responses to questions from parents and assurances on the effective delivery of the action plans you mention remain outstanding. She has emphasised to Professor Wallace the importance of ensuring that this is considered as part of the work that she is leading and co-ordinating in NHS Greater Glasgow and Clyde.

Finally, I am grateful to you for your continued support for the work of the Oversight Board and have asked Fiona to keep me updated on how your feedback on the draft documents shared following recent meetings will inform the further work planned.

[redacted]

JEANE FREEMAN

St Andrew's House, Regent Road, Edinburgh EH1 3DG
www.gov.scot

Health Facilities Scotland

NHS SCOTLAND

NHS Scotland: Repeatable Rooms

Improving Quality, Value & Sustainability through Standardisation

Prepared by Health Facilities Scotland & NHS Boards
Issued December 2020 - Draft
A47472337

Introduction

Health Facilities Scotland in conjunction with representation from several NHS Boards around the country have been meeting as a Short Life Working Group (SLWG) to develop a Repeatable Rooms Strategy for specific key rooms commonly utilised across the NHS Scotland Estate.

Through the ProCure21+ framework in England, a number of Repeatable Rooms have been developed. These provide a set layout and standardised set of components, that through repetition, deliver various savings in relation to construction cost. This Report aims to replicate this ProCure21+ document but with specifics related to systems, procedures and experience within NHS Scotland.

It is intended that this document will expand as further Repeatable Rooms are considered and developed through to a design conclusion.

Repeatable Room Layouts

Each Room has been developed following thorough discussion and debate throughout the course of the SLWG. The proposed layouts are evidence based and informed by experiences of each of the participating NHS Boards. Consultation with staff, manual handling and occupational therapy teams, end users, as well as architectural input has been sought in order to produce rooms with an improved function and environment. These arrangements are supported by Health Facilities Scotland and NHS Scotland.

NHS boards consulted with their individual Infection Control teams and comments were taken into consideration when developing the room layouts.

Room Layout Reviews

Room layouts will be subject to a review process and may be updated in response to post-occupancy evaluations and reviews, changes to models of care, or new technologies. It is intended that the post-occupancy evaluation will follow the format agreed for the P22 framework, with findings then shared with the Department of Health in England.

Principals of Application

NHS clients using the HFS3 Framework should identify their requirement for Repeatable Rooms and Standardised Components when completing the Works Information. It is recommended that the implementation requirement should form part of the briefing information that goes to the framework providers or others initially. This places an obligation on the PSCPs, PSCs, Hub or others, along with their team members to incorporate Repeatable Rooms into initial scheme designs.

Where not specified, the Repeatable Room arrangements and Standardised Components will be offered by the PSCP as the baseline design and specification, as they represent the best value for quality and cost.

Benefits

Repeatable Room arrangements have been designed to assist in the design and procurement of common and key rooms proposed in healthcare facilities across NHS Scotland. It is intended that utilising a repeatable design, with limited project specific changes in components will deliver a quality room output which improves on safety, reduces infection control issues and provides better value through improved life cycle costs.

Local Considerations

It should be noted that each repeatable room should be viewed on a project-by-project basis. Specific matters may vary between boards and circumstances. Each room and project should be subjected to local risk assessments to ensure compliance with local guidance, including infection and prevention policies.

Similarly, it is recognised that some of the fixtures, fittings and positions may not be suitable for all patient groups. Again, the repeatable rooms should be viewed on a project specific basis and any changes considered to best respond to the patient group to be catered for.

Guidance

This document and the repeatable rooms illustrated should be read in conjunction with all relevant guidance documentation, included, but not limited to SHTM, SHPN, Technical Standards etc. This will allow consideration of matters such as safety, fire compartmentation, acoustics, thermal and energy, to be considered and incorporated into the application of these repeatable rooms within the overall building arrangement.

Repeatable Rooms Matrix

The matrix below illustrates the current Repeatable Rooms that have been developed and the layouts agreed. The matrix suggests suitable healthcare buildings and locations where these rooms could be utilised.

It is intended that this matrix will be expanded as more Repeatable Rooms are proposed and their layouts agreed. This will produce a live document that will continue to be updated to provide the best value and benefits NHS Scotland.

The rooms within this document were developed at a specific point in time. Designs may require to be updated to reflect relevant policies and guidance as these are issued or revised.

Should readers note any areas of the report that they deem to be superseded, or contrary to any changes in guidance, these should be confirmed back to HFS and the SLWG team to allow the document to be updated and revised accordingly.

	New Build	Refurbishment	Primary	Community	Acute	Private	Mental Health Adult Acute
Adult Single Bedroom nested, with Outboard En-Suite (right hand unassisted En-Suite transfer)	•	•		•	•	•	
Adult Single Bedroom nested, with Outboard En-Suite (left hand unassisted En-Suite transfer)	•	•		•	•	•	
Adult Single Bedroom nested, with Inboard En-Suite (right hand unassisted En-Suite transfer)	•	•		•	•	•	
Adult Single Bedroom nested, with Inboard En-Suite (left hand unassisted En-Suite transfer)	•	•		•	•	•	
En-Suite nested (right hand unassisted transfer)	•	•		•	•	•	
En-Suite nested (left hand unassisted transfer)	•	•		•	•	•	
Consultation / Exam Room Three-sided Couch access – examination couch by door	•	•	•	•	•	•	

Figure 1.1: Repeatable Rooms Matrix

Adult Single Bedroom, nested

The Adult Single Bedroom has been developed in one key arrangement – that of a nested arrangement with back-to-back En-Suites.

Within this Repeatable Room, there are 4 variations:

Adult Single Bedroom nested, with Outboard En-Suite, for right hand unassisted En-Suite WC transfer.

Adult Single Bedroom nested, with Inboard En-Suite, for right hand unassisted En-Suite WC transfer.

Adult Single Bedroom nested, with Outboard En-Suite, for left hand unassisted En-Suite WC transfer.

Adult Single Bedroom nested, with Inboard En-Suite, for left hand unassisted En-Suite WC transfer.

Figure 2.1: Nested Single Bedroom Repeatable Room Arrangement - 3D Visualisation

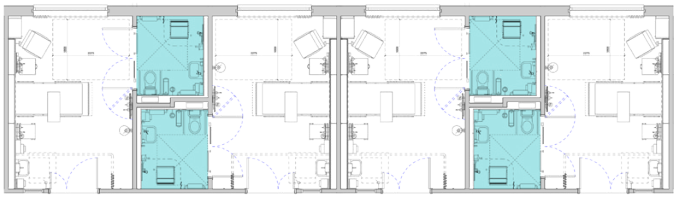

Figure 2.2: Repeated Nested Arrangement - All right-hand unassisted WC transfer

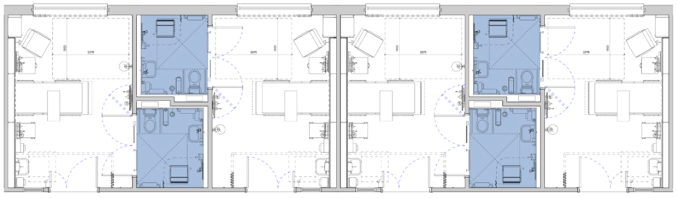

Figure 2.3: Repeated Nested Arrangement - All left-hand unassisted WC transfer

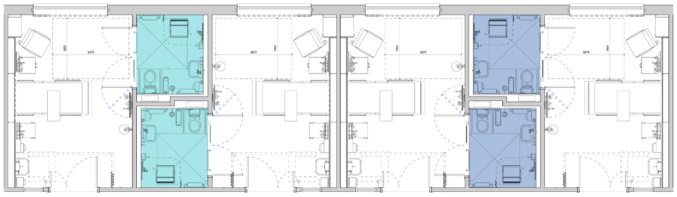

Figure 2.4: Mirrored Nested Arrangement - 50/50 split of right and left-hand unassisted WC transfer

The number of variations for this room arrangement is required to ensure an equal split of right and left-handed unassisted WC transfer is provided within the En-Suites to each department. Figures 2.1 and 2.2 adjacent demonstrate how a simple block repetition of 2no Single Bedrooms, with either right or left-handed nested En-Suites would lead to an imbalance in accommodation across a ward or department.

Figure 2.4 shows that Single Bedrooms with a nested En-Suite arrangement should be planned and viewed as a repeatable 4-bed cluster, providing a 50/50 split of left and right-handed unassisted transfer En-Suites across a department. This arrangement is critical in providing the variety of rooms required to treat those with varying levels of mobility.

Room Description

The Adult Single Bedroom has been designed to an area of 19m². Each room has been designed with the majority of equipment and components being as standard. Each room has been designed in accordance with relevant Health Building Notes (HBN) and Scottish Health Planning Notes (SHPN).

The nested, back-to-back arrangement maximises the floor area, whilst offering opportunities for excellent natural daylight, observation or social contact within the ward. These characteristics are facilitated by not having an inboard or outboard En-Suites located within a quadrant of the room itself.

The Bedroom (and adjacent En-Suite) has been designed in accordance with standard brick setting-out dimensions, giving a width of 3700mm. This allows the arrangement to be compatible across a number of construction types.

A full length IPS wall is proposed along the bed head side of the room, allowing the concealed integration of the clinical wash hand basin, lighting and bed head services (medical gases, suction). All supplies and services can be hidden behind this panel, which also allows for an ease of maintenance. Additionally, limited projections into the bedroom area and subsequent floor finishing details will assist with cleaning regimes. It will be important to ensure sufficient structural support and patressing is designed into the bedhead IPS to allow all proposed services and fittings to be accommodated.

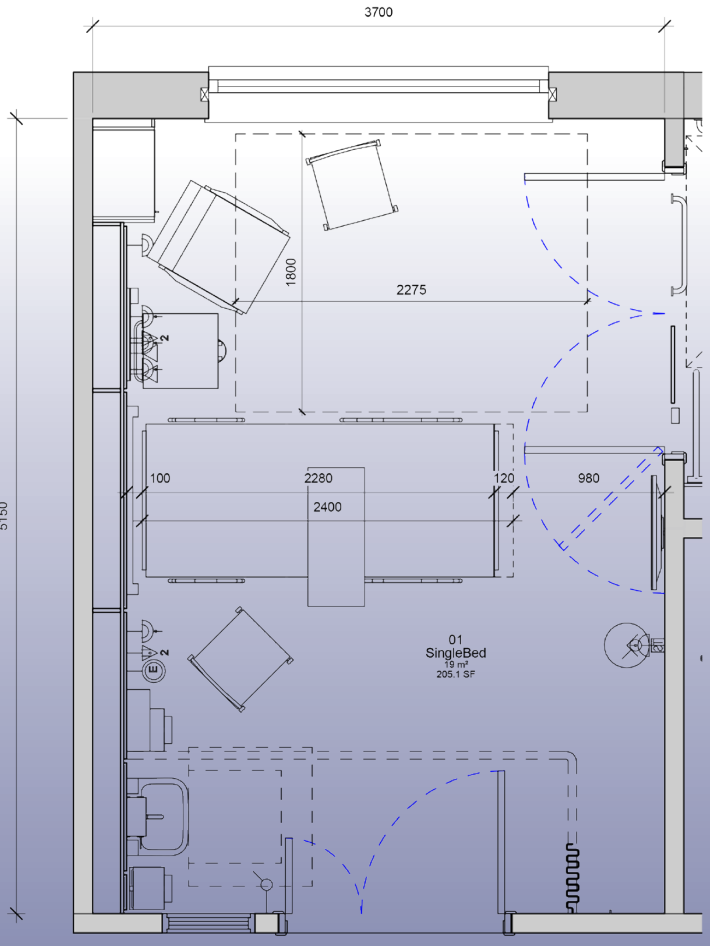

Figure 2.5: Nested Single Bedroom Repeatable Room Arrangement (not to scale)

Key Features

- The nested En-Suite increases the overall width and depth of room available for patient space.
- Observation and social contact maintained with views of the bed through to the Ward corridor beyond.
- External views, and daylight, are maximised.
- Family Space provided at the bed side.
- Patient monitoring is maximised.
- Sight line of WC is available from the bed head.
- An Activity Space of 2275 x 1800mm is provided, which is in excess of the dimensions required for 90% of self-propelled and electric sampled wheelchair users to turn 180°, in accordance with BS8300-2: 2018. For reference, these dimensions are 2275 x 1625mm, as p.198 of BS8300-2: 2018.

Several design features may be added to the designs depending on local Board and project specific decisions. These include, but are not limited to:

- Wardrobe zone built into the bedhead IPS wall, including the size, type, internal arrangement.
- Ceiling-mounted overhead hoists.
- Loose Furniture Options.
- Patient Entertainment System.

In addition, there will be alternative project specific design options around the main fabric of the room, the external glazing, and the internal entrance doors and vision screens to the room. These are noted at the end of this section.

Room, wall, IPS and finishes colours should be considered on a project specific basis, in line with the use of the room. For example, when used correctly, feature walls allow those with dementia to make sense of a space. However, consideration should be given to the extent and colour of any feature walls, as some colours may not be suitable for the patient group or care being provided.

Figure 2.6: Nested Single Bedroom Repeatable Room - Internal 3D Visualisation

Clinical Benefits

3600mm x 3700mm bed space, reflects research by the Medical Architecture Research Unit at London South Bank University and the Health and Care Infrastructure Research and Innovation Centre at Loughborough University, indicating this space to be optimal in accommodating a full range of clinical activities taking place at the bedside or in the individual's bed space, together with operating equipment at the bedside. The provision of this space is in line with the requirements noted within SHPN 04-01.

Clinical Wash Hand Basin is located in a highly visible and convenient location, immediately accessible upon entry into the room. Mounted upon the bedhead IPS wall, this allows all services to be contained and managed behind these panels, giving a flexibility of incoming and outgoing service connections.

Bedhead IPS allows for clear and uncluttered containment of services. Additionally, ledges and steps are minimised with one continuous service zone. Services can be swapped in and out if necessary without the need to revise and alter the service strategy within each room. Bedhead services should be reviewed on a project specific basis to ensure they support the specific local and clinical needs.

The type of laminate utilised within the IPS panelling can also promote a varying level of environment and interior design within the room.

Location of Wash Hand Basin does not require staff to turn their back on the patient when utilising the basin.

The location of the bed and En-Suite doors immediately opposite provide **good sight lines** from the bedhead to the En-Suite, which is particularly beneficial for people with dementia.

Clear access to the external wall allows for **good daylight with sight lines to the outside environment** from the bedhead. This creates a lighter, brighter, therapeutic environment. Refer to the end of this section for various project specific window options.

Figure 2.7: Nested Single Bedroom Repeatable Room - Internal 3D Visualisation

Project Specific Options

Bedhead IPS

The proposals described above show the bedhead IPS running in a straight line behind the bed. This allows for simple and efficient detailing. Project specific situations may determine that a recess would be beneficial immediately behind the bed.

This will allow the bed to be recessed 100-200mm into the IPS wall, and increase the activity space at the foot of the bed. This will increase the detailing of the Bedhead IPS, and will require a more complex floor coving detail. In addition, there may need to be a consideration for edge protection to the recess.

However, this may be an acceptable project option that boards could consider.

In addition, individual consideration to the bedhead luminaire could be given depending on the experiences of different Boards. Articulated arm or side reading lights could be considered should these be preferred.

Figure 2.8 Nested Single Bedroom Repeatable Room showing Recessed Bedhead IPS Option

Bedroom Door & Vision

There are various options for project specific considerations in relation to the Bedroom entrance door and vision panels.

Door and a Half Leaf with Glazed Side Screen

The standard option as indicated in the plans and images previously is for a door and a half leaf with a separate glazed vision side screen. The screen has been sized and positioned to allow a direct sight line to the bed, whilst not clashing with the wash hand basin. The constraints of the door location and the basin does limit the dimensions of this screen.

Figure 2.9: Right, Bedroom Door with Door and a Half Leaf, and Glazed Side Screen.

Door and a Half Leaf with integrated Vision Panels

A project specific option to remove the glazed side screen could be offered, where the door and an half leaf would be provided with glazed vision panels, for patient monitoring. Panels could be fitted with integral blinds allowing for a degree of privacy. This option would remove possible clashes between the glazed side panel and the wash hand basin.

Figure 2.10: Right, Bedroom Door with Door and a Half Leaf, with integrated Vision Panels.

Door with Glazed Half Leaf

A further option would remove the glazed side screen, instead installing a glazed half leaf within the doorset. This would allow increased vision and monitoring without the requirement, and expense, of a separate screen.

Figure 2.11: Right, Bedroom Door with Door and a Half Leaf - Half Leaf fully glazed.

Note: Alternative options on door widths could also be proposed but should be considered in relation to HBN 00-04, and the correlation between door clear width and corridor width for bed tracking. All options within this document show a doorset with a 1700mm structural opening, providing an effective clear width of minimum 1500mm between open leaves. This is compliant with an adjacent corridor width of between 2150mm and 2400mm. If the adjacent corridor width is narrower, designers should carry out bed tracking to ensure the arrangement chosen is functional.

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Bedroom Window and Glazing

There are various options for project specific considerations in relation to the bedroom windows, glazing and seating.

Fully Glazed Window Option

The standard option as indicated in the plans and images previously show a fully glazed window option. The size, shape, depth, openable panels, height above floor level and head height can be amended to suit the individual building and elevation arrangements of each specific project.

Figure 2.12: Right, Bedroom Window - Fully Glazed Panel.

Glazed with Openable Panel behind Fixed Louvre System

A project specific option could be to install a fixed louvre panel externally, with a full height, glazed openable vent behind. This allows for the vent panel to be opened fully on the longer, hinged side, enabling the room to benefit from high and low level ventilation, promoting increased air flow and natural ventilation to the room. The fixed louvre panel will act as a protective barrier in this arrangement.

The size, shape, depth, size of the openable louvre panels, heights above floor level and head height can be amended to suit the individual building and elevation arrangements of each specific project.

Figure 2.13: Right, Bedroom Window - Fixed Glazed panel, with openable Louvre Side Panel.

Window with Built-in Bench Seating

A further option would be to utilise the window as a location to install a new built-in bench seating arrangement. This could reduce the requirement for the loose chairs currently proposed within the room or overall within a department. This will be dependent on the width of the window as well as the depth available for the location of the window within the overall wall thickness.

Bench seating is to comply with Infection Control guidelines.

Figure 2.14: Right, Bedroom Window - Fully Glazed Panel with Built-in Bench Seating.

Alternative FF&E

Additional items, such as those suggested on the Room Data Sheets within Appendix A could be included on a project-specific basis. Additional space, power points, supplies etc should be considered and allowed for with any project specific options.

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En-Suite, nested back-to-back

Sitting alongside the Adult Single Bedroom noted above, the nested En-Suite arrangement provides back-to-back En-Suites located between two Single Bedrooms.

Within this Repeatable Room, there are 2 variations:

En-Suite nested, for right-hand unassisted En-Suite WC transfer.
En-Suite nested, for left-hand unassisted En-Suite WC transfer.

As with the Single Bedrooms, these En-Suites should be accommodated within a 4-bed cluster in order to provide a 50/50 split of left and right-handed unassisted WC transfer.

Refer to Figures 2.2, 2.3 and 2.4 within the Adult Single Bedroom section to demonstrate how this split is achieved. This arrangement is critical in providing the variety of rooms required to treat those with varying levels of mobility.

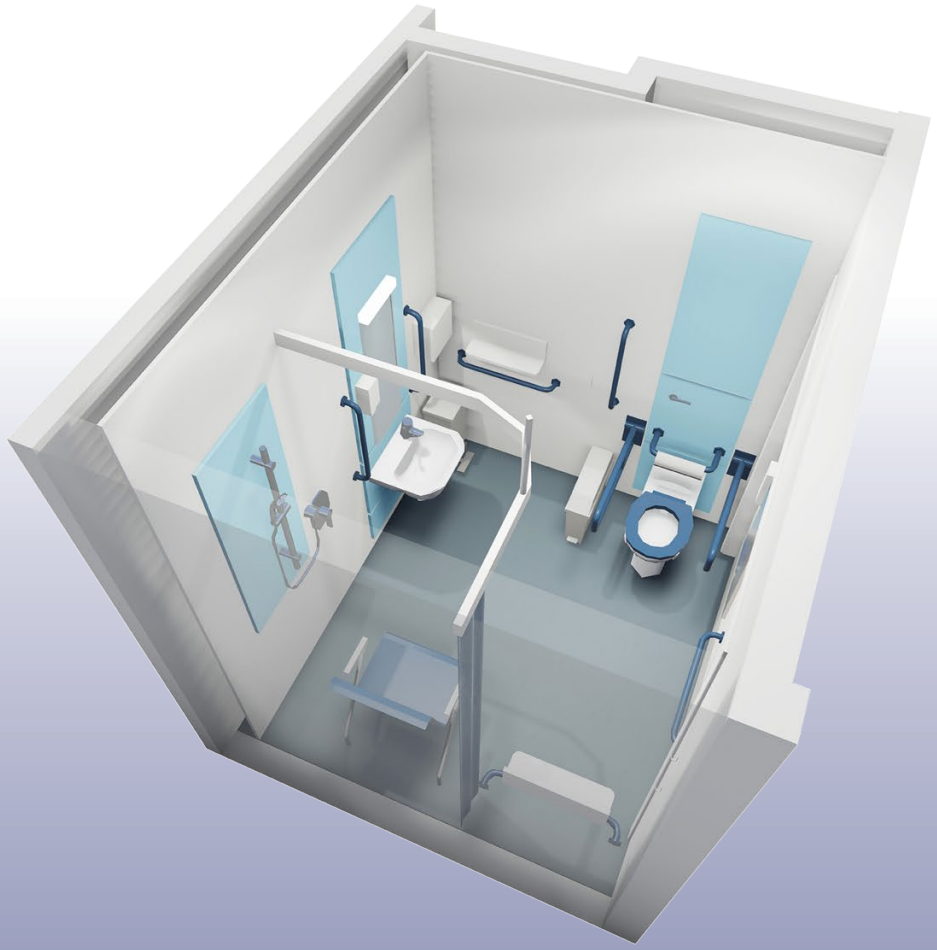


Figure 3.1: Nested En-Suite, back-to-back arrangement - 3D Visualisation

Room Description

The En-Suite has been designed to an area of 5.3m². Rooms will sit back to back within the space between two Single Bedrooms. Each room has been designed in accordance with relevant Health Building Notes (HBN) and with the majority of equipment and components as standard

The nested En-Suites sit within the depth of the adjacent Single Bedrooms. A stepped partition arrangement between each En-Suite allows WCs to sit back-to-back, with concealed cisterns behind the IPS panels within the En-Suite. This arrangement allows for a consolidation of drainage stacks within this zone. In order to maximise the area within each En-Suite, the stacks serving each WC will also provide a drainage point for the WHB from the adjacent nested En-Suite.

As with the adjacent Single Bedroom, the En-Suite has been designed in accordance with standard brick setting-out dimensions, giving a width of 2128mm, meaning the nested Bedroom and En-Suite arrangement can be realised across a number of construction types.

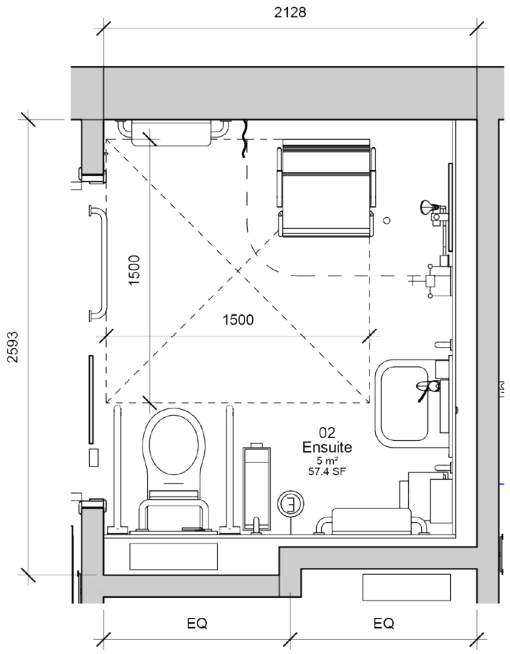


Figure 3.2: Nested En-Suite, Back-to-Back Arrangement (not to scale)

Key Features

- Nested En-Suite allows for an increased overall width and depth of room available within the adjacent Single Bedrooms.
- Wet Room arrangement provides level access to all sanitary facilities including the shower. A mobile shower seat has been specified to allow maximum space for patient assistance within the shower space.
- Clear manoeuvring space of 1500 x 1500mm in line with relevant guidance.
- 1900mm openable space facilitated by double doors to the En-Suite. This allows for dual transfer onto the WC, alongside staff assistance. The left and right-handed options allow for unassisted transfer from both the left hand right of the WC.

Design features may be added to the designs depending on local Board and project specific decisions. These include, but are not limited to:

- Portable shower screens in place of ceiling-mounted shower tracks and curtains, to allow an option for assisted showering.
- Variable height toilet seating for areas such as Orthopaedic departments.
- Alternatively, the mobile shower seat could double as a commode - either free-standing with mounted disposable bedpans, or to be positioned over the toilet.
- Ceiling-mounted overhead hoists from the adjacent Single Bedrooms.
- Loose Furniture Options.
- Reversible mirror with graphic on reverse, for Dementia patients.

Clinical Benefits

Good visibility is maintained from the bed with a degree of privacy from Corridor when viewing through the glazed screen / door vision panel.

Outward opening double doors, can open further than 90°, providing both staff assisted and unassisted patient transfer.

Mobile shower seat allows for both assisted and non-assisted showering.

Various **wall-mounted shelves** allow for storage of both staff and patient consumables.

Consultation / Examination Room

The Consultation / Examination Room has been developed in one considered arrangement – with the couch located close to the door.

Currently, there is only one variation proposed for the Consultation / Examination Room in this arrangement – that with **double-sided access** to the couch.

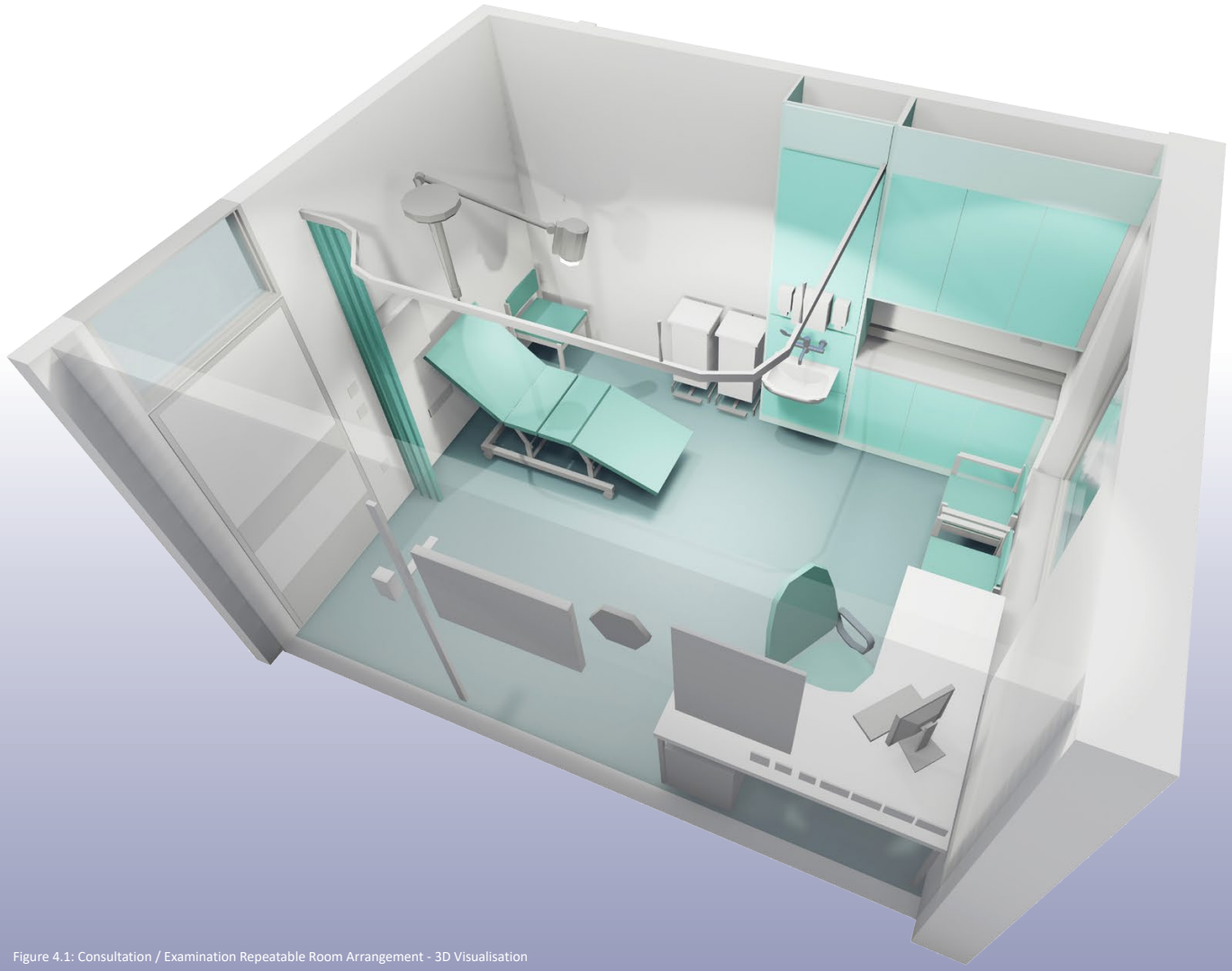


Figure 4.1: Consultation / Examination Repeatable Room Arrangement - 3D Visualisation

Room Description

The Consultation / Examination Room has been designed to an area of 15m². Each room has been designed with the majority of equipment and components being as standard. Spaces and equipment are also all in accordance with relevant Health Building Notes (HBN).

With this arrangement, a consultation focus has been provided with a priority on sight lines upon entry into the room. It should be noted that this arrangement could result in the patient being located between the clinical staff member and the door, depending on where the loose chairs are positioned. This may require a risk assessment to be considered by various Boards locally.

The Consultation / Examination Room has been designed in accordance with standard brick setting-out dimensions, with a room width of 3475mm. This allows the room to be repeated across a variety of construction types.

A wash hand basin is positioned centrally within the room, mounted upon an IPS system. This IPS aligns and runs into a storage and worktop area adjacent providing set down space and storage for consumables within the room. Running the depth of the IPS in line with the storage cupboards and work tops allows for a simpler floor detail, with limited steps and projections, which simplifies maintenance and cleaning.

An L-shaped corner desk is positioned in the opposite corner of the room, and accommodates the IT workstation within the room. A combination of straight desks and various desk pedestals could also be accommodated on a project-specific basis.

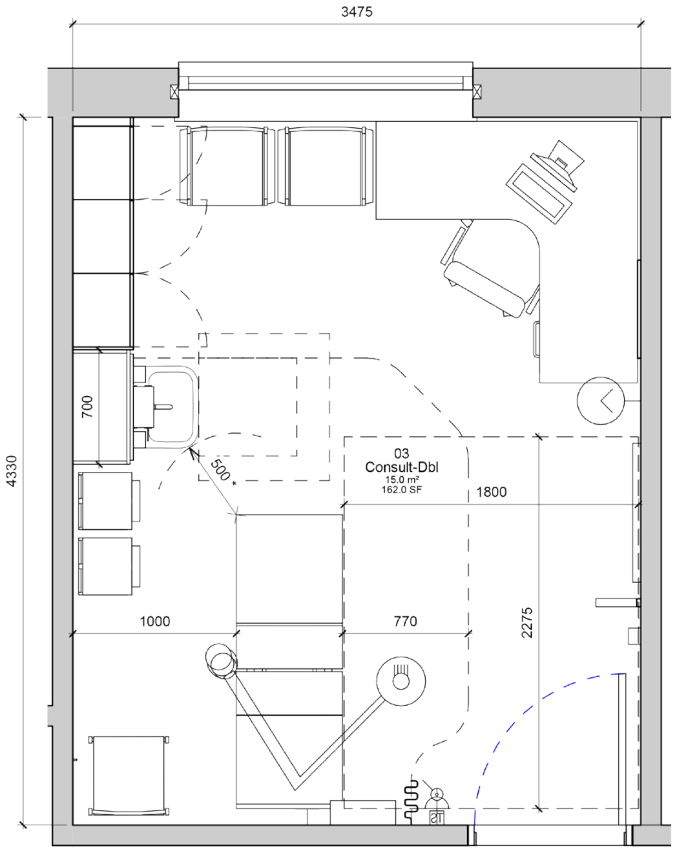


Figure 4.2: Consultation / Examination Room Repeatable Room Arrangement (not to scale)

Key Features

- A focus on consultation with excellent sight lines upon entering the room.
- Seating for 1no clinical staff member and 2no others (patient, family etc) within the room.
- An ability to share the screen at the corner workstation.
- Double-sided couch access with space for assistance.
- Curved, extensive curtain for privacy.
- Access to the clinical hand wash basin without having to leave the patient behind the curtain.
- Provision of daylight is maximised with the external window being located opposite the entrance door.
- Locating the Consultant adjacent to the window allows for the opportunity to vary focal distancing.
- An Activity Space of 2275 x 1800mm is provided, which is in excess of the dimensions required for 90% of self-propelled and electric sampled wheelchair users to turn 180°, in accordance with BS8300-2: 2018. For reference, these dimensions are 2275 x 1625mm, as p.198 of BS8300-2: 2018.

Several design features may be added to the designs depending on local Board and project specific decisions. These include, but are not limited to:

- Extent and dimensions of the window zone, including methods for controlling daylight and glare.
- Extent and dimensions of the room entrance door and vision panel, including the finish, ironmongery and any interstitial blinds.
- Type of lock on the entrance door – suited, digilock etc.
- A mobile examination light could be considered in lieu of the fixed, ceiling-mounted model, should the clinical requirements within the specific Board or location dictate.
- Consideration and option for the desk to be a rise-and-fall type.
- Loose Furniture Options.
- Consideration should be given to sourcing a model of bin that avoids opening lids damaging walls – wall protection is not currently proposed due bins being moveable items.

Room, wall, IPS and finishes colours should be considered on a project specific basis, in line with the use of the room. For example, when used correctly, feature walls allow those with dementia to make sense of a space. However, consideration should be given to the extent and colour of any feature walls, as some colours may not be suitable for the patient group or care being provided.

Figure 4.3: Consultation / Examination Repeatable Room - Internal 3D Visualisation

Clinical Benefits

Distinct zones for both consultation and examination are created within the room. The room is designed so that the couch does not dominate the room.

Access is provided to **both sides** of the couch.

Good levels of natural daylight are provided with the window being located at the end of the room, opposite the entrance door. Should privacy be a concern with this window (for example, ground floor consulting rooms), window manifestation or external planting and landscaping could facilitate additional privacy measures.

Different specialities can be accommodated within the space, as the layout can respond to the evolution of outpatient clinics, in terms of patients' expectations of technology and practice.

A **priority on sightlines** upon entry to the room.

Figure 4.4: Consultation / Examination Repeatable Room - Internal 3D Visualisation

Repeatable Room Data Sheets

The room layouts proposed on previous pages of this report have been developed alongside Talon Solutions in order to provide a standard Room Data Sheet, downloadable from the Talon Activity Data Base. These room layouts have been developed to utilise standard components from the Activity Data Base where possible. Examples of these full Room Data Sheets can be found within **Appendix A** of this document

Where components differ from the ADB standard, or are necessary to be specified as a certain product type, the proposed equipment performance specification, including any changes in specification have been included within the relevant notes of the Room Data Sheet. An example of this would be the bed proposed for the Single Bedroom. Here, a larger bed has been proposed, in line with specific items available on the market. This has been done to ensure a larger component can fit within the space available within the repeatable room. There is an understanding that the actual specification of loose components may change on a project specific basis.

Where suitable components are deemed to be not currently available as a standard product, a performance specification has been included within the relevant notes of the Room Data Sheet. An example of this would be the examination light within the Consultation and Examination Room. Specific requirements are necessary for this fitting in order to accommodate a variety of different ceiling heights, couch heights and the range of movement required to function effectively under these varying conditions.

Product and Material Specifications

As with the P22 Repeatable Room catalogue for England, standard specifications and materials have been developed and agreed between the Department of Health and various suppliers and companies.

It is intended that the Repeatable Rooms within this document will follow and utilise similar specifications where material quality, characteristics and costs are broadly known. However, it is again noted that many of these could be chosen on a project specific basis. As such, refer to **Appendix B** of this document where a list of suggested performance specifications for various products, materials and finishes are noted.

Appendix A

Repeatable Room Data Sheets

B0305-HFS1 Single Bedroom Outboard Configuration, Option 1

B0305-HFS2 Single Bedroom Outboard Configuration, Option 2

B0305-HFS3 Single Bedroom Inboard Configuration, Option 1

B0305-HFS4 Single Bedroom Inboard Configuration, Option 2

V1643-HFS1 Shower Room En-Suite Outboard Configuration, Option 1

V1643-HFS2 Shower Room En-Suite Outboard Configuration, Option 2

V1643-HFS1 Shower Room En-Suite Inboard Configuration, Option 1

V1643-HFS1 Shower Room En-Suite Inboard Configuration, Option 2

C0237-HFS Consultation / Examination Room, Double Sided Couch Access

ADB	Room Data Sheet	B0305-HFS1

Project:	2532-RR	HFS Repeatable Rooms, ADB		
Department:	EXEM	Exemplar Repeatable Rooms		
Room:	B0305-HFS1	Single-bed room, outboard configuration, option 1		
Room Number:			**Revision Date:**	20/03/2020

Activities:	1) User may undress and dress in privacy. 2) Rest and relaxation or sleeping. 3) Patient may take meals or refreshments in bed, by the bed or in the sitting space. 4) Entertainment services system may be used. 5) Patient may receive visitors. 6) Clinical wash-hand basin may be used. 7) Patient records may be reviewed and recorded. 8) Electronic patient records (EPRs) may be accessed and updated. 9) Medicines for use by patients (self-medication) is stored securely in a 'personal' locker. 10) A working supply of linen and amenities is stored. 11) A working supply of consumables may be held/stored. 12) Mobile hoist may be used. 13) Patient will receive therapeutic and clinical attention from healthcare staff. 14) Patient may be ambulant, in a wheelchair or on a trolley or bed 15) Carrying out examinations and assessment of patient. 16) Piped medical gases, vacuum and associated equipment may be used.
Personnel:	1 x patient. 4 x others (staff and/or visitors).
Planning Relationships:	En-suite sanitary facilities.

Space Data:	**Area (m²):**	19.00	**Height (mm):**	2700

Notes:

Design Notes:
- DOOR IRONMONGERY: to be part of Door Schedule.
- DOOR STOPPER: to prevent clash with TV, specification to be confirmed.

HIGHLIGHTED AREAS:
- WINDOW ZONE: Extent / Dimensions to be project specific.
- WARDROBE: Type / Size to be project specific
- GLAZED SCREEN: Extent / Dimensions to be project specific
- DOOR VISION PANEL / VISTAMATIC: Extent / Dimensions to be project specific but dependant on Glazed Screen.

ADB 2017 Room Notes:
This room is based on the use of a trolley with a worktop.
It is assumed that computers will be handheld or brought into the room on a trolley.

The call repeat lamp is situated over the door outside the room.

The following items may be provided:
- a ceiling-mounted hoist;
- a small fridge for patient use;
- a combined wardrobe and bedside locker instead of the separate wardrobe and locker;
- when used for maternity post-natal provision of a cot(s) will be required.

Separate data and voice outlets may be used where structure cabling solutions are not available.

ADB	Room Environmental Data	B0305-HFS1

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	B0305-HFS1	Single-bed room, outboard configuration, option 1
Room Number:		**Revision Date:** 20/03/2020

TEMPERATURE AND VENTILATION	**Requirements**	**Notes**
Permissible Space Temerature Range(dry bulb) (degC):	18 - 28	
Heating Design Temperature (dry bulb)(degC):	22	
Minimum Air Changes (AC/hr):	6	
Ventilation Type:	S/E/N	
Pressure Relative to Adjoining Space:	Bal	
Supply Air: Final Filter Class	G4	
Permisiible Relative Humidity Range (%):	Uncontrolled	
General Notes:		

LIGHTING		
Type Of Control:	S/N/EM	
Daytime General Service Illuminance (Lux):	100	
Daytime Specific Service Illuminance (Lux):	300	
Nighttime General Service Illuminance (Lux):	5	
Nighttime Specific Service Illuminance (Lux):	0.5	
Local Task Illuminance (Lux):	300	
Colour Rendering Required:	Y	
Colour Rendering Required Characteristics (Ra):	80	
Unified Glare Rating Limit (UGRL):	19	
Emergency Escape Route Lighting Required:	Y	In accordance with BS 5266 and Health Technical Memorandums
Standby Lighting Grade - General Lighting:	A	
Standby Lighting Grade - Local Lighting:	A	
General Notes:	Refer to SLL Lighting Guide 2 for more detailed guidance	

RISK		
Clinical Risk Category:		
Non-clinical Business Continuity Risk Category:		
General Notes:		

NOISE		
Noise Intrusion (dB) 1hr day:	40	The LAmax,f dB noise limit applies only at night 23:00 to 07:00 hours.
Noise Intrusion (dB) 1hr night:	35	
Noise Intrusion (dB) f night:	45	
Maximum Internal Noise from M&E Services (NR):	30	Total noise of MEP services under normal operation across the range 63Hz to 4kHz inclusive.
Room Sound-insulation Parameters - Privacy:	Confidential	Reference to Table 3 of the Department of Health 'Acoustics: Technical design manual 4032:0.6:England'.
Room Sound-insulation Parameters - Noise Generation:	Typical	
Noise Sensitiviy:	Medium	
Sound-insulation Rating (dB D nT,w):		
General Notes:		

SAFETY/FIRE		
Maximum Surface Temperature (DegC):	43	
Domestic Hot Water Discharge Temperature (DegC):	41	
Maximum Cold Water Discharge Temperature (DegC):	<20	
General Notes:		
Type of Automatic Fire Detection:	Smoke	
General Notes:		

ADB	Room Design Character	B0305-HFS1

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	B0305-HFS1	Single-bed room, outboard configuration, option 1
Room Number:		**Revision Date:** 20/03/2020

Walls:	Wall finishes to comply with Performance Requirements in HBN 00-10 Part B:Walls and Ceilings (2013) Wall finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part B:Walls and Ceilings.
Floor:	Floor finishes to comply with Performance Requirements in HBN 00-10 Part A:Flooring (2013) Floor finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part A:Flooring.
Ceiling:	Ceiling finishes to comply with Performance Requirements in HBN 00-10 Part B:Walls and Ceilings (2013) Ceiling finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part B:Walls and Ceilings.
Doorsets:	Configuration, glazing, fire rating, security, etc. to be determined by Project Team. HTM 58 (Mar-2005) Refer to HBN 00-04 (May-2007) for effective clear door widths. 2 sets of doors: 1 x personnel, bed, trolley, wheelchair & equipment access (1500mm); 1 x approx 2200 mm - see HBN 00-02 Requirement for hinge protection when areas used by children
Windows:	Essential Clear glass with solar and privacy control Designation to be validated against current documentation (HTM 55 archived).
Internal Glazing:	Non-essential - Project Option Clear with privacy control Designation to be validated against current documentation. HTM 57 (Mar-2005)
Hatch:	Not required
Notes:	All finishes to be selected using the "Selection Procedure for Finishes" included in 8941:06: England. All finishes selected must have an appropriate risk assessment to accompany the design decision. Infection Control must be consulted as described in Performance Requirements for Building Elements Used in Healthcare Facilities 8941:0.6 England.

ADB	Schedule of Components by Room	B0305-HFS1

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	B0305-HFS1	Single-bed room, outboard configuration, option 1
Room Number:		**Revision Date:** 20/03/2020

Quantity			Code	Description	Alt. Code	Grp
New	Trans	Total				
1		1	BAS1113	BASIN, Contour 21 back outlet washbasin, 50cm, no tapholes, no overflow, no chainstay hole		1
1		1	BED1040	WALL PROTECTION, Bed Head Buffer, Vertical		1
1		1	CAL007	PULL/PUSH BUTTON, staff emergency call, reset and integral/adjacent indicator lamp		1
1		1	CAN1012	CANOPY, size to suit unit below		1
2		2	HOO019	HOOK, single, small, wall mounted		1
1		1	LIG1005	LIGHT, bed head, dimmable, wall mounted		1
1		1	OUT006	SOCKET outlet unswitched 13amp single.		1
7		7	OUT010	SOCKET outlet, switched, 13 amp, twin		1
3		3	OUT131	SOCKET outlet data/voice, double.		1
1		1	OUT206	SOCKET outlet television aerial, single.		1
1		1	OUT471	OUTLET oxygen medical, trunking mounted		1
1		1	OUT476	OUTLET vacuum medical, trunking mounted		1
1		1	RAI1302	RAIL, clinical equipment, wall mounted, max width available		1
1		1	RAI1305	RAIL, Railing (To Suit Length, door)		1
1		1	RAI1306	RAIL, Railing (To Suit Length)		1
2		2	SWC025	SWITCH, light		1
1		1	SWC1090	SWITCH; light, 3 gang		1
1		1	TAP1500	TAP, Markwik 21 Demountable Panel Mixer, Lever Handle, Detachable Spout		1
1		1	THE005	THERMOSTAT		1
1		1	WAR1062	WARDROBE, built in wardrobe, with shelf and 4 no. coat hooks within wardrobe, 600W 400D 1810H		1
1		1	BRA015	BRACKET, flat panel monitor, height adjustable, wall mounted		2
1		1	CLO001	CLOCK battery, wall mounted		2
1		1	DIS011	DISPENSER, barrier cream, disposable single cartridge, wall mounted		2
1		1	DIS013	DISPENSER, paper towel, wall mounted		2
1		1	DIS026	DISPENSER, Medical hand sanitizer, lever action, wall mounted		2
1		1	DIS030	DISPENSER, soap, disposable single cartridge, lever action, wall mounted		2
1		1	DIS438	DISPENSER, disposable gloves set of 3 and disposable apron, wall mounted		2
1		1	TVM1010	TELEVISION monitor, colour, flat panel, 32", wall mounted		2
1		1	BED015	BED variable height, two-way tilt, adjustable backrest and knee-break, built-in bed extension with mattress retainer, electrically operated, on castors, 380-780H 2260/2430L 1010W		3
1		1	CHA307	CHAIR, easy, high back, with open arms, upholstered, wipeable		3
2		2	CHA317	CHAIR, upright, upholstered, stacking, wipeable		3
2		2	HOL004	HOLDER, sack, with lid foot operated, small, freestanding		3

ADB	Schedule of Components by Room	B0305-HFS1

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	B0305-HFS1	Single-bed room, outboard configuration, option 1
Room Number:		**Revision Date:** 20/03/2020

Quantity			Code	Description	Alt. Code	Grp
New	Trans	Total				
1		1	LOC004	LOCKER, bedside, 4 compartment with lockable section /drawer, towel rail at rear, on castors, 902H 485W 485D		3
1		1	MAT008	MATTRESS, suitable for BED015		3
1		1	TAB073	TABLE, overbed, cantilevered		3

ADB	Room Data Sheet	B0305-HFS2

Project:	2532-RR	HFS Repeatable Rooms, ADB		
Department:	EXEM	Exemplar Repeatable Rooms		
Room:	B0305-HFS2	Single-bed room, outboard configuration, option 2		
Room Number:			**Revision Date:**	20/03/2020

Activities:	1) User may undress and dress in privacy. 2) Rest and relaxation or sleeping. 3) Patient may take meals or refreshments in bed, by the bed or in the sitting space. 4) Entertainment services system may be used. 5) Patient may receive visitors. 6) Clinical wash-hand basin may be used. 7) Patient records may be reviewed and recorded. 8) Electronic patient records (EPRs) may be accessed and updated. 9) Medicines for use by patients (self-medication) is stored securely in a 'personal' locker. 10) A working supply of linen and amenities is stored. 11) A working supply of consumables may be held/stored. 12) Mobile hoist may be used. 13) Patient will receive therapeutic and clinical attention from healthcare staff. 14) Patient may be ambulant, in a wheelchair or on a trolley or bed 15) Carrying out examinations and assessment of patient. 16) Piped medical gases, vacuum and associated equipment may be used.
Personnel:	1 x patient. 4 x others (staff and/or visitors).
Planning Relationships:	En-suite sanitary facilities.

Space Data:	**Area (m²):**	19.00	**Height (mm):**	2700

Notes:

Design Notes:
- DOOR IRONMONGERY: to be part of Door Schedule.
- DOOR STOPPER: to prevent clash with TV, specification to be confirmed.

HIGHLIGHTED AREAS:
- WINDOW ZONE: Extent / Dimensions to be project specific.
- WARDROBE: Type / Size to be project specific
- GLAZED SCREEN: Extent / Dimensions to be project specific
- DOOR VISION PANEL / VISTAMATIC: Extent / Dimensions to be project specific but dependant on Glazed Screen.

ADB 2017 Room Notes:
This room is based on the use of a trolley with a worktop.
It is assumed that computers will be handheld or brought into the room on a trolley.

The call repeat lamp is situated over the door outside the room.

The following items may be provided:
- a ceiling-mounted hoist;
- a small fridge for patient use;
- a combined wardrobe and bedside locker instead of the separate wardrobe and locker;
- when used for maternity post-natal provision of a cot(s) will be required.

Separate data and voice outlets may be used where structure cabling solutions are not available.

ADB	Room Environmental Data	B0305-HFS2

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	B0305-HFS2	Single-bed room, outboard configuration, option 2
Room Number:		**Revision Date:** 20/03/2020

TEMPERATURE AND VENTILATION	**Requirements**	**Notes**
Permissible Space Temerature Range(dry bulb) (degC):	18 - 28	
Heating Design Temperature (dry bulb)(degC):	22	
Minimum Air Changes (AC/hr):	6	
Ventilation Type:	S/E/N	
Pressure Relative to Adjoining Space:	Bal	
Supply Air: Final Filter Class	G4	
Permisiible Relative Humidity Range (%):	Uncontrolled	
General Notes:		

LIGHTING		
Type Of Control:	S/N/EM	
Daytime General Service Illuminance (Lux):	100	
Daytime Specific Service Illuminance (Lux):	300	
Nighttime General Service Illuminance (Lux):	5	
Nighttime Specific Service Illuminance (Lux):	0.5	
Local Task Illuminance (Lux):	300	
Colour Rendering Required:	Y	
Colour Rendering Required Characteristics (Ra):	80	
Unified Glare Rating Limit (UGRL):	19	
Emergency Escape Route Lighting Required:	Y	In accordance with BS 5266 and Health Technical Memorandums
Standby Lighting Grade - General Lighting:	A	
Standby Lighting Grade - Local Lighting:	A	
General Notes:	Refer to SLL Lighting Guide 2 for more detailed guidance	

RISK		
Clinical Risk Category:		
Non-clinical Business Continuity Risk Category:		
General Notes:		

NOISE		
Noise Intrusion (dB) 1hr day:	40	The LAmax,f dB noise limit applies only at night 23:00 to 07:00 hours.
Noise Intrusion (dB) 1hr night:	35	
Noise Intrusion (dB) f night:	45	
Maximum Internal Noise from M&E Services (NR):	30	Total noise of MEP services under normal operation across the range 63Hz to 4kHz inclusive.
Room Sound-insulation Parameters - Privacy:	Confidential	Reference to Table 3 of the Department of Health 'Acoustics: Technical design manual 4032:0.6:England'.
Room Sound-insulation Parameters - Noise Generation:	Typical	
Noise Sensitiviy:	Medium	
Sound-insulation Rating (dB D nT,w):		
General Notes:		

SAFETY/FIRE		
Maximum Surface Temperature (DegC):	43	
Domestic Hot Water Discharge Temperature (DegC):	41	
Maximum Cold Water Discharge Temperature (DegC):	<20	
General Notes:		
Type of Automatic Fire Detection:	Smoke	
General Notes:		

ADB	Room Design Character	B0305-HFS2

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	B0305-HFS2	Single-bed room, outboard configuration, option 2
Room Number:		**Revision Date:** 20/03/2020

Walls:	Wall finishes to comply with Performance Requirements in HBN 00-10 Part B:Walls and Ceilings (2013) Wall finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part B:Walls and Ceilings.
Floor:	Floor finishes to comply with Performance Requirements in HBN 00-10 Part A:Flooring (2013) Floor finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part A:Flooring.
Ceiling:	Ceiling finishes to comply with Performance Requirements in HBN 00-10 Part B:Walls and Ceilings (2013) Ceiling finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part B:Walls and Ceilings.
Doorsets:	Configuration, glazing, fire rating, security, etc. to be determined by Project Team. HTM 58 (Mar-2005) Refer to HBN 00-04 (May-2007) for effective clear door widths. 2 sets of doors: 1 x personnel, bed, trolley, wheelchair & equipment access (1500mm); 1 x approx 2200 mm - see HBN 00-02 Requirement for hinge protection when areas used by children
Windows:	Essential Clear glass with solar and privacy control Designation to be validated against current documentation (HTM 55 archived).
Internal Glazing:	Non-essential - Project Option Clear with privacy control Designation to be validated against current documentation. HTM 57 (Mar-2005)
Hatch:	Not required
Notes:	All finishes to be selected using the "Selection Procedure for Finishes" included in 8941:06: England. All finishes selected must have an appropriate risk assessment to accompany the design decision. Infection Control must be consulted as described in Performance Requirements for Building Elements Used in Healthcare Facilities 8941:0.6 England.

ADB	Schedule of Components by Room	B0305-HFS2

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	B0305-HFS2	Single-bed room, outboard configuration, option 2
Room Number:		**Revision Date:** 20/03/2020

Quantity			Code	Description	Alt. Code	Grp
New	Trans	Total				
1		1	BAS1113	BASIN, Contour 21 back outlet washbasin, 50cm, no tapholes, no overflow, no chainstay hole		1
1		1	BED1040	WALL PROTECTION, Bed Head Buffer, Vertical		1
1		1	CAL007	PULL/PUSH BUTTON, staff emergency call, reset and integral/adjacent indicator lamp		1
1		1	CAN1012	CANOPY, size to suit unit below		1
2		2	HOO019	HOOK, single, small, wall mounted		1
1		1	LIG1005	LIGHT, bed head, dimmable, wall mounted		1
1		1	OUT006	SOCKET outlet unswitched 13amp single.		1
7		7	OUT010	SOCKET outlet, switched, 13 amp, twin		1
3		3	OUT131	SOCKET outlet data/voice, double.		1
1		1	OUT206	SOCKET outlet television aerial, single.		1
1		1	OUT471	OUTLET oxygen medical, trunking mounted		1
1		1	OUT476	OUTLET vacuum medical, trunking mounted		1
1		1	RAI1302	RAIL, clinical equipment, wall mounted, max width available		1
1		1	RAI1305H	RAIL, Railing (To Suit Length, door), handed		1
1		1	RAI1306	RAIL, Railing (To Suit Length)		1
2		2	SWC025	SWITCH, light		1
1		1	SWC1090	SWITCH; light, 3 gang		1
1		1	TAP1500	TAP, Markwik 21 Demountable Panel Mixer, Lever Handle, Detachable Spout		1
1		1	THE005	THERMOSTAT		1
1		1	WAR1062	WARDROBE, built in wardrobe, with shelf and 4 no. coat hooks within wardrobe, 600W 400D 1810H		1
1		1	BRA015	BRACKET, flat panel monitor, height adjustable, wall mounted		2
1		1	CLO001	CLOCK battery, wall mounted		2
1		1	DIS011	DISPENSER, barrier cream, disposable single cartridge, wall mounted		2
1		1	DIS013	DISPENSER, paper towel, wall mounted		2
1		1	DIS026	DISPENSER, Medical hand sanitizer, lever action, wall mounted		2
1		1	DIS030	DISPENSER, soap, disposable single cartridge, lever action, wall mounted		2
1		1	DIS438	DISPENSER, disposable gloves set of 3 and disposable apron, wall mounted		2
1		1	TVM1010	TELEVISION monitor, colour, flat panel, 32", wall mounted		2
1		1	BED015	BED variable height, two-way tilt, adjustable backrest and knee-break, built-in bed extension with mattress retainer, electrically operated, on castors, 380-780H 2260/2430L 1010W		3
1		1	CHA307	CHAIR, easy, high back, with open arms, upholstered, wipeable		3
2		2	CHA317	CHAIR, upright, upholstered, stacking, wipeable		3
2		2	HOL004	HOLDER, sack, with lid foot operated, small, freestanding		3

ADB	Schedule of Components by Room	B0305-HFS2

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	B0305-HFS2	Single-bed room, outboard configuration, option 2
Room Number:		**Revision Date:** 20/03/2020

Quantity			Code	Description	Alt. Code	Grp
New	Trans	Total				
1		1	LOC004	LOCKER, bedside, 4 compartment with lockable section /drawer, towel rail at rear, on castors, 902H 485W 485D		3
1		1	MAT008	MATTRESS, suitable for BED015		3
1		1	TAB073	TABLE, overbed, cantilevered		3

ADB	Room Data Sheet	B0305-HFS3

Project:	2532-RR	HFS Repeatable Rooms, ADB		
Department:	EXEM	Exemplar Repeatable Rooms		
Room:	B0305-HFS3	Single-bed room, inboard configuration, option 1		
Room Number:			**Revision Date:**	20/03/2020

Activities:	1) User may undress and dress in privacy. 2) Rest and relaxation or sleeping. 3) Patient may take meals or refreshments in bed, by the bed or in the sitting space. 4) Entertainment services system may be used. 5) Patient may receive visitors. 6) Clinical wash-hand basin may be used. 7) Patient records may be reviewed and recorded. 8) Electronic patient records (EPRs) may be accessed and updated. 9) Medicines for use by patients (self-medication) is stored securely in a 'personal' locker. 10) A working supply of linen and amenities is stored. 11) A working supply of consumables may be held/stored. 12) Mobile hoist may be used. 13) Patient will receive therapeutic and clinical attention from healthcare staff. 14) Patient may be ambulant, in a wheelchair or on a trolley or bed 15) Carrying out examinations and assessment of patient. 16) Piped medical gases, vacuum and associated equipment may be used.
Personnel:	1 x patient. 4 x others (staff and/or visitors).
Planning Relationships:	En-suite sanitary facilities.

Space Data:	**Area (m²):**	19.00	**Height (mm):**	2700

adb	**Activity DataBase**	**09/07/2020**

Notes:

Design Notes:
- DOOR IRONMONGERY: to be part of Door Schedule.
- DOOR STOPPER: to prevent clash with TV, specification to be confirmed.

HIGHLIGHTED AREAS:
- WINDOW ZONE: Extent / Dimensions to be project specific.
- WARDROBE: Type / Size to be project specific
- GLAZED SCREEN: Extent / Dimensions to be project specific
- DOOR VISION PANEL / VISTAMATIC: Extent / Dimensions to be project specific but dependant on Glazed Screen.

ADB 2017 Room Notes:
This room is based on the use of a trolley with a worktop.
It is assumed that computers will be handheld or brought into the room on a trolley.

The call repeat lamp is situated over the door outside the room.

The following items may be provided:
- a ceiling-mounted hoist;
- a small fridge for patient use;
- a combined wardrobe and bedside locker instead of the separate wardrobe and locker;
- when used for maternity post-natal provision of a cot(s) will be required.

Separate data and voice outlets may be used where structure cabling solutions are not available.

ADB	Room Environmental Data	B0305-HFS3

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	B0305-HFS3	Single-bed room, inboard configuration, option 1
Room Number:		**Revision Date:** 20/03/2020

TEMPERATURE AND VENTILATION	**Requirements**	**Notes**
Permissible Space Temerature Range(dry bulb) (degC):	18 - 28	
Heating Design Temperature (dry bulb)(degC):	22	
Minimum Air Changes (AC/hr):	6	
Ventilation Type:	S/E/N	
Pressure Relative to Adjoining Space:	Bal	
Supply Air: Final Filter Class	G4	
Permisiible Relative Humidity Range (%):	Uncontrolled	
General Notes:		

LIGHTING		
Type Of Control:	S/N/EM	
Daytime General Service Illuminance (Lux):	100	
Daytime Specific Service Illuminance (Lux):	300	
Nighttime General Service Illuminance (Lux):	5	
Nighttime Specific Service Illuminance (Lux):	0.5	
Local Task Illuminance (Lux):	300	
Colour Rendering Required:	Y	
Colour Rendering Required Characteristics (Ra):	80	
Unified Glare Rating Limit (UGRL):	19	
Emergency Escape Route Lighting Required:	Y	In accordance with BS 5266 and Health Technical Memorandums
Standby Lighting Grade - General Lighting:	A	
Standby Lighting Grade - Local Lighting:	A	
General Notes:	Refer to SLL Lighting Guide 2 for more detailed guidance	

RISK		
Clinical Risk Category:		
Non-clinical Business Continuity Risk Category:		
General Notes:		

NOISE		
Noise Intrusion (dB) 1hr day:	40	The LAmax,f dB noise limit applies only at night 23:00 to 07:00 hours.
Noise Intrusion (dB) 1hr night:	35	
Noise Intrusion (dB) f night:	45	
Maximum Internal Noise from M&E Services (NR):	30	Total noise of MEP services under normal operation across the range 63Hz to 4kHz inclusive.
Room Sound-insulation Parameters - Privacy:	Confidential	Reference to Table 3 of the Department of Health 'Acoustics: Technical design manual 4032:0.6:England'.
Room Sound-insulation Parameters - Noise Generation:	Typical	
Noise Sensitiviy:	Medium	
Sound-insulation Rating (dB D nT,w):		
General Notes:		

SAFETY/FIRE		
Maximum Surface Temperature (DegC):	43	
Domestic Hot Water Discharge Temperature (DegC):	41	
Maximum Cold Water Discharge Temperature (DegC):	<20	
General Notes:		
Type of Automatic Fire Detection:	Smoke	
General Notes:		

ADB	Room Design Character	B0305-HFS3

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	B0305-HFS3	Single-bed room, inboard configuration, option 1
Room Number:		**Revision Date:** 20/03/2020

Walls:	Wall finishes to comply with Performance Requirements in HBN 00-10 Part B:Walls and Ceilings (2013) Wall finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part B:Walls and Ceilings.
Floor:	Floor finishes to comply with Performance Requirements in HBN 00-10 Part A:Flooring (2013) Floor finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part A:Flooring.
Ceiling:	Ceiling finishes to comply with Performance Requirements in HBN 00-10 Part B:Walls and Ceilings (2013) Ceiling finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part B:Walls and Ceilings.
Doorsets:	Configuration, glazing, fire rating, security, etc. to be determined by Project Team. HTM 58 (Mar-2005) Refer to HBN 00-04 (May-2007) for effective clear door widths. 2 sets of doors: 1 x personnel, bed, trolley, wheelchair & equipment access (1500mm); 1 x approx 2200 mm - see HBN 00-02 Requirement for hinge protection when areas used by children
Windows:	Essential Clear glass with solar and privacy control Designation to be validated against current documentation (HTM 55 archived).
Internal Glazing:	Non-essential - Project Option Clear with privacy control Designation to be validated against current documentation. HTM 57 (Mar-2005)
Hatch:	Not required
Notes:	All finishes to be selected using the "Selection Procedure for Finishes" included in 8941:06: England. All finishes selected must have an appropriate risk assessment to accompany the design decision. Infection Control must be consulted as described in Performance Requirements for Building Elements Used in Healthcare Facilities 8941:0.6 England.

ADB	Schedule of Components by Room	B0305-HFS3

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	B0305-HFS3	Single-bed room, inboard configuration, option 1
Room Number:		**Revision Date:** 20/03/2020

Quantity			Code	Description	Alt. Code	Grp
New	Trans	Total				
1		1	BAS1113	BASIN, Contour 21 back outlet washbasin, 50cm, no tapholes, no overflow, no chainstay hole		1
1		1	BED1040	WALL PROTECTION, Bed Head Buffer, Vertical		1
1		1	CAL007	PULL/PUSH BUTTON, staff emergency call, reset and integral/adjacent indicator lamp		1
1		1	CAN1012	CANOPY, size to suit unit below		1
2		2	HOO019	HOOK, single, small, wall mounted		1
1		1	LIG1005	LIGHT, bed head, dimmable, wall mounted		1
1		1	OUT006	SOCKET outlet unswitched 13amp single.		1
7		7	OUT010	SOCKET outlet, switched, 13 amp, twin		1
3		3	OUT131	SOCKET outlet data/voice, double.		1
1		1	OUT206	SOCKET outlet television aerial, single.		1
1		1	OUT471	OUTLET oxygen medical, trunking mounted		1
1		1	OUT476	OUTLET vacuum medical, trunking mounted		1
1		1	RAI1302	RAIL, clinical equipment, wall mounted, max width available		1
1		1	RAI1305H	RAIL, Railing (To Suit Length, door), handed		1
1		1	RAI1306	RAIL, Railing (To Suit Length)		1
2		2	SWC025	SWITCH, light		1
1		1	SWC1090	SWITCH; light, 3 gang		1
1		1	TAP1500	TAP, Markwik 21 Demountable Panel Mixer, Lever Handle, Detachable Spout		1
1		1	THE005	THERMOSTAT		1
1		1	WAR1062	WARDROBE, built in wardrobe, with shelf and 4 no. coat hooks within wardrobe, 600W 400D 1810H		1
1		1	BRA015	BRACKET, flat panel monitor, height adjustable, wall mounted		2
1		1	CLO001	CLOCK battery, wall mounted		2
1		1	DIS011	DISPENSER, barrier cream, disposable single cartridge, wall mounted		2
1		1	DIS013	DISPENSER, paper towel, wall mounted		2
1		1	DIS026	DISPENSER, Medical hand sanitizer, lever action, wall mounted		2
1		1	DIS030	DISPENSER, soap, disposable single cartridge, lever action, wall mounted		2
1		1	DIS438	DISPENSER, disposable gloves set of 3 and disposable apron, wall mounted		2
1		1	TVM1010	TELEVISION monitor, colour, flat panel, 32", wall mounted		2
1		1	BED015	BED variable height, two-way tilt, adjustable backrest and knee-break, built-in bed extension with mattress retainer, electrically operated, on castors, 380-780H 2260/2430L 1010W		3
1		1	CHA307	CHAIR, easy, high back, with open arms, upholstered, wipeable		3
2		2	CHA317	CHAIR, upright, upholstered, stacking, wipeable		3
2		2	HOL004	HOLDER, sack, with lid foot operated, small, freestanding		3

ADB	Schedule of Components by Room	B0305-HFS3

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	B0305-HFS3	Single-bed room, inboard configuration, option 1
Room Number:		**Revision Date:** 20/03/2020

Quantity			Code	Description	Alt. Code	Grp
New	Trans	Total				
1		1	LOC004	LOCKER, bedside, 4 compartment with lockable section /drawer, towel rail at rear, on castors, 902H 485W 485D		3
1		1	MAT008	MATTRESS, suitable for BED015		3
1		1	TAB073	TABLE, overbed, cantilevered		3

ADB	Room Data Sheet	B0305-HFS4

Project:	2532-RR	HFS Repeatable Rooms, ADB		
Department:	EXEM	Exemplar Repeatable Rooms		
Room:	B0305-HFS4	Single-bed room, inboard configuration, option 2		
Room Number:			**Revision Date:**	20/03/2020

Activities:	1) User may undress and dress in privacy. 2) Rest and relaxation or sleeping. 3) Patient may take meals or refreshments in bed, by the bed or in the sitting space. 4) Entertainment services system may be used. 5) Patient may receive visitors. 6) Clinical wash-hand basin may be used. 7) Patient records may be reviewed and recorded. 8) Electronic patient records (EPRs) may be accessed and updated. 9) Medicines for use by patients (self-medication) is stored securely in a 'personal' locker. 10) A working supply of linen and amenities is stored. 11) A working supply of consumables may be held/stored. 12) Mobile hoist may be used. 13) Patient will receive therapeutic and clinical attention from healthcare staff. 14) Patient may be ambulant, in a wheelchair or on a trolley or bed 15) Carrying out examinations and assessment of patient. 16) Piped medical gases, vacuum and associated equipment may be used.
Personnel:	1 x patient. 4 x others (staff and/or visitors).
Planning Relationships:	En-suite sanitary facilities.

Space Data:	**Area (m²):**	19.00	**Height (mm):**	2700

adb	**Activity DataBase**	**09/07/2020**

Notes:

Design Notes:
- DOOR IRONMONGERY: to be part of Door Schedule.
- DOOR STOPPER: to prevent clash with TV, specification to be confirmed.

HIGHLIGHTED AREAS:
- WINDOW ZONE: Extent / Dimensions to be project specific.
- WARDROBE: Type / Size to be project specific
- GLAZED SCREEN: Extent / Dimensions to be project specific
- DOOR VISION PANEL / VISTAMATIC: Extent / Dimensions to be project specific but dependant on Glazed Screen.

ADB 2017 Room Notes:
This room is based on the use of a trolley with a worktop.
It is assumed that computers will be handheld or brought into the room on a trolley.

The call repeat lamp is situated over the door outside the room.

The following items may be provided:
- a ceiling-mounted hoist;
- a small fridge for patient use;
- a combined wardrobe and bedside locker instead of the separate wardrobe and locker;
- when used for maternity post-natal provision of a cot(s) will be required.

Separate data and voice outlets may be used where structure cabling solutions are not available.

ADB	Room Environmental Data	B0305-HFS4

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	B0305-HFS4	Single-bed room, inboard configuration, option 2
Room Number:		**Revision Date:** 20/03/2020

TEMPERATURE AND VENTILATION	**Requirements**	**Notes**
Permissible Space Temerature Range(dry bulb) (degC):	18 - 28	
Heating Design Temperature (dry bulb)(degC):	22	
Minimum Air Changes (AC/hr):	6	
Ventilation Type:	S/E/N	
Pressure Relative to Adjoining Space:	Bal	
Supply Air: Final Filter Class	G4	
Permisiible Relative Humidity Range (%):	Uncontrolled	
General Notes:		

LIGHTING		
Type Of Control:	S/N/EM	
Daytime General Service Illuminance (Lux):	100	
Daytime Specific Service Illuminance (Lux):	300	
Nighttime General Service Illuminance (Lux):	5	
Nighttime Specific Service Illuminance (Lux):	0.5	
Local Task Illuminance (Lux):	300	
Colour Rendering Required:	Y	
Colour Rendering Required Characteristics (Ra):	80	
Unified Glare Rating Limit (UGRL):	19	
Emergency Escape Route Lighting Required:	Y	In accordance with BS 5266 and Health Technical Memorandums
Standby Lighting Grade - General Lighting:	A	
Standby Lighting Grade - Local Lighting:	A	
General Notes:	Refer to SLL Lighting Guide 2 for more detailed guidance	

RISK		
Clinical Risk Category:		
Non-clinical Business Continuity Risk Category:		
General Notes:		

NOISE		
Noise Intrusion (dB) 1hr day:	40	The LAmax,f dB noise limit applies only at night 23:00 to 07:00 hours.
Noise Intrusion (dB) 1hr night:	35	
Noise Intrusion (dB) f night:	45	
Maximum Internal Noise from M&E Services (NR):	30	Total noise of MEP services under normal operation across the range 63Hz to 4kHz inclusive.
Room Sound-insulation Parameters - Privacy:	Confidential	Reference to Table 3 of the Department of Health 'Acoustics: Technical design manual 4032:0.6:England'.
Room Sound-insulation Parameters - Noise Generation:	Typical	
Noise Sensitiviy:	Medium	
Sound-insulation Rating (dB D nT,w):		
General Notes:		

SAFETY/FIRE		
Maximum Surface Temperature (DegC):	43	
Domestic Hot Water Discharge Temperature (DegC):	41	
Maximum Cold Water Discharge Temperature (DegC):	<20	
General Notes:		
Type of Automatic Fire Detection:	Smoke	
General Notes:		

ADB	Room Design Character	B0305-HFS4

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	B0305-HFS4	Single-bed room, inboard configuration, option 2
Room Number:		**Revision Date:** 20/03/2020

Walls:	Wall finishes to comply with Performance Requirements in HBN 00-10 Part B:Walls and Ceilings (2013) Wall finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part B:Walls and Ceilings.
Floor:	Floor finishes to comply with Performance Requirements in HBN 00-10 Part A:Flooring (2013) Floor finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part A:Flooring.
Ceiling:	Ceiling finishes to comply with Performance Requirements in HBN 00-10 Part B:Walls and Ceilings (2013) Ceiling finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part B:Walls and Ceilings.
Doorsets:	Configuration, glazing, fire rating, security, etc. to be determined by Project Team. HTM 58 (Mar-2005) Refer to HBN 00-04 (May-2007) for effective clear door widths. 2 sets of doors: 1 x personnel, bed, trolley, wheelchair & equipment access (1500mm); 1 x approx 2200 mm - see HBN 00-02 Requirement for hinge protection when areas used by children
Windows:	Essential Clear glass with solar and privacy control Designation to be validated against current documentation (HTM 55 archived).
Internal Glazing:	Non-essential - Project Option Clear with privacy control Designation to be validated against current documentation. HTM 57 (Mar-2005)
Hatch:	Not required
Notes:	All finishes to be selected using the "Selection Procedure for Finishes" included in 8941:06: England. All finishes selected must have an appropriate risk assessment to accompany the design decision. Infection Control must be consulted as described in Performance Requirements for Building Elements Used in Healthcare Facilities 8941:0.6 England.

ADB	Schedule of Components by Room	B0305-HFS4

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	B0305-HFS4	Single-bed room, inboard configuration, option 2
Room Number:		**Revision Date:** 20/03/2020

Quantity			Code	Description	Alt. Code	Grp
New	Trans	Total				
1		1	BAS1113	BASIN, Contour 21 back outlet washbasin, 50cm, no tapholes, no overflow, no chainstay hole		1
1		1	BED1040	WALL PROTECTION, Bed Head Buffer, Vertical		1
1		1	CAL007	PULL/PUSH BUTTON, staff emergency call, reset and integral/adjacent indicator lamp		1
1		1	CAN1012	CANOPY, size to suit unit below		1
2		2	HOO019	HOOK, single, small, wall mounted		1
1		1	LIG1005	LIGHT, bed head, dimmable, wall mounted		1
1		1	OUT006	SOCKET outlet unswitched 13amp single.		1
7		7	OUT010	SOCKET outlet, switched, 13 amp, twin		1
3		3	OUT131	SOCKET outlet data/voice, double.		1
1		1	OUT206	SOCKET outlet television aerial, single.		1
1		1	OUT471	OUTLET oxygen medical, trunking mounted		1
1		1	OUT476	OUTLET vacuum medical, trunking mounted		1
1		1	RAI1302	RAIL, clinical equipment, wall mounted, max width available		1
1		1	RAI1305	RAIL, Railing (To Suit Length, door)		1
1		1	RAI1306	RAIL, Railing (To Suit Length)		1
2		2	SWC025	SWITCH, light		1
1		1	SWC1090	SWITCH; light, 3 gang		1
1		1	TAP1500	TAP, Markwik 21 Demountable Panel Mixer, Lever Handle, Detachable Spout		1
1		1	THE005	THERMOSTAT		1
1		1	WAR1062	WARDROBE, built in wardrobe, with shelf and 4 no. coat hooks within wardrobe, 600W 400D 1810H		1
1		1	BRA015	BRACKET, flat panel monitor, height adjustable, wall mounted		2
1		1	CLO001	CLOCK battery, wall mounted		2
1		1	DIS011	DISPENSER, barrier cream, disposable single cartridge, wall mounted		2
1		1	DIS013	DISPENSER, paper towel, wall mounted		2
1		1	DIS026	DISPENSER, Medical hand sanitizer, lever action, wall mounted		2
1		1	DIS030	DISPENSER, soap, disposable single cartridge, lever action, wall mounted		2
1		1	DIS438	DISPENSER, disposable gloves set of 3 and disposable apron, wall mounted		2
1		1	TVM1010	TELEVISION monitor, colour, flat panel, 32", wall mounted		2
1		1	BED015	BED variable height, two-way tilt, adjustable backrest and knee-break, built-in bed extension with mattress retainer, electrically operated, on castors, 380-780H 2260/2430L 1010W		3
1		1	CHA307	CHAIR, easy, high back, with open arms, upholstered, wipeable		3
2		2	CHA317	CHAIR, upright, upholstered, stacking, wipeable		3
2		2	HOL004	HOLDER, sack, with lid foot operated, small, freestanding		3

ADB	Schedule of Components by Room	B0305-HFS4

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	B0305-HFS4	Single-bed room, inboard configuration, option 2
Room Number:		**Revision Date:** 20/03/2020

Quantity			Code	Description	Alt. Code	Grp
New	Trans	Total				
1		1	LOC004	LOCKER, bedside, 4 compartment with lockable section /drawer, towel rail at rear, on castors, 902H 485W 485D		3
1		1	MAT008	MATTRESS, suitable for BED015		3
1		1	TAB073	TABLE, overbed, cantilevered		3

ADB	Room Data Sheet	V1643-HFS1

Project:	2532-RR	HFS Repeatable Rooms, ADB	
Department:	EXEM	Exemplar Repeatable Rooms	
Room:	V1643-HFS1	Shower room: en-suite, outboard configuration 1	
Room Number:		**Revision Date:**	23/03/2020

Activities:	1) Use of shower requires assistance. The shower may have an adjustable or fixed tip-up shower seat. 2) Use of toilet requires assistance. 3) Adjustable height hand-wash basin may be used. 4) User may undress and dress in privacy. 5) Hanging outdoor clothing. 6) Hanging clothes and towels. 7) Sanitary chair/commode may be used. 8) Use of shower chair. 9) Mobile hoist may be used. 10) Call systems may be used.			
Personnel:	1 x patient. 1-2 x assistants. Intermittent use.			
Planning Relationships:	En-suite to single-bed room.			
Space Data:	**Area (m²):**	5.00	**Height (mm):**	2400

Notes:

Design Notes:
- PORTABLE SHOWER SCREEN: as an option for assisted showering.
- DOOR IRONMONGERY: to be part of a Door Schedule.
- DRAINAGE: 1No. 110mm pop-up per En-Suite.

Pop-up to take waste pipe from WC within room, and WHB / Shower from adjacent En-Suite.
Pipes passing through intermediate partition may require fire protection / sleeves depending on:
a) pipe diameter
b) fire strategy specific to project.

ADB 2017 Room Note:
Assisted access to one side of the toilet requires the second door to the en-suite bedroom to be open. See HBN 00-02.

The call repeat lamp is situated over the doors outside the en-suite room and the bedroom.

The following items are shown on the drawing but are optional:
- the bin for the disposal of sanitary towels is only required in female WCs;
- mirror, light and shaver outlet.

The following items may be provided:
- fixed shower head.

ADB	Room Environmental Data	V1643-HFS1

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	V1643-HFS1	Shower room: en-suite, outboard configuration 1
Room Number:		**Revision Date:** 23/03/2020

TEMPERATURE AND VENTILATION	**Requirements**	**Notes**
Permissible Space Temerature Range(dry bulb) (degC):	18 - 28	
Heating Design Temperature (dry bulb)(degC):	22	
Minimum Air Changes (AC/hr):	10	
Ventilation Type:	E	
Pressure Relative to Adjoining Space:	-ve	
Supply Air: Final Filter Class		
Permisiible Relative Humidity Range (%):	Uncontrolled	
General Notes:		
LIGHTING		
Type Of Control:	N	
Daytime General Service Illuminance (Lux):	200	
Daytime Specific Service Illuminance (Lux):		
Nighttime General Service Illuminance (Lux):		
Nighttime Specific Service Illuminance (Lux):		
Local Task Illuminance (Lux):		
Colour Rendering Required:	Y	
Colour Rendering Required Characteristics (Ra):	80	
Unified Glare Rating Limit (UGRL):	22	
Emergency Escape Route Lighting Required:	Y	In accordance with BS 5266 and Health Technical Memorandums
Standby Lighting Grade - General Lighting:	B	
Standby Lighting Grade - Local Lighting:		
General Notes:		
RISK		
Clinical Risk Category:		
Non-clinical Business Continuity Risk Category:		
General Notes:		
NOISE		
Noise Intrusion (dB) 1hr day:	45	
Noise Intrusion (dB) 1hr night:	-	
Noise Intrusion (dB) f night:	-	
Maximum Internal Noise from M&E Services (NR):	40	Total noise of MEP services under normal operation across the range 63Hz to 4kHz inclusive.
Room Sound-insulation Parameters - Privacy:	Moderate	Reference to Table 3 of the Department of Health 'Acoustics: Technical design manual 4032:0.6:England'.
Room Sound-insulation Parameters - Noise Generation:	Typical	
Noise Sensitiviy:	Not Sensitive	
Sound-insulation Rating (dB D nT,w):		
General Notes:		
SAFETY/FIRE		
Maximum Surface Temperature (DegC):	43	
Domestic Hot Water Discharge Temperature (DegC):	41	
Maximum Cold Water Discharge Temperature (DegC):	<20	
General Notes:		
Type of Automatic Fire Detection:		Omitted via risk assessment
General Notes:		

ADB	Room Design Character	V1643-HFS1

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	V1643-HFS1	Shower room: en-suite, outboard configuration 1
Room Number:		**Revision Date:** 23/03/2020

Walls:	Wall finishes to comply with Performance Requirements in HBN 00-10 Part B:Walls and Ceilings (2013) Wall finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part B:Walls and Ceilings.
Floor:	Floor finishes to comply with Performance Requirements in HBN 00-10 Part A:Flooring (2013) Floor finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part A:Flooring.
Ceiling:	Ceiling finishes to comply with Performance Requirements in HBN 00-10 Part B:Walls and Ceilings (2013) Ceiling finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part B:Walls and Ceilings.
Doorsets:	Configuration, glazing, fire rating, security, etc. to be determined by Project Team. HTM 58 (Mar-2005) Refer to HBN 00-04 (May-2007) for effective clear door widths. 1 doorset - double leaf sliding/folding: 1 x approx 2200 mm - see HBN 00-02 Requirement for hinge protection when areas used by children
Windows:	Not required
Internal Glazing:	Not required
Hatch:	Not required
Notes:	All finishes selected must have an appropriate risk assessment to accompany the design decision. Infection Control must be consulted as described in Performance Requirements for Building Elements Used in Healthcare Facilities 8941:0.6 England.

ADB	Schedule of Components by Room	V1643-HFS1

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	V1643-HFS1	Shower room: en-suite, outboard configuration 1
Room Number:		**Revision Date:** 23/03/2020

Quantity			Code	Description	Alt. Code	Grp
New	Trans	Total				
1		1	BAS1112	BASIN, Portman 21 Washbasin 50cm RH Taphole, No Overflow or Chainstay Hole		1
1		1	CAL1417	PUSH BUTTON staff/patient emergency call, reset and integral/adjacent indicator lamp, wall mounted		1
1		1	CIS005	CISTERN WC/toilet, concealed, reversible. To suit WC		1
2		2	HOO019	HOOK, single, small, wall mounted		1
1		1	LIG063	LUMINAIRE, single fluorescent lamp, wall, 8 watt, 300 mm		1
1		1	MIR002	MIRROR, wall mounted, 900H 300W		1
1		1	MIR026	MIRROR, unbreakable, wall mounted, 1300H 500W		1
1		1	RAI1303	RAIL, rail for shower curtain, L-shape		1
3		3	RAI1304	RAIL, grab rail, horizontal		1
3		3	RAI1307	RAIL, grab rail, horizontal		1
1		1	RAI1308	RAIL,toilet backing rail, with backrest		1
2		2	RAI175	RAIL, grab, hinged, wall mounted, 750mm		1
1		1	SHO018	SHOWER, valve, thermostatic mixer (associated with SHO020).		1
1		1	SHO020	SHOWER, adjustable shower head hand spray (associated with SHO018).		1
2		2	STF200	STORAGE UNIT, mid, shelf, 150H 300W 150D		1
1		1	TAP1501	TAP, A4169AA Contour 21 washbasin mixer thermostatic		1
1		1	WAS105	WASTE DISPOSAL UNIT, sink waste		1
1		1	WCH1008	WC, Contour 21 back to wall rimless raised height WC pan, 70cm projection with horizontal outlet		1
1		1	DIS013	DISPENSER, paper towel, wall mounted		2
1		1	DIS015	DISPENSER, toilet paper, dispense individual sheets, wall mounted		2
1		1	DIS030	DISPENSER, soap, disposable single cartridge, lever action, wall mounted		2
1		1	BIN028	BIN, disposal, sealed, operated with one hand, nominal 420H 155W 490D		3
1		1	CHA1396	CHAIR, shower, mobile		3
1		1	HOL004	HOLDER, sack, with lid foot operated, small, freestanding		3

ADB	Room Data Sheet	V1643-HFS2

Project:	2532-RR	HFS Repeatable Rooms, ADB		
Department:	EXEM	Exemplar Repeatable Rooms		
Room:	V1643-HFS2	Shower room: en-suite, outboard configuration 2		
Room Number:			**Revision Date:**	23/03/2020

Activities:	1) Use of shower requires assistance. The shower may have an adjustable or fixed tip-up shower seat. 2) Use of toilet requires assistance. 3) Adjustable height hand-wash basin may be used. 4) User may undress and dress in privacy. 5) Hanging outdoor clothing. 6) Hanging clothes and towels. 7) Sanitary chair/commode may be used. 8) Use of shower chair. 9) Mobile hoist may be used. 10) Call systems may be used.			
Personnel:	1 x patient. 1-2 x assistants. Intermittent use.			
Planning Relationships:	En-suite to single-bed room.			
Space Data:	**Area (m²):**	5.00	**Height (mm):**	2400

Notes:

Design Notes:
- PORTABLE SHOWER SCREEN: as an option for assisted showering.
- DOOR IRONMONGERY: to be part of a Door Schedule.
- DRAINAGE: 1No. 110mm pop-up per En-Suite.

Pop-up to take waste pipe from WC within room, and WHB / Shower from adjacent En-Suite.
Pipes passing through intermediate partition may require fire protection / sleeves depending on:
a) pipe diameter
b) fire strategy specific to project.

ADB 2017 Room Note:
Assisted access to one side of the toilet requires the second door to the en-suite bedroom to be open. See HBN 00-02.

The call repeat lamp is situated over the doors outside the en-suite room and the bedroom.

The following items are shown on the drawing but are optional:
- the bin for the disposal of sanitary towels is only required in female WCs;
- mirror, light and shaver outlet.

The following items may be provided:
- fixed shower head.

ADB	Room Environmental Data	V1643-HFS2

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	V1643-HFS2	Shower room: en-suite, outboard configuration 2
Room Number:		**Revision Date:** 23/03/2020

TEMPERATURE AND VENTILATION	**Requirements**	**Notes**
Permissible Space Temerature Range(dry bulb) (degC):	18 - 28	
Heating Design Temperature (dry bulb)(degC):	22	
Minimum Air Changes (AC/hr):	10	
Ventilation Type:	E	
Pressure Relative to Adjoining Space:	-ve	
Supply Air: Final Filter Class		
Permisiible Relative Humidity Range (%):	Uncontrolled	
General Notes:		
LIGHTING		
Type Of Control:	N	
Daytime General Service Illuminance (Lux):	200	
Daytime Specific Service Illuminance (Lux):		
Nighttime General Service Illuminance (Lux):		
Nighttime Specific Service Illuminance (Lux):		
Local Task Illuminance (Lux):		
Colour Rendering Required:	Y	
Colour Rendering Required Characteristics (Ra):	80	
Unified Glare Rating Limit (UGRL):	22	
Emergency Escape Route Lighting Required:	Y	In accordance with BS 5266 and Health Technical Memorandums
Standby Lighting Grade - General Lighting:	B	
Standby Lighting Grade - Local Lighting:		
General Notes:		
RISK		
Clinical Risk Category:		
Non-clinical Business Continuity Risk Category:		
General Notes:		
NOISE		
Noise Intrusion (dB) 1hr day:	45	
Noise Intrusion (dB) 1hr night:	-	
Noise Intrusion (dB) f night:	-	
Maximum Internal Noise from M&E Services (NR):	40	Total noise of MEP services under normal operation across the range 63Hz to 4kHz inclusive.
Room Sound-insulation Parameters - Privacy:	Moderate	Reference to Table 3 of the Department of Health 'Acoustics: Technical design manual 4032:0.6:England'.
Room Sound-insulation Parameters - Noise Generation:	Typical	
Noise Sensitiviy:	Not Sensitive	
Sound-insulation Rating (dB D nT,w):		
General Notes:		
SAFETY/FIRE		
Maximum Surface Temperature (DegC):	43	
Domestic Hot Water Discharge Temperature (DegC):	41	
Maximum Cold Water Discharge Temperature (DegC):	<20	
General Notes:		
Type of Automatic Fire Detection:		Omitted via risk assessment
General Notes:		

ADB	Room Design Character	V1643-HFS2

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	V1643-HFS2	Shower room: en-suite, outboard configuration 2
Room Number:		**Revision Date:** 23/03/2020

Walls:	Wall finishes to comply with Performance Requirements in HBN 00-10 Part B:Walls and Ceilings (2013) Wall finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part B:Walls and Ceilings.
Floor:	Floor finishes to comply with Performance Requirements in HBN 00-10 Part A:Flooring (2013) Floor finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part A:Flooring.
Ceiling:	Ceiling finishes to comply with Performance Requirements in HBN 00-10 Part B:Walls and Ceilings (2013) Ceiling finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part B:Walls and Ceilings.
Doorsets:	Configuration, glazing, fire rating, security, etc. to be determined by Project Team. HTM 58 (Mar-2005) Refer to HBN 00-04 (May-2007) for effective clear door widths. 1 doorset - double leaf sliding/folding: 1 x approx 2200 mm - see HBN 00-02 Requirement for hinge protection when areas used by children
Windows:	Not required
Internal Glazing:	Not required
Hatch:	Not required
Notes:	All finishes selected must have an appropriate risk assessment to accompany the design decision. Infection Control must be consulted as described in Performance Requirements for Building Elements Used in Healthcare Facilities 8941:0.6 England.

ADB	Schedule of Components by Room	V1643-HFS2

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	V1643-HFS2	Shower room: en-suite, outboard configuration 2
Room Number:		**Revision Date:** 23/03/2020

Quantity			Code	Description	Alt. Code	Grp
New	Trans	Total				
1		1	BAS1112	BASIN, Portman 21 Washbasin 50cm RH Taphole, No Overflow or Chainstay Hole		1
1		1	CAL1417	PUSH BUTTON staff/patient emergency call, reset and integral/adjacent indicator lamp, wall mounted		1
1		1	CIS005	CISTERN WC/toilet, concealed, reversible. To suit WC		1
2		2	HOO019	HOOK, single, small, wall mounted		1
1		1	LIG063	LUMINAIRE, single fluorescent lamp, wall, 8 watt, 300 mm		1
1		1	MIR002	MIRROR, wall mounted, 900H 300W		1
1		1	MIR026	MIRROR, unbreakable, wall mounted, 1300H 500W		1
1		1	RAI1303H	RAIL, rail for shower curtain, L-shape (Handed)		1
3		3	RAI1304	RAIL, grab rail, horizontal		1
3		3	RAI1307	RAIL, grab rail, horizontal		1
1		1	RAI1308	RAIL,toilet backing rail, with backrest		1
2		2	RAI175	RAIL, grab, hinged, wall mounted, 750mm		1
1		1	SHO018	SHOWER, valve, thermostatic mixer (associated with SHO020).		1
1		1	SHO020	SHOWER, adjustable shower head hand spray (associated with SHO018).		1
2		2	STF200	STORAGE UNIT, mid, shelf, 150H 300W 150D		1
1		1	TAP1501	TAP, A4169AA Contour 21 washbasin mixer thermostatic		1
1		1	WAS105	WASTE DISPOSAL UNIT, sink waste		1
1		1	WCH1008	WC, Contour 21 back to wall rimless raised height WC pan, 70cm projection with horizontal outlet		1
1		1	DIS013	DISPENSER, paper towel, wall mounted		2
1		1	DIS015	DISPENSER, toilet paper, dispense individual sheets, wall mounted		2
1		1	DIS030	DISPENSER, soap, disposable single cartridge, lever action, wall mounted		2
1		1	BIN028	BIN, disposal, sealed, operated with one hand, nominal 420H 155W 490D		3
1		1	CHA1396	CHAIR, shower, mobile		3
1		1	HOL004	HOLDER, sack, with lid foot operated, small, freestanding		3

ADB	Room Data Sheet	V1643-HFS3

Project:	2532-RR	HFS Repeatable Rooms, ADB		
Department:	EXEM	Exemplar Repeatable Rooms		
Room:	V1643-HFS3	Shower room: en-suite, inboard configuration 1		
Room Number:			**Revision Date:**	23/03/2020

Activities:	1) Use of shower requires assistance. The shower may have an adjustable or fixed tip-up shower seat. 2) Use of toilet requires assistance. 3) Adjustable height hand-wash basin may be used. 4) User may undress and dress in privacy. 5) Hanging outdoor clothing. 6) Hanging clothes and towels. 7) Sanitary chair/commode may be used. 8) Use of shower chair. 9) Mobile hoist may be used. 10) Call systems may be used.			
Personnel:	1 x patient. 1-2 x assistants. Intermittent use.			
Planning Relationships:	En-suite to single-bed room.			
Space Data:	**Area (m²):**	5.00	**Height (mm):**	2400

Notes:

Design Notes:
- PORTABLE SHOWER SCREEN: as an option for assisted showering.
- DOOR IRONMONGERY: to be part of a Door Schedule.
- DRAINAGE: 1No. 110mm pop-up per En-Suite.

Pop-up to take waste pipe from WC within room, and WHB / Shower from adjacent En-Suite.
Pipes passing through intermediate partition may require fire protection / sleeves depending on:
a) pipe diameter
b) fire strategy specific to project.

ADB 2017 Room Note:
Assisted access to one side of the toilet requires the second door to the en-suite bedroom to be open. See HBN 00-02.

The call repeat lamp is situated over the doors outside the en-suite room and the bedroom.

The following items are shown on the drawing but are optional:
- the bin for the disposal of sanitary towels is only required in female WCs;
- mirror, light and shaver outlet.

The following items may be provided:
- fixed shower head.

ADB	Room Environmental Data	V1643-HFS3

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	V1643-HFS3	Shower room: en-suite, inboard configuration 1
Room Number:		**Revision Date:** 23/03/2020

TEMPERATURE AND VENTILATION	**Requirements**	**Notes**
Permissible Space Temerature Range(dry bulb) (degC):	18 - 28	
Heating Design Temperature (dry bulb)(degC):	22	
Minimum Air Changes (AC/hr):	10	
Ventilation Type:	E	
Pressure Relative to Adjoining Space:	-ve	
Supply Air: Final Filter Class		
Permisiible Relative Humidity Range (%):	Uncontrolled	
General Notes:		
LIGHTING		
Type Of Control:	N	
Daytime General Service Illuminance (Lux):	200	
Daytime Specific Service Illuminance (Lux):		
Nighttime General Service Illuminance (Lux):		
Nighttime Specific Service Illuminance (Lux):		
Local Task Illuminance (Lux):		
Colour Rendering Required:	Y	
Colour Rendering Required Characteristics (Ra):	80	
Unified Glare Rating Limit (UGRL):	22	
Emergency Escape Route Lighting Required:	Y	In accordance with BS 5266 and Health Technical Memorandums
Standby Lighting Grade - General Lighting:	B	
Standby Lighting Grade - Local Lighting:		
General Notes:		
RISK		
Clinical Risk Category:		
Non-clinical Business Continuity Risk Category:		
General Notes:		
NOISE		
Noise Intrusion (dB) 1hr day:	45	
Noise Intrusion (dB) 1hr night:	-	
Noise Intrusion (dB) f night:	-	
Maximum Internal Noise from M&E Services (NR):	40	Total noise of MEP services under normal operation across the range 63Hz to 4kHz inclusive.
Room Sound-insulation Parameters - Privacy:	Moderate	Reference to Table 3 of the Department of Health 'Acoustics: Technical design manual 4032:0.6:England'.
Room Sound-insulation Parameters - Noise Generation:	Typical	
Noise Sensitiviy:	Not Sensitive	
Sound-insulation Rating (dB D nT,w):		
General Notes:		
SAFETY/FIRE		
Maximum Surface Temperature (DegC):	43	
Domestic Hot Water Discharge Temperature (DegC):	41	
Maximum Cold Water Discharge Temperature (DegC):	<20	
General Notes:		
Type of Automatic Fire Detection:		Omitted via risk assessment
General Notes:		

ADB	Room Design Character	V1643-HFS3

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	V1643-HFS3	Shower room: en-suite, inboard configuration 1
Room Number:		**Revision Date:** 23/03/2020

Walls:	Wall finishes to comply with Performance Requirements in HBN 00-10 Part B:Walls and Ceilings (2013) Wall finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part B:Walls and Ceilings.
Floor:	Floor finishes to comply with Performance Requirements in HBN 00-10 Part A:Flooring (2013) Floor finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part A:Flooring.
Ceiling:	Ceiling finishes to comply with Performance Requirements in HBN 00-10 Part B:Walls and Ceilings (2013) Ceiling finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part B:Walls and Ceilings.
Doorsets:	Configuration, glazing, fire rating, security, etc. to be determined by Project Team. HTM 58 (Mar-2005) Refer to HBN 00-04 (May-2007) for effective clear door widths. 1 doorset - double leaf sliding/folding: 1 x approx 2200 mm - see HBN 00-02 Requirement for hinge protection when areas used by children
Windows:	Not required
Internal Glazing:	Not required
Hatch:	Not required
Notes:	All finishes selected must have an appropriate risk assessment to accompany the design decision. Infection Control must be consulted as described in Performance Requirements for Building Elements Used in Healthcare Facilities 8941:0.6 England.

ADB	Schedule of Components by Room	V1643-HFS3

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	V1643-HFS3	Shower room: en-suite, inboard configuration 1
Room Number:		**Revision Date:** 23/03/2020

Quantity			Code	Description	Alt. Code	Grp
New	Trans	Total				
1		1	BAS1112	BASIN, Portman 21 Washbasin 50cm RH Taphole, No Overflow or Chainstay Hole		1
1		1	CAL1417	PUSH BUTTON staff/patient emergency call, reset and integral/adjacent indicator lamp, wall mounted		1
1		1	CIS005	CISTERN WC/toilet, concealed, reversible. To suit WC		1
2		2	HOO019	HOOK, single, small, wall mounted		1
1		1	LIG063	LUMINAIRE, single fluorescent lamp, wall, 8 watt, 300 mm		1
1		1	MIR002	MIRROR, wall mounted, 900H 300W		1
1		1	MIR026	MIRROR, unbreakable, wall mounted, 1300H 500W		1
1		1	RAI1303	RAIL, rail for shower curtain, L-shape		1
3		3	RAI1304	RAIL, grab rail, horizontal		1
3		3	RAI1307	RAIL, grab rail, horizontal		1
1		1	RAI1308	RAIL,toilet backing rail, with backrest		1
2		2	RAI175	RAIL, grab, hinged, wall mounted, 750mm		1
1		1	SHO018	SHOWER, valve, thermostatic mixer (associated with SHO020).		1
1		1	SHO020	SHOWER, adjustable shower head hand spray (associated with SHO018).		1
2		2	STF200	STORAGE UNIT, mid, shelf, 150H 300W 150D		1
1		1	TAP1501	TAP, A4169AA Contour 21 washbasin mixer thermostatic		1
1		1	WAS105	WASTE DISPOSAL UNIT, sink waste		1
1		1	WCH1008	WC, Contour 21 back to wall rimless raised height WC pan, 70cm projection with horizontal outlet		1
1		1	DIS013	DISPENSER, paper towel, wall mounted		2
1		1	DIS015	DISPENSER, toilet paper, dispense individual sheets, wall mounted		2
1		1	DIS030	DISPENSER, soap, disposable single cartridge, lever action, wall mounted		2
1		1	BIN028	BIN, disposal, sealed, operated with one hand, nominal 420H 155W 490D		3
1		1	CHA1396	CHAIR, shower, mobile		3
1		1	HOL004	HOLDER, sack, with lid foot operated, small, freestanding		3

ADB	Room Data Sheet	V1643-HFS4

Project:	2532-RR	HFS Repeatable Rooms, ADB		
Department:	EXEM	Exemplar Repeatable Rooms		
Room:	V1643-HFS4	Shower room: en-suite, inboard configuration 2		
Room Number:			**Revision Date:**	23/03/2020

Activities:	1) Use of shower requires assistance. The shower may have an adjustable or fixed tip-up shower seat. 2) Use of toilet requires assistance. 3) Adjustable height hand-wash basin may be used. 4) User may undress and dress in privacy. 5) Hanging outdoor clothing. 6) Hanging clothes and towels. 7) Sanitary chair/commode may be used. 8) Use of shower chair. 9) Mobile hoist may be used. 10) Call systems may be used.			
Personnel:	1 x patient. 1-2 x assistants. Intermittent use.			
Planning Relationships:	En-suite to single-bed room.			
Space Data:	**Area (m²):**	5.00	**Height (mm):**	2400

Notes:

Design Notes:
- PORTABLE SHOWER SCREEN: as an option for assisted showering.
- DOOR IRONMONGERY: to be part of a Door Schedule.
- DRAINAGE: 1No. 110mm pop-up per En-Suite.

Pop-up to take waste pipe from WC within room, and WHB / Shower from adjacent En-Suite.
Pipes passing through intermediate partition may require fire protection / sleeves depending on:
a) pipe diameter
b) fire strategy specific to project.

ADB 2017 Room Note:
Assisted access to one side of the toilet requires the second door to the en-suite bedroom to be open. See HBN 00-02.

The call repeat lamp is situated over the doors outside the en-suite room and the bedroom.

The following items are shown on the drawing but are optional:
- the bin for the disposal of sanitary towels is only required in female WCs;
- mirror, light and shaver outlet.

The following items may be provided:
- fixed shower head.

ADB	Room Environmental Data	V1643-HFS4

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	V1643-HFS4	Shower room: en-suite, inboard configuration 2
Room Number:		**Revision Date:** 23/03/2020

TEMPERATURE AND VENTILATION	**Requirements**	**Notes**
Permissible Space Temerature Range(dry bulb) (degC):	18 - 28	
Heating Design Temperature (dry bulb)(degC):	22	
Minimum Air Changes (AC/hr):	10	
Ventilation Type:	E	
Pressure Relative to Adjoining Space:	-ve	
Supply Air: Final Filter Class		
Permisiible Relative Humidity Range (%):	Uncontrolled	
General Notes:		
LIGHTING		
Type Of Control:	N	
Daytime General Service Illuminance (Lux):	200	
Daytime Specific Service Illuminance (Lux):		
Nighttime General Service Illuminance (Lux):		
Nighttime Specific Service Illuminance (Lux):		
Local Task Illuminance (Lux):		
Colour Rendering Required:	Y	
Colour Rendering Required Characteristics (Ra):	80	
Unified Glare Rating Limit (UGRL):	22	
Emergency Escape Route Lighting Required:	Y	In accordance with BS 5266 and Health Technical Memorandums
Standby Lighting Grade - General Lighting:	B	
Standby Lighting Grade - Local Lighting:		
General Notes:		
RISK		
Clinical Risk Category:		
Non-clinical Business Continuity Risk Category:		
General Notes:		
NOISE		
Noise Intrusion (dB) 1hr day:	45	
Noise Intrusion (dB) 1hr night:	-	
Noise Intrusion (dB) f night:	-	
Maximum Internal Noise from M&E Services (NR):	40	Total noise of MEP services under normal operation across the range 63Hz to 4kHz inclusive.
Room Sound-insulation Parameters - Privacy:	Moderate	Reference to Table 3 of the Department of Health 'Acoustics: Technical design manual 4032:0.6:England'.
Room Sound-insulation Parameters - Noise Generation:	Typical	
Noise Sensitiviy:	Not Sensitive	
Sound-insulation Rating (dB D nT,w):		
General Notes:		
SAFETY/FIRE		
Maximum Surface Temperature (DegC):	43	
Domestic Hot Water Discharge Temperature (DegC):	41	
Maximum Cold Water Discharge Temperature (DegC):	<20	
General Notes:		
Type of Automatic Fire Detection:		Omitted via risk assessment
General Notes:		

ADB	Room Design Character	V1643-HFS4

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	V1643-HFS4	Shower room: en-suite, inboard configuration 2
Room Number:		**Revision Date:** 23/03/2020

Walls:	Wall finishes to comply with Performance Requirements in HBN 00-10 Part B:Walls and Ceilings (2013) Wall finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part B:Walls and Ceilings.
Floor:	Floor finishes to comply with Performance Requirements in HBN 00-10 Part A:Flooring (2013) Floor finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part A:Flooring.
Ceiling:	Ceiling finishes to comply with Performance Requirements in HBN 00-10 Part B:Walls and Ceilings (2013) Ceiling finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part B:Walls and Ceilings.
Doorsets:	Configuration, glazing, fire rating, security, etc. to be determined by Project Team. HTM 58 (Mar-2005) Refer to HBN 00-04 (May-2007) for effective clear door widths. 1 doorset - double leaf sliding/folding: 1 x approx 2200 mm - see HBN 00-02 Requirement for hinge protection when areas used by children
Windows:	Not required
Internal Glazing:	Not required
Hatch:	Not required
Notes:	All finishes selected must have an appropriate risk assessment to accompany the design decision. Infection Control must be consulted as described in Performance Requirements for Building Elements Used in Healthcare Facilities 8941:0.6 England.

ADB	Schedule of Components by Room	V1643-HFS4

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	V1643-HFS4	Shower room: en-suite, inboard configuration 2
Room Number:		**Revision Date:** 23/03/2020

Quantity			Code	Description	Alt. Code	Grp
New	Trans	Total				
1		1	BAS1112	BASIN, Portman 21 Washbasin 50cm RH Taphole, No Overflow or Chainstay Hole		1
1		1	CAL1417	PUSH BUTTON staff/patient emergency call, reset and integral/adjacent indicator lamp, wall mounted		1
1		1	CIS005	CISTERN WC/toilet, concealed, reversible. To suit WC		1
2		2	HOO019	HOOK, single, small, wall mounted		1
1		1	LIG063	LUMINAIRE, single fluorescent lamp, wall, 8 watt, 300 mm		1
1		1	MIR002	MIRROR, wall mounted, 900H 300W		1
1		1	MIR026	MIRROR, unbreakable, wall mounted, 1300H 500W		1
1		1	RAI1303H	RAIL, rail for shower curtain, L-shape (Handed)		1
3		3	RAI1304	RAIL, grab rail, horizontal		1
3		3	RAI1307	RAIL, grab rail, horizontal		1
1		1	RAI1308	RAIL,toilet backing rail, with backrest		1
2		2	RAI175	RAIL, grab, hinged, wall mounted, 750mm		1
1		1	SHO018	SHOWER, valve, thermostatic mixer (associated with SHO020).		1
1		1	SHO020	SHOWER, adjustable shower head hand spray (associated with SHO018).		1
2		2	STF200	STORAGE UNIT, mid, shelf, 150H 300W 150D		1
1		1	TAP1501	TAP, A4169AA Contour 21 washbasin mixer thermostatic		1
1		1	WAS105	WASTE DISPOSAL UNIT, sink waste		1
1		1	WCH1008	WC, Contour 21 back to wall rimless raised height WC pan, 70cm projection with horizontal outlet		1
1		1	DIS013	DISPENSER, paper towel, wall mounted		2
1		1	DIS015	DISPENSER, toilet paper, dispense individual sheets, wall mounted		2
1		1	DIS030	DISPENSER, soap, disposable single cartridge, lever action, wall mounted		2
1		1	BIN028	BIN, disposal, sealed, operated with one hand, nominal 420H 155W 490D		3
1		1	CHA1396	CHAIR, shower, mobile		3
1		1	HOL004	HOLDER, sack, with lid foot operated, small, freestanding		3

ADB	Room Data Sheet	C0237-HFS

Project:	2532-RR	HFS Repeatable Rooms, ADB		
Department:	EXEM	Exemplar Repeatable Rooms		
Room:	C0237-HFS	Consulting/examination room: double-sided couch access		
Room Number:			**Revision Date:**	17/03/2020

Activities:	1) Call systems may be used. 2) Consultations may take place. 3) Sterile supplies and consumables are stored on a trolley. 4) User may undress and dress in privacy. 5) Electronic patient records (EPRs) may be accessed and updated. 6) Clinical hand washing. 7) Discussions and interviews may take place. 8) Carrying out examinations and assessment of patient. 9) Patient may arrive on foot or in a wheelchair. 10) Examinations of the patient may be carried out from one or both sides of the couch. 11) Minimally invasive clinical procedures may be undertaken from one or both sides of the couch.
Personnel:	1 x patient. 1-2 x staff. 1 x other (escort).
Planning Relationships:	

Space Data:	**Area (m²):**	15.00	**Height (mm):**	2700

Notes:

Design Notes:
- LIG053 Luminaire specification to be confirmed
- Staff should risk assess the location of the patient chairs in the Consulting Room ; this is to make staff aware of the hazzards of patient chaires being located between the door and the work station.

Highlighted Areas:
- Window Zone: Extent / Dimensions to be project specific
- Door Vision Panel / Vistamatic: with Fan light: Extent / Dimensions to be project specific
- Desk: option for rise & fall desk with socket provision (if required) to be project specific.

ADB 2017 Room note:
This room includes a 3-section couch, alternatively, it may accommodate a 2-section couch or specialist couch.

The call repeat lamp is situated over the door outside the room.

The following items are shown on the room layout but are optional:
- patient/staff call (although expected where a patient will be left unattended);
- room in use switch and indicator.

The following items may be provided:
- a small printer;
- a small lockable drawer;
- dimming switch.

Piped medical gases may be required for some clinical specialties.

Workstations have been placed in Consult/ exam rooms at 900mmm. Local policy may prefer a desk up to 1200mm to facilitate working practice.

Separate data and voice outlets may be used where structure cabling solutions are not available.

ADB	Room Environmental Data	C0237-HFS

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	C0237-HFS	Consulting/examination room: double-sided couch access
Room Number:		**Revision Date:** 17/03/2020

TEMPERATURE AND VENTILATION	**Requirements**	**Notes**
Permissible Space Temerature Range(dry bulb) (degC):	18 - 28	
Heating Design Temperature (dry bulb)(degC):	22	
Minimum Air Changes (AC/hr):	6	
Ventilation Type:	S/E/N	
Pressure Relative to Adjoining Space:	Bal or -ve	
Supply Air: Final Filter Class	G4	
Permisiible Relative Humidity Range (%):	Uncontrolled	
General Notes:		

LIGHTING		
Type Of Control:	N	
Daytime General Service Illuminance (Lux):	300	WP
Daytime Specific Service Illuminance (Lux):		
Nighttime General Service Illuminance (Lux):		
Nighttime Specific Service Illuminance (Lux):		
Local Task Illuminance (Lux):	1000	Bed level (provided by the mobile examinantion lamp)
Colour Rendering Required:	Y	
Colour Rendering Required Characteristics (Ra):	80	
Unified Glare Rating Limit (UGRL):	19	
Emergency Escape Route Lighting Required:	Y	In accordance with BS 5266 and Health Technical Memorandums
Standby Lighting Grade - General Lighting:	B	
Standby Lighting Grade - Local Lighting:		
General Notes:	Refer to SLL Lighting Guide 2 for more detailed guidance	

RISK		
Clinical Risk Category:		
Non-clinical Business Continuity Risk Category:		
General Notes:		

NOISE		
Noise Intrusion (dB) 1hr day:	40	
Noise Intrusion (dB) 1hr night:	-	
Noise Intrusion (dB) f night:	-	
Maximum Internal Noise from M&E Services (NR):	35	Total noise of MEP services under normal operation across the range 63Hz to 4kHz inclusive.
Room Sound-insulation Parameters - Privacy:	Confidential	Reference to Table 3 of the Department of Health 'Acoustics: Technical design manual 4032:0.6:England'.
Room Sound-insulation Parameters - Noise Generation:	Typical	
Noise Sensitiviy:	Medium	
Sound-insulation Rating (dB D nT,w):		
General Notes:		

SAFETY/FIRE		
Maximum Surface Temperature (DegC):	43	
Domestic Hot Water Discharge Temperature (DegC):	41	
Maximum Cold Water Discharge Temperature (DegC):	<20	
General Notes:		
Type of Automatic Fire Detection:	Smoke	
General Notes:		

ADB	Room Design Character	C0237-HFS

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	C0237-HFS	Consulting/examination room: double-sided couch access
Room Number:		**Revision Date:** 17/03/2020

Walls:	Wall finishes to comply with Performance Requirements in HBN 00-10 Part B:Walls and Ceilings (2013) Wall finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part B:Walls and Ceilings.
Floor:	Floor finishes to comply with Performance Requirements in HBN 00-10 Part A:Flooring (2013) Floor finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part A:Flooring.
Ceiling:	Ceiling finishes to comply with Performance Requirements in HBN 00-10 Part B:Walls and Ceilings (2013) Ceiling finishes to be selected using the "Selection process for finishes" and "Types of finish by room space" included in HBN 00-10 Part B:Walls and Ceilings.
Doorsets:	Configuration, glazing, fire rating, security, etc. to be determined by Project Team. HTM 58 (Mar-2005) Refer to HBN 00-04 (May-2007) for effective clear door widths. 1 doorset: 1 x personnel, wheelchair & equipment access (1000mm) Requirement for hinge protection when areas used by children
Windows:	Desirable - Project Option Clear glass with solar and privacy control Designation to be validated against current documentation (HTM 55 archived).
Internal Glazing:	Not required
Hatch:	Not required
Notes:	All finishes selected must have an appropriate risk assessment to accompany the design decision. Infection Control must be consulted as described in Performance Requirements for Building Elements Used in Healthcare Facilities 8941:0.6 England.

ADB	Schedule of Components by Room	C0237-HFS

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	C0237-HFS	Consulting/examination room: double-sided couch access
Room Number:		**Revision Date:** 17/03/2020

Quantity			Code	Description	Alt. Code	Grp
New	Trans	Total				
1		1	BAS1113	BASIN, Contour 21 back outlet washbasin, 50cm, no tapholes, no overflow, no chainstay hole		1
1		1	CAL007	PULL/PUSH BUTTON, staff emergency call, reset and integral/adjacent indicator lamp		1
1		1	CAN1012	CANOPY, size to suit unit below		1
3		3	CUP1754	CUPBOARD; Wall Mounted, option for locking (keys to be suited), 900H 450W 370D		1
1		1	HOO019	HOOK, single, small, wall mounted		1
1		1	LIG053	LUMINAIRE, examination, ceiling, adjustable, 1000 lux		1
1		1	OUT006	SOCKET outlet unswitched 13amp single.		1
7		7	OUT010	SOCKET outlet, switched, 13 amp, twin		1
2		2	OUT131	SOCKET outlet data/voice, double.		1
1		1	SWC025	SWITCH, light		1
1		1	TAP1500	TAP, Markwik 21 Demountable Panel Mixer, Lever Handle, Detachable Spout		1
1		1	THE005	THERMOSTAT		1
1		1	TRA1573	TRACK, curtain around bed, 2450W 3000D		1
1		1	WOR1771	WORKTOP; Length as designed		1
1		1	BOA022	BOARD, display/notice, magnetic, wall mounted, 900H 600W		2
1		1	CLO001	CLOCK battery, wall mounted		2
1		1	CUP1755L	CUPBOARD; Lockable, 860H 450W 370D, Left Handed		2
2		2	CUP1755R	CUPBOARD; Lockable, 860H 450W 370D, Right Handed		2
1		1	DIS011	DISPENSER, barrier cream, disposable single cartridge, wall mounted		2
1		1	DIS013	DISPENSER, paper towel, wall mounted		2
1		1	DIS026	DISPENSER, Medical hand sanitizer, lever action, wall mounted		2
1		1	DIS030	DISPENSER, soap, disposable single cartridge, lever action, wall mounted		2
1		1	DIS438	DISPENSER, disposable gloves set of 3 and disposable apron, wall mounted		2
1		1	ART100	ART, Artwork		3
1		1	CHA301	CHAIR, swivel, height adjustable, high back, with arms, wipeable, 5 star base, on castors		3
1		1	CHA317	CHAIR, upright, upholstered, stacking, wipeable		3
2		2	CHA318	CHAIR, upright, with arms, upholstered, stacking, wipeable		3
1		1	COM033	COMPUTER KEYBOARD		3
1		1	COM049	COMPUTER MONITOR, 17"; TFT, digital flat panel display, high-resolution screens, desk top		3
1		1	COU010	COUCH, examination/treatment, (3 section), variable height, retractable wheels, with paper roll holder		3
1		1	DES1032	DESK, Corner unit		3
1		1	DRA056	DRAWER UNIT, 2 drawer, lockable, on castors, 600H 410W 600D		3

ADB	Schedule of Components by Room	C0237-HFS

Project:	2532-RR	HFS Repeatable Rooms, ADB
Department:	EXEM	Exemplar Repeatable Rooms
Room:	C0237-HFS	Consulting/examination room: double-sided couch access
Room Number:		**Revision Date:** 17/03/2020

Quantity			Code	Description	Alt. Code	Grp
New	Trans	Total				
2		2	HOL006	HOLDER, sack, with lid foot operated, medium, freestanding, 875H 430W 385D		3
1		1	STA1262	STADIOMETER		3

Appendix B

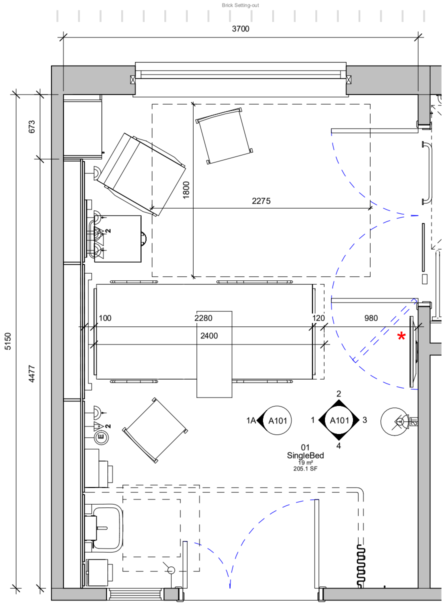
Product and Material Performance Specifications

Product and material performance specifications will be included on the following pages, where deemed appropriate and/or relevant by Health Facilities Scotland.

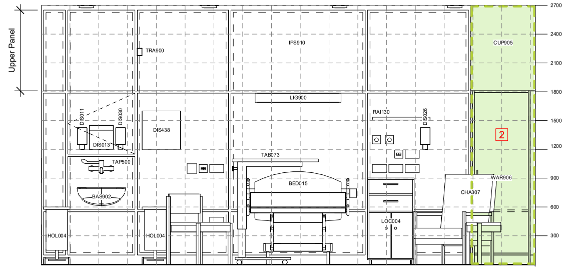
Appendix C

1:50 Room Layouts of Repeatable Rooms

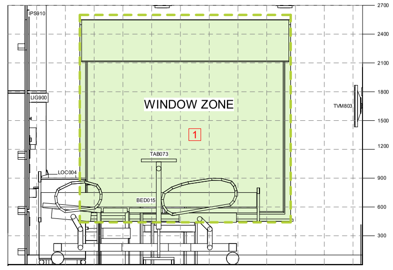
Room Layouts will be included on the following pages, and will refer to the rooms noted earlier in this document. As this is a live document, additional drawings will be added as the number of Repeatable Rooms developed, grows.



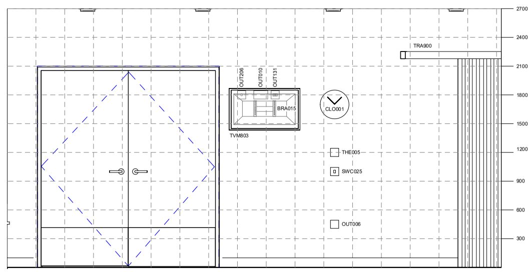
01 Single Bed - Plan
1 : 25



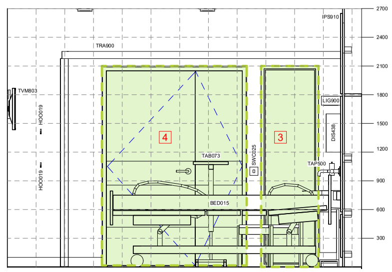
01 Single Bed - 1
1 : 25



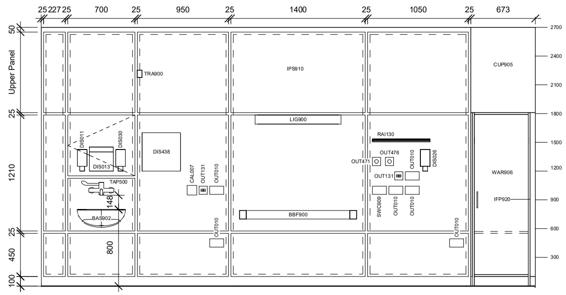
01 Single Bed - 2
1 : 25



01 Single Bed - 3
1 : 25

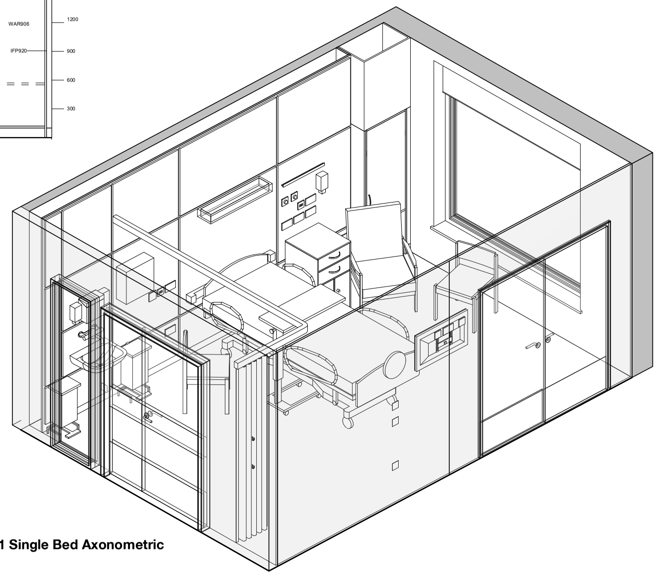


01 Single Bed - 4
1 : 25



01 Single Bed - 1A (Bedhead IPS)
1 : 25

		01 Single Bed	
QTY	ADBCode	Description	Group
1	BAS902	BASIN, back outlet washbasin, 50cm, no tapholes, no overflow, no chainstay hole	1
1	BBF900	WALL PROTECTION, Bed Head Buffer, Vertical	1
1	BED015	BED variable height, two-way tilt, adjustable backrest and knee-break, built-in bed extension with mattress retainer, electrically operated, on castors, 380-780H 2260/2430L 1010W	3
1	BLI001	ROLLER BLIND, wipeable, at full height window	1
1	BRA015	BRACKET, flat panel monitor, height adjustable, wall mounted	2
1	CAL007	PULL/PUSH BUTTON, staff emergency call, reset and integral/adjacent indicator lamp	1
1	CHA307	CHAIR, easy, high back, with open arms, upholstered, wipeable	3
2	CHA317	CHAIR, upright, upholstered, stacking, wipeable	3
1	CLO001	CLOCK battery, wall mounted	2
1	CUP905	Canopy, size to suit unit below	1
1	DIS011	DISPENSER, barrier cream, disposable single cartridge, wall mounted	2
1	DIS013	DISPENSER, paper towel, wall mounted	2
1	DIS026	DISPENSER, Medical hand sanitizer, lever action, wall mounted	2
1	DIS030	DISPENSER, soap, disposable single cartridge, lever action, wall mounted	2
1	DIS438	DISPENSER, disposable gloves set of 3 and disposable apron, wall mounted	2
1	ENP400	Decor End Panel (Tall Unit Standard)	1
2	HOL004	HOLDER, sack, with lid foot operated, small, freestanding	3
2	HOO019	HOOK, single, small, wall mounted	1
1	IFP920	INFIL PANEL, Tall Unit	1
1	IPS910	IPS, Bedhead IPS including Clinical WHB and Bedhead Services	1
1	LIG900	Light; bed head; dimmable; wall mounted	
1	LOC004	LOCKER, bedside, 4 compartment with lockable section /drawer, towel rail at rear, on castors, 902H 485W 485D	3
8	LUM002	LIGHTING, Mirage LED	1
1	MAT008	MATTRESS, suitable for BED015	3
1	OUT006	SOCKET outlet, switched, 13 amp, single	1
7	OUT010	SOCKET outlet, switched, 13 amp, twin	1
3	OUT131	SOCKET outlet data/voice, double.	1
1	OUT206	SOCKET outlet television aerial, single.	1
1	OUT471	OUTLET, oxygen medical	1
1	OUT476	OUTLET, vacuum medical	1
1	RAI130	RAIL, clinical equipment, wall mounted, max width available	1
2	SWC025	ELECTRIC, light switch	1
1	SWC909	SWITCH; light, 3 gang	1
1	TAB073	TABLE, overbed, cantilevered	3
1	TAP500	TAP, Demountable Panel Mixer, Lever Handle, Detachable Spout	1 Local Option
1	THE005	THERMOSTAT, wall mounted	1
1	TRA900	RAIL, Railing (To Suit Length)	1
1	TVM803	TELEVISION monitor, colour, flat panel, 32", wall mounted	2
1	WAR906	WARDROBE, built in wardrobe, with shelf and 4 no. coat hooks within wardrobe, 600W 400D 1810H	1



01 Single Bed Axonometric

Scale convertor

A1 Scale - A3 Scale		A1 Scale - A3 Scale	
1:1	1:2	1:5	1:10
1:10	1:20	1:25	1:50
1:50	1:100	1:100	1:200
1:250	1:500		

Rev.	Date	Amendment
A	12/02/20	Revised following comments at meeting 12/02/20
B	05/03/20	Revised following comments on 04/03/20
C	11/03/20	Revised following SLWG meeting on 10/03/20.
D	25/09/20	Draft Report Issue

NOTES TO BE INCLUDED ON ADB SHEET:

- DOOR IRONMONGERY:
to be part of a Door Schedule.

* NOTE:
DOOR STOPPER to prevent clash with TV - spec to be confirmed.

HIGHLIGHTED AREAS

1 WINDOW ZONE:
Extent / Dimensions to be Project Specific.

2 WARDROBE ZONE:
Type / Size to be Project Specific.

3 GLAZED SCREEN:
Extent / Dimensions to be Project Specific.

4 DOOR VISION PANEL / VISTAMATIC:
Extent / Dimensions to be Project Specific.
May be dependent on Glazed Screen as note 3.

ROOM AREA:
19m² (including bedhead IPS zone)

oberlanders

Project Name
Health Facilities Scotland
ADB SLWG
Repeatable Rooms

Title
Single Bed
Outboard En-Suite

Status
Preliminary

Project no. - Drawing no. - Rev
2532-A101-D-

Drawn By
AR

Drawn date
16/01/20

Scale(s) @ A1
1 : 25

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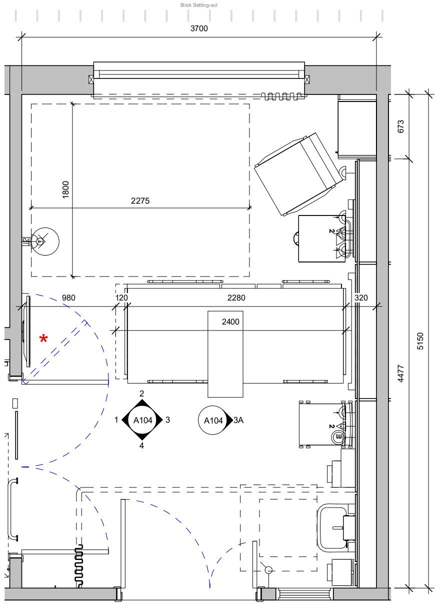
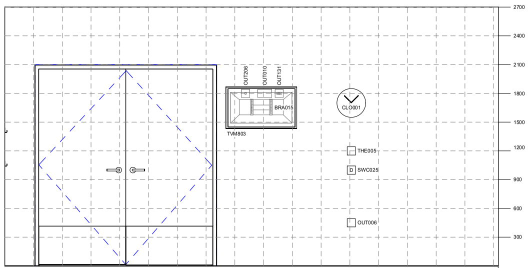
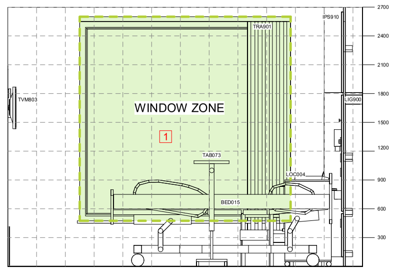
A47472337



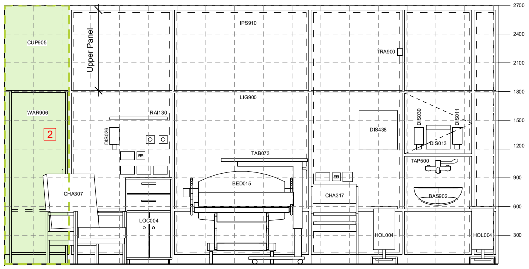
04 Single Bed - Plan
1 : 25



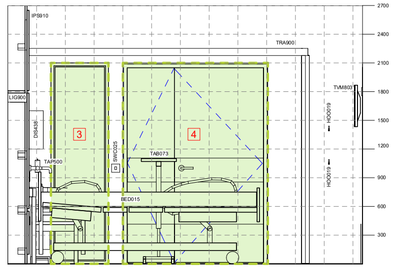
04 Single Bed - 1
1 : 25



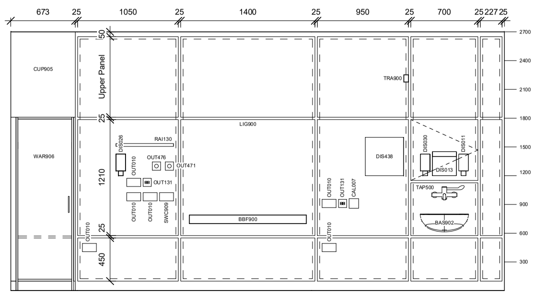
04 Single Bed - 2
1 : 25



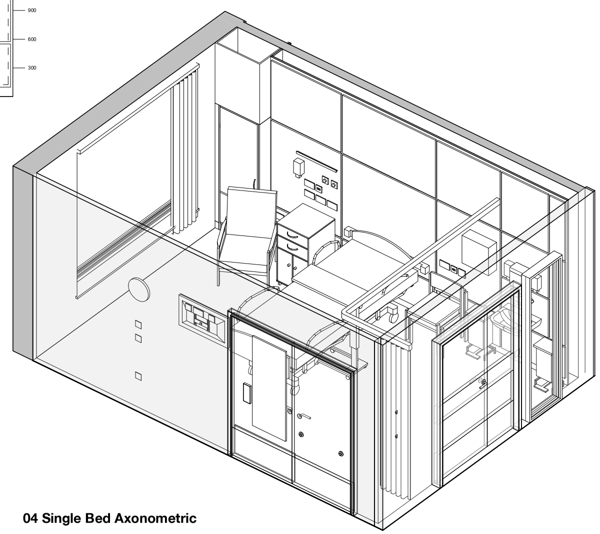
04 Single Bed - 3
1 : 25



04 Single Bed - 4
1 : 25



04 Single Bed - 3A (Bedhead IPS)
1 : 25



04 Single Bed Axonometric

		04 Single Bed	
QTY	ADBCode	Description	Group
1	BAS902	BASIN, back outlet washbasin, 50cm, no tapholes, no overflow, no chainstay hole	1
1	BBF900	WALL PROTECTION, Bed Head Buffer, Vertical	1
1	BED015	BED variable height, two-way tilt, adjustable backrest and knee-break, built-in bed extension with mattress retainer, electrically operated, on castors, 380-780H 2260/2430L 1010W	3
1	BRA015	BRACKET, flat panel monitor, height adjustable, wall mounted	2
1	CAL007	PULL/PUSH BUTTON, staff emergency call, reset and integral/adjacent indicator lamp	1
1	CHA307	CHAIR, easy, high back, with open arms, upholstered, wipeable	3
2	CHA317	CHAIR, upright, upholstered, stacking, wipeable	3
1	CLO001	CLOCK battery, wall mounted	2
1	CUP905	Canopy, size to suit unit below	1
1	DIS011	DISPENSER, barrier cream, disposable single cartridge, wall mounted	2
1	DIS013	DISPENSER, paper towel, wall mounted	2
1	DIS026	DISPENSER, Medical hand sanitizer, lever action, wall mounted	2
1	DIS030	DISPENSER, soap, disposable single cartridge, lever action, wall mounted	2
1	DIS438	DISPENSER, disposable gloves set of 3 and disposable apron, wall mounted	2
1	ENP400	Decor End Panel (Tall Unit Standard)	1
2	HOL004	HOLDER, sack, with lid foot operated, small, freestanding	3
2	HOO019	HOOK, single, small, wall mounted	1
1	IFP920	INFIL PANEL, Tall Unit	1
1	IPS910	IPS, Bedhead IPS including Clinical WHB and Bedhead Services	1
1	LIG900	Light; bed head; dimmable; wall mounted	
1	LOC004	LOCKER, bedside, 4 compartment with lockable section /drawer, towel rail at rear, on castors, 902H 485W 485D	3
1	MAT008	MATTRESS, suitable for BED015	3
1	OUT006	SOCKET outlet, switched, 13 amp, single	1
7	OUT010	SOCKET outlet, switched, 13 amp, twin	1
3	OUT131	SOCKET outlet data/voice, double.	1
1	OUT206	SOCKET outlet television aerial, single.	1
1	OUT471	OUTLET, oxygen medical	1
1	OUT476	OUTLET, vacuum medical	1
1	RAI130	RAIL, clinical equipment, wall mounted, max width available	1
2	SWC025	ELECTRIC, light switch	1
1	SWC909	SWITCH; light, 3 gang	1
1	TAB073	TABLE, overbed, cantilevered	3
1	TAP500	TAP, Demountable Panel Mixer, Lever Handle, Detachable Spout	1 Local Option
1	THE005	THERMOSTAT, wall mounted	1
1	TRA900	RAIL, Railing (To Suit Length)	1
1	TRA901	RAIL, Railing (To Suit Length)	1
1	TVM803	TELEVISION monitor, colour, flat panel, 32'', wall mounted	2
1	WAR906	WARDROBE, built in wardrobe, with shelf and 4 no. coat hooks within wardrobe, 600W 400D 1810H	1

Scale convertor

A1 Scale	A3 Scale	A1 Scale	A3 Scale
1:1	1:2	1:5	1:10
1:10	1:20	1:25	1:50
1:50	1:100	1:100	1:200
1:250	1:500		

Rev.	Date	Amendment
A	05/03/20	Revised following comments on 04/03/20
B	11/03/20	Revised following SLWG meeting on 10/03/20.
C	25/09/20	Draft Report Issue

NOTES TO BE INCLUDED ON ADB SHEET:

- DOOR IRONMONGERY:
to be part of a Door Schedule.

* NOTE:
DOOR STOPPER to prevent clash with TV - spec to be confirmed.

HIGHLIGHTED AREAS

1 WINDOW ZONE:
Extent / Dimensions to be Project Specific.

2 WARDROBE ZONE:
Type / Size to be Project Specific.

3 GLAZED SCREEN:
Extent / Dimensions to be Project Specific.

4 DOOR VISION PANEL / VISTAMATIC:
Extent / Dimensions to be Project Specific.
May be dependent on Glazed Screen as note 3.

ROOM AREA:
$19m^2$ (including bedhead IPS zone)

oberlanders

Project Name
Health Facilities Scotland
ADB SLWG
Repeatable Rooms

Title
Single Bed
Inboard En-suite

Status
Preliminary

Project no. - Drawing no. - Rev
2532-A104-C-

Drawn By
AR

Drawn date
13/02/20

Scale(s) @ A1
1 : 25

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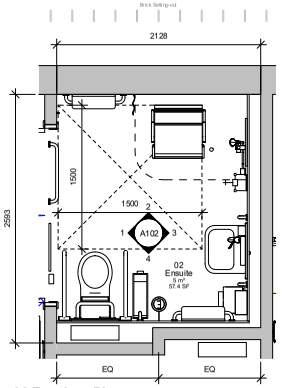
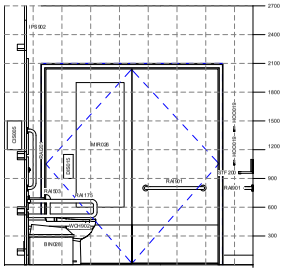


02 Ensuite - Plan
1 : 25



02 Ensuite - 1
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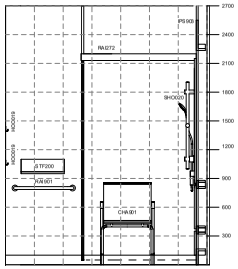
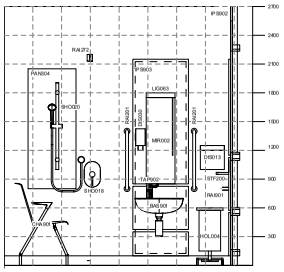
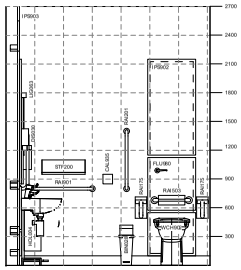


02 Ensuite - 2
1 : 25

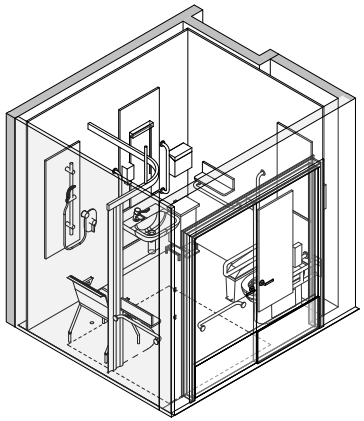


02 Ensuite - 3
1 : 25



02 Ensuite - 4
1 : 25

02 Ensuite			
QTY	ADBCode	Description	Group
1	BAS901	BASIN, Washbasin 50cm RH Taphole, No Overflow or Chainstay Hole	1
1	BIN028	BIN, disposal, sealed, operated with one hand	3
1	CAL935	PUSH BUTTON staff/patient emergency call, reset and integral/adjacent indicator lamp, wall mounted	1
1	CHA901	CHAIR, shower, mobile	3
1	CIS005	CISTERN WC/toilet, concealed, reversible. To suit WC HTM64	1
1	DIS013	DISPENSER, paper towel, wall mounted	2
1	DIS030	DISPENSER, soap, disposable single cartridge, lever action, wall mounted	2
1	FLU980	WC flush, handle	1
1	HOL004	HOLDER, sack, with lid foot operated, small, freestanding	3
2	HOO019	HOOK, single, small, wall mounted	1
1	IPS902	IPS, IPS Panel, WC	1
1	IPS903	IPS, IPS Panel, WHB	1
1	LIG063	LIGHTING, LUMINAIRE fitted with single fluorescent lamp, 8watt, 300mm, wall mounted	1
1	MIR002	MIRROR, wall mounted, 900H 300W	1
1	PAN304	SANITARY BACK-PANEL: IPS type; 500W	1
2	RAI175	RAIL, grab, hinged, wall mounted, 760mm	1
3	RAI201	RAIL, grab rail, vertical	1
1	RAI272	RAIL, rail for shower curtain, L-shape	1
1	RAI603	RAIL,toilet backing rail, with backrest	1
2	RAI901	RAIL, grab rail, horizontal	1
1	SHO018	SHOWER, valve, thermostatic mixer (associated with SHO020), HTM 64 TM1	1
1	SHO020	SHOWER, adjustable shower head hand spray, smooth, impervious, with retainer ring (associated with SHO018).	1
2	STP200	STORAGE UNIT, mid, shelf, 150H 450W 150D, HTM63	1
1	TAP902	TAP, Washbasin mixer thermostatic	1
1	WAS105	GULLY, Floor gulley to shower area	1
1	WCH902	WC, back to wall rimless raised height WC pan, 70cm projection with horizontal outlet	1



02 Ensuite Axonometric

Scale convertor

A1 Scale - A3 Scale		A1 Scale - A3 Scale	
1:1	1:2	1:5	1:10
1:10	1:20	1:25	1:50
1:50	1:100	1:100	1:200
1:250	1:500		

Rev.	Date	Amendment
A	12/02/20	Revised following comments at meeting 12/02/20
B	05/03/20	Revised following comments on 04/03/20
C	25/09/20	Draft Report Issue

NOTES TO BE INCLUDED ON ADB SHEET:

- PORTABLE SHOWER SCREEN as an option for assisted showering.

- DOOR IRONMONGERY:
to be part of a Door Schedule.

- DRAINAGE:
1no 110mm pop-up per En-Suite.
Pop-up to take waste pipe from WC within room, and WHB from adjacent En-Suite. Pipes from adjacent En-Suite passing through intermediate partition may require fire protection / sleeves depending on a) pipe diameter b) fire strategy specific to project.

ROOM AREA:
5.3m² (including area behind IPS panelling)

oberlanders

Project Name
Health Facilities Scotland
ADB SLWG
Repeatable Rooms

Title
En-Suite (Nested Arrangement)

Status
Preliminary

Project no. - Drawing no. - Rev
2532-A102-C-

Drawn By
AR

Drawn date
16/01/20

Scale(s) @ A1
1 : 25

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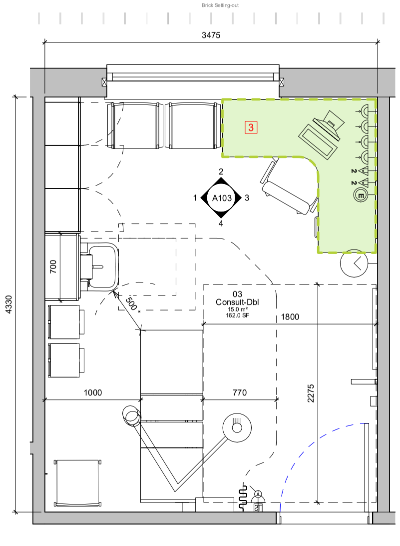
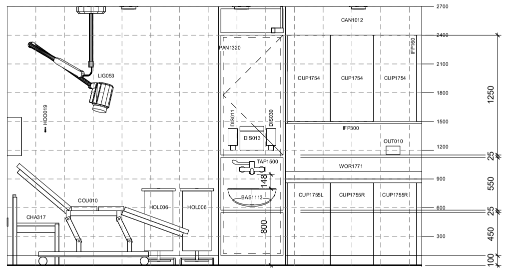
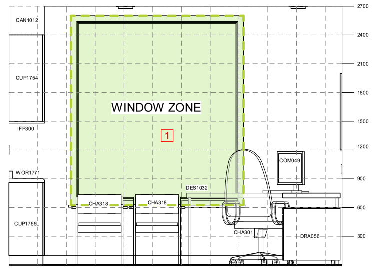


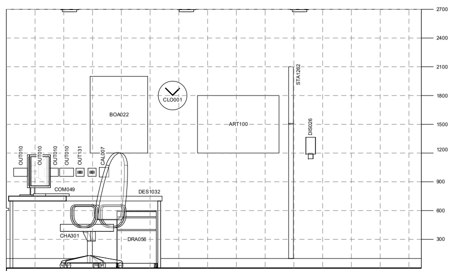
03 Consulting Room - Plan
1 : 25



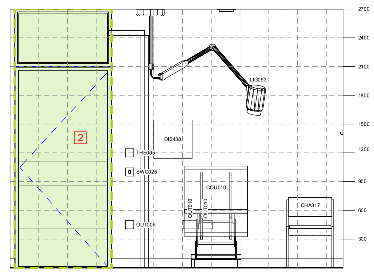
03 Consult Room - 1
1 : 25



03 Consult Room - 2
1 : 25

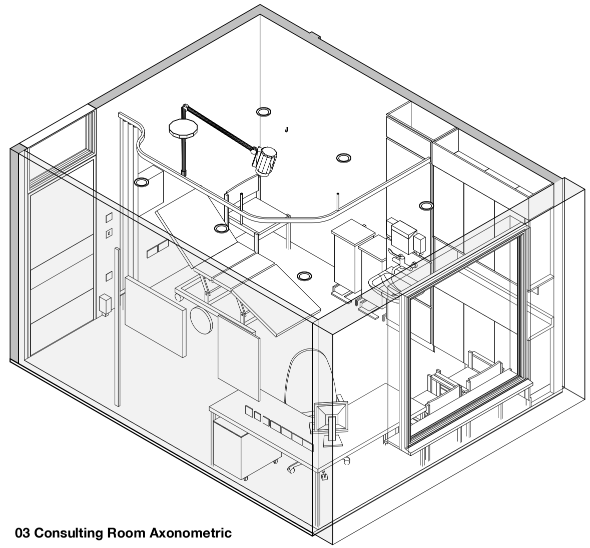


03 Consult Room - 3
1 : 25



03 Consult Room - 4
1 : 25

Consult Room			
QTY	ADBCode	Description	Group
1	ART100	ART, Artwork	3
1	BAS1113	BASIN, back outlet washbasin, 50cm, no tapholes, no overflow, no chainstay hole	1
1	BOA022	BOARD, display/notice, magnetic, wall mounted, 900H 600W	2
1	CAL007	PULL/PUSH BUTTON, staff emergency call, reset and integral/adjacent indicator lamp	1
1	CAN1012	CANOPY, size to suit unit below	1
1	CHA301	CHAIR, swivel, height adjustable, high back, with arms, wipeable, 5 star base, on castors	3
1	CHA317	CHAIR, upright, upholstered, stacking, wipeable	3
2	CHA318	CHAIR, upright, with arms, upholstered, stacking, wipeable	3
1	CLO001	CLOCK battery, wall mounted	2
1	COM033	COMPUTER KEYBOARD	3
1	COM049	COMPUTER MONITOR, 17inch, TFT, digital flat panel display, high-resolution screens, desk top	3
1	COU010	COUCH, examination/treatment, (3 section), variable height, retractable wheels, with paper roll holder	3
3	CUP1754	CUPBOARD; Wall Mounted, option for locking (keys to be suited), 900H 450W 370D	1
1	CUP1755L	CUPBOARD; Lockable, 860H 450W 370D, Left Handed	2
2	CUP1755R	CUPBOARD; Lockable, 860H 450W 370D, Right Handed	2
1	DES1032	DESK, corner unit	3
1	DIS011	DISPENSER, barrier cream, disposable single cartridge, wall mounted	2
1	DIS013	DISPENSER, paper towel, wall mounted	2
1	DIS026	DISPENSER, Medical hand sanitizer, lever action, wall mounted	2
1	DIS030	DISPENSER, soap, disposable single cartridge, lever action, wall mounted	2
1	DIS438	DISPENSER, disposable gloves set of 3 and disposable apron, wall mounted	2
1	DRA056	DRAWER UNIT, 2 drawer, lockable, on castors, 600H 410W 600D	3
2	ENP140	Decor End Panel (Base Unit Working Height)	1
1	ENP150	Decor End Panel (Wall Unit)	1
2	HOL006	HOLDER, sack, with lid foot operated, medium, freestanding, 875H 430W 385D	3
1	HOO019	HOOK, single, small, wall mounted	1
1	IFP160	Infill Panel (Wall Unit)	1
1	IFP300	Underside Infill Panel	1
1	IFP500	Infill Panel (Base Unit Working Height)	1
1	LIG053	LUMINAIRE, examination, ceiling, adjustable, 1000 lux	1
6	LUM002	LIGHTING, Mirage LED	1
1	OUT006	ELECTRIC, SOCKET outlet, switched, 13 amp, single	1
7	OUT010	SOCKET outlet, switched, 13 amp, twin	1
2	OUT131	SOCKET outlet data/voice, double.	1
1	PAN1320	IPS, IPS Panel, Clinical WHB	1
1	STA1262	STADIOMETER	3
1	SWC025	ELECTRIC, light switch	1
1	TAP1500	TAP, Demountable Panel Mixer, Lever Handle, Detachable Spout	1
1	THE005	THERMOSTAT, Thermostat wall mounted	1
1	TRA1573	TRACK, curtain around bed, 2450W 3000D	1
1	WOR1771	WORKTOP; Length as designed	1



03 Consulting Room Axonometric

Scale convertor

A1 Scale	A3 Scale	A1 Scale	A3 Scale
1:1	1:2	1:5	1:10
1:10	1:20	1:25	1:50
1:50	1:100	1:100	1:200
1:250	1:500		

Rev.	Date	Amendment
A	14/02/20	Revised following comments at meeting 12/02/20
B	05/03/20	Revised following comments on 04/03/20
C	30/07/20	Revised to incorporate Talon's changes to ADB codes.
D	25/09/20	Draft Report Issue

NOTES TO BE INCLUDED ON ADB SHEET:

- LIG053 Luminaire Specification to be confirmed.

- Staff should risk assess the possible relocation of the Patient chairs in the Consulting Room. This is to make Staff aware of the hazards of Patient chairs being located between the door and the work station.

HIGHLIGHTED AREAS

1 WINDOW ZONE: Extent / Dimensions to be Project Specific.

2 DOOR VISION PANEL / VISTAMATIC: with Fan Light; Extent / Dimensions to be Project Specific.

3 DESK: Option for rise & fall desk with socket provision (if required) to be Project Specific.

ROOM AREA:
15.0m²

oberlanders

Project Name
Health Facilities Scotland
ADB SLWG
Repeatable Rooms

Title
Consulting Room

Status
Preliminary

Project no. - Drawing no. - Rev
2532-A103-D-

Drawn By
AR

Drawn date
16/01/20

Scale(s) @ A1
1 : 25

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Scottish Health Planning Note 03

General design guidance

NHSScotland, P&EFEx, January 2002

Contents

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About this series

The Scottish Health Planning Note series is intended to give advice on the briefing and design of healthcare premises in Scotland.

These Notes are prepared in consultation with representatives of NHSScotland and appropriate professional bodies. Health Planning Notes are aimed at multi-disciplinary teams engaged in:

- designing new buildings;
- adapting or extending existing buildings.

Throughout the series, particular attention is paid to the relationship between the design of a given department and its subsequent management. Since this equation will have important implications for capital and running costs, alternative solutions are sometimes proposed. The intention is to give the reader informed guidance on which to base design decisions.

Acknowledgements

The Property and Environment Forum Executive thanks Mr Norman Raitt of Norman Raitt Architects for editing and compiling this publication for NHSScotland.

1. Scope of SHPN 03

Introduction

1.1 This Scottish Health Planning Note (SHPN) is a guide for all those responsible for the planning of new, altered or extended health buildings including project managers and their project teams, design teams and all other responsible professionals.

1.2 The functions and procedures described in the Note are common to most departments in a District General Hospital (DGH) and to many other healthcare buildings for which NHSScotland Trusts are responsible. The guidance is of a general nature and in many instances will have to be supplemented by more specific instruction to comply with both individual Trust policies and project specific requirements.

Context

1.3 SHPN 03 should be read prior to using individual departmental and other Notes in the SHPN series. Departmental specific guidance on some of the topics discussed in this publication, e.g. communications and waste disposal, may be found in the appropriate departmental SHPN.

2. General functional and design requirements

Introduction

2.1 This Chapter contains guidance concerning aspects of function and design which are common to health buildings generally and which will need to be borne in mind when designing new buildings or upgrading existing premises.

Economy

2.2 The planning of hospital buildings requires design solutions, which not only satisfy functional requirements but also ensure maximum economy in respect of both capital and running costs. Due weight must therefore be given to the questions of space provision, maintenance (including cleaning), energy consumption and staffing requirements. Planning should ensure that spaces are used as intensively as possible and are not unnecessarily duplicated. Wherever possible spaces should be designed for flexibility of function, not only in their original use but also in terms of future change of use. Care should however be taken to ensure that the space provided allows for the activities required and is not reduced to the extent that infection control implications are compromised.

Alterations and extensions to existing buildings

2.3 Guidance for new build is not intended to apply retrospectively to alterations to buildings. Nevertheless, the principles are equally valid and they should be applied wherever practicable when buildings are altered* or extended. Applying the Building Standards (Scotland) Regulations to this type of work sometimes presents difficulties. The basic principle is that the Regulations apply to both alterations and extensions but not to unaffected parts of the building even if these parts do not conform to the Regulations.

2.4 The cost of alterations and/or extensions should be established in accordance with the guidance outlined in Chapter 5. The estimated life of the existing building and the difference in cost between works to an existing building and that of a new building should be taken into consideration.

2.5 Before any decision is made to carry out such a project an option appraisal should be undertaken. Consideration must be given to the long-term strategy for the service, the space required for the new service and the size of the

* Alterations include upgradings and adaptations of existing buildings.

building. Regard must also be paid to the orientation and aspect of the building and the adequacy and location of all necessary support services.

2.6 If at first sight there is a case for upgrading, a thorough analysis of all functional and physical conditions of the existing building should be undertaken.

2.7 When comparing alteration and/or extension of existing buildings with new build, economic considerations will not be the only criteria to be considered. Attention should be paid to matters such as location, accessibility, staffing, etc. The check of physical and other aspects of existing buildings should include:

- availability of space for alterations and additions;
- type of construction;
- insulation;
- age of the buildings, condition of fabric for example external and internal walls, floors, roofs, doors and windows, which can be determined by a condition survey;
- life expectancy and adequacy of engineering services, ease of access and facility for installation of new wiring and pipework, if required. Managers and Design Teams should refer to HFN 26 – 'Refurbishment for natural ventilation';
- the heights of ceilings (high ceilings do not necessarily call for the installation of false ceilings which are costly and often impair natural ventilation);
- changes of floor levels to obviate hazards to disabled people;
- fire precautions;
- physical constraints to adaptation such as load bearing walls and columns.

2.8 Having decided that existing premises are suitable for upgrading or conversion, the main requirement will be to assess how best the accommodation can be planned to enable the practice of modern care.

2.9 This summary of the main aspects of upgrading is general in character. It is recognised that each upgrading project will present its own problems. In many instances compromises may have to be made between Planning Note standards and what it is possible to achieve. Alterations should be functionally sound, not merely cosmetic, and appropriate for the projected needs of patients and staff for a number of years to come. Extensions should be regarded as new build wherever practicable.

Statutory and other requirements

2.10 NHS Circular No 1991 (GEN)1 advised Health Boards of the requirement to comply with all relevant legislation following the removal of Crown immunity under Section 60 of the NHS and Community Care Act 1990. Health Boards and NHSScotland Trusts are reminded of their responsibility for ensuring compliance with all statutes, regulations, codes and standards.

CDM requirements

2.11 Throughout this guidance, detailed attention is paid to considerations of safety, risk control and the implications for design. The requirement to give such attention in building projects is embraced by SI 3140 (1994), The Construction (Design and Management) Regulations. These are broadly based but assign particular and specific duties to both designers and others who contribute to the shaping of design solutions. The Regulations were subject to technical amendments in 2000, with clarification on the statutory definition of a designer.

2.12 The primary duty is concerned with due regard to health and safety in design work. This includes a requirement to conduct risk assessments, with respect to both the product built and the process of its construction. In addition to an overall consideration of broad risk categories, the Regulations also instruct on the need for safety and risk analysis at the detailed design level. There is a requirement to evaluate design options in terms of risk reduction and cost, through a balanced approach with due consideration to many other factors.

2.13 A large part of the design process must always consist of close collaboration and consultation with end-users of the new development and those responsible for existing buildings within the same or closely related institutions. The Regulations may be interpreted as requiring broad care in respect of overall design and facility management, as well as technical alignment. There is a particular need to avoid solutions that may be technically acceptable but are not compatible with organisational requirements.

2.14 In all instances there are duties on the designer and planning supervisor, but those of the client or end-user must be respected.

Smoking

2.15 Following NHS in Scotland Management Executive letter MEL(1992)24, which set a target date of 31 May 1993, all health boards and NHSScotland Trusts have introduced and implemented written no-smoking policies. No smoking is now the standard in all NHSScotland premises. Although the policies may allow for provision of designated smoking areas for staff and patients, increasingly, Boards and Trusts are adopting a total restriction on smoking. MEL(1992)24 refers to a fuller set of guidance available for those Boards and Trusts who

might find it a helpful resource. This guidance includes a statement that consideration should be given on how to adequately ventilate smoking rooms.

Fire safety

2.16 The project team members should familiarise themselves with NHSScotland Firecode. This contains technical guidance on fire safety in hospitals and other National Health Service premises.

2.17 During the design stage it is important to establish those aspects of fire safety strategy, which affect the design, configuration and structure of the department. At appropriate stages of the design process the architect and engineer will be required to discuss their proposals with the local fire brigade. They will ensure that the project team and all other NHSScotland staff are fully acquainted with the fire safety strategy for the design in operational terms (staff responsibilities, etc) equipment provision, and engineering layouts. Health Technical Memoranda 57, 58, 59, 60 and Property and Environment Forum Executive publication 'Wayfinding' give detailed information on the selection of fire resisting components and fire signs.

2.18 The principles of fire safety apply to both new projects and to alterations and upgrading of existing buildings.

Communications

2.19 Provision of effective communication systems is essential for the efficient management of any department. Specialist advice should be sought when systems are being considered and specified. Communication systems in three main categories are described below.

Telephones

2.20 Central telephone facilities for internal and external calls should be extended to serve the department in accordance with the requirements shown on the Activity Data Sheets. Wiring should terminate at each extension point in a standard line jack unit. When telephones have an audible bell or buzzer this should be fitted with a muting facility for night-time operation. All telephones should be fitted with visual indicators.

2.21 Outlets should be provided for fixed payphones for the use of staff and visitors only. Payphones for use by visitors should be located near to the visitors' accommodation and the waiting area, and should be fitted with an inductive coupler to assist people using a hearing aid. Guidance concerning the provision of telephone services, including the telephone internal cabling distribution and telephone handsets, is given in HBN 48 - 'Telephone services'. (Joint NHSScotland Property and Environment Forum/NHS Estates publication).

Patient-to-staff and staff-to-staff call systems

2.22 Patient-to-staff call systems should be provided in bed spaces and in all spaces where patients may be left alone temporarily, such as consultation/examination/ treatment rooms and WCs. Staff-to-staff call systems should be provided in all spaces where staff consult, examine and treat patients. Terminals to the call systems should be located at the staff base or as otherwise directed.

Staff-to-patient call system

2.23 Project teams will need to consider how patients, including those who have visual and hearing impairment, should be called for treatment from the main waiting area. Patients may be given a number as they register. When required for treatment, the patient's number may then be displayed on a digital clock in the main waiting area. This system helps to maintain patient anonymity and to ensure that patients are seen in order. Other options include announcements:

- by a member of staff personally;
- over a loudspeaker system;
- using a visual display unit.

Security/control of access

2.24 Assaults on hospital staff and theft of NHSScotland property are recognised problems. The project team should discuss security with the officer in charge of the local Police Crime Prevention Department and the hospital or district security officer or adviser at an early stage in the design of the building. Fire and Security Officers should be consulted at the same time because the demands of security and fire safety may sometimes conflict. The attention of planners is drawn to NHS MEL(1992)35, about security and the revised NHS Security Manual to which it refers, NHS MEL (1994)93 and NHS MEL (1995)67 regarding maternity units. Reference should also be made to Scottish Office PAN 46 – 'Planning for crime prevention'.

2.25 Security needs to be considered from both the point of view of security from outside intruders and the safety and security of patients and staff. Buildings should be designed, fitted and equipped to a standard which reduces the risk of

injury to users. The creation of a homely, domestic environment will be of equal importance in certain departments.

2.26 Project teams should also consult HFN 05 – 'Design against crime'. This recommends that only after making buildings as safe as possible by means of a number of design processes should consideration be given to the provision of security systems, such as electronic locking devices, closed-circuit television and other items of hardware. Consideration needs to be given to how the security of the building will interact with the therapeutic atmosphere.

Protection from intruders

2.27 Careful consideration must be given to the security of the department from outside intruders. There should preferably be only one point of entry to each department which should be staffed 24 hours per day or have CCTV surveillance. Special consideration should be given to fire doors on escape routes which are not part of the usual circulation, to ensure that they are used only for their proper function. The entrance door will need to be lockable at night. A bell push may be required at the entrance to the department and to any self-contained component part of the department.

2.28 Throughout the accommodation, except for ground floor windows looking onto courtyards, window openings should be restricted at the bottom to 100mm for security and to discourage intruders. On the ground floor, which is more vulnerable to intruders, the degree of restriction at the top of the window will be a matter for local decision, bearing in mind that the more a window can be opened the better the natural ventilation. On the first floor, some restriction of top opening is desirable but the amount should be left to local decision. However, in all sanitary and utility areas there should be restrictors to allow opening of windows 100mm at both the top and bottom. Similarly, casement windows, if used, should be restricted at the side. All restrictors should be tamper-proof.

Patient protection

2.29 Some patients may attempt to harm themselves or others and so some precautions need to be taken, though the overriding safety measures are good staff/patient relationships. In units for the elderly, particular attention should be paid to the problem of patients who 'wander'. Give thought to whether doors should be locked or suitably alarmed so that staff can be alerted if a patient wanders (see SE Development Department's *Building Regulation Note 8/2000* regarding locks on exit doors). It is necessary to lock doors of those parts of the accommodation which are not used 'out of hours' and at weekends. There should be no open stairwells. Domestic Service Rooms should be lockable because they may contain toxic materials.

Valuables

2.30 A secure, dedicated cupboard may be required for the temporary security of patients' valuables. Valuables requiring longer-term storage should be kept in accordance with the hospital operational policy.

Drugs

2.31 Secure storage for Controlled Drugs will be required in certain areas. Because of their potential for abuse, normal control procedures over all drugs may need to be strengthened.

Damage in health buildings

2.32 When designing and equipping health buildings, the likely occurrence and effects of accidental damage should be considered. Damage in health buildings has increased over the years, to some extent as a result of lightweight, often less robust, building materials, and the use of heavier equipment for the movement of patients. Measures to minimise damage should be taken as appropriate. Protective devices should be capable of being renewed, if required, and should be designed as part of the decoration.

Building component data

2.33 The Building Components Database consists of a series of Health Technical Memoranda (HTMs), 54–71 which provide specification and design guidance on building components for health buildings which are not adequately covered by current British Standards. No firms or products are listed. The numbers and titles of the various SHTMs and HTMs in the series are listed in ‘References’. It should be noted that some HTMs are not endorsed for use in Scotland (see NHSScotland Property and Environment Forum Executive: HTM, HGN, HTN Reference Guide).

Environmental considerations

2.34 The effect of operations and actions on the environment is of significant importance, and is an integral part of the responsibility for the health and well-being of the community. Care must be taken to contain the environmental impact of activities to a practical minimum consistent with maintaining responsibilities of providing high quality patient care. Commitment to the requirements of the Environmental Protection Act and all other relevant statutory legislation is essential. It is of particular importance to seek to:

- continue to promote the efficient use of energy in an economical and environmentally sound manner. This is done by promoting energy conservation and where economically viable, investing in energy saving technology. Management Greencode, the Property and Environment Forum's computerised environmental management system, is available to NHSScotland;
- provide environmental training to appropriate staff, ensure that all staff are aware of the environmental policy and how they can contribute to the overall environmental performance;
- promote waste minimisation and reduce the environmental impact of waste through beneficial use, where practicable, or safe disposal where not;
- reduce, where practicable, pollution to air, land and water;
- improve sustainable development principles.

Internal environmental conditions

General

2.35 Good interior design contributes to both staff and patient morale. The aim should be to create a pleasant, comfortable and safe environment throughout within any constraints relating to specific departments.

Noise and sound attenuation

2.36 Most departments will have to cater for both noisy and quiet activities. This should be borne in mind during the early stages of planning. It is important that sleeping areas, quiet day spaces, interview rooms, and rooms where concentration is required, should not be adjacent to noisy areas. Utility rooms and pantries likely to be used at night should not be so close to the sleeping areas as to cause a disturbance.

2.37 The quality of the acoustics is important. It is vital to avoid empty echoing sounds which give a very institutional impression. In addition to appropriate planning measures, noise can be lessened by isolating sound sources with sound containing partitions and doors, by attenuating sound with acoustic materials and generally using soft floor coverings (see paragraph 2.34), curtains and other such materials. There may be a need to ensure oral privacy so that confidential conversation is unintelligible in adjoining rooms or spaces. This will typically, but not exclusively, be required in consulting/examination rooms and interview rooms. The acceptable noise level, and any requirement for speech privacy, where applicable, in the individual spaces in this department is shown on the Activity Data Base sheets. (See HTM 56 – 'Partitions'.)

Floor finishes

2.38 It is important to select a floor covering which contributes towards the creation of an attractive environment. It must be appropriate to the area and and not present a hazard to disabled people or the movement of wheeled equipment.

2.39 Carpets, for example, may be suitable for use in offices, staff rest rooms and visitors' waiting areas. For further information on soft floor coverings see HTM 61 – 'Flooring'. In other areas floor finishes should be capable of withstanding harsh treatment, regular hard cleaning and should be slip resistant under wet conditions. Skirting should be coved for ease of cleaning. The Infection Control Team should be consulted on the use of soft floor coverings, particularly for patient access areas.

2.40 It is important that whatever floor covering is chosen it can be effectively cleaned, maintained and repaired. Rapid developments in soft floor covering technology have produced a wide variety of new materials. Floors should not present or appear to present a slip hazard. The patterning should not induce disorientation. Surface drag, static electricity, flammability and infection hazards are other factors which need to be considered.

Main entrance

2.41 The first impression gained by patients and visitors entering a hospital or department is of fundamental importance. The design and furnishings of entrance, reception and waiting spaces should be warm and welcoming with a carefully chosen decor, soft floor coverings, pictures and plants. This feeling of warmth and welcome should, as far as practical, be continued throughout the accommodation.

Shape of rooms

2.42 The shape and appearance of rooms have effects on people. Rooms, which are square or nearly square, are preferable for most purposes. Long, narrow tunnel-like rooms and rooms which are small, internal, badly lit or poorly ventilated should be avoided.

Windows

2.43 The design of windows must reconcile different needs as well as providing natural daylight and outside views. In addition to the various statutory requirements, the following aspects must also be considered:

- illumination and ventilation;
- insulation against noise;

- thermal loss or solar gain;
- the prevention of glare;
- the provision of a visual link with the outside world;
- security (see paragraph 2.24).

2.44 Design must give cleaners easy access to the inside and outside of windows. Guidance on types of window and on the safety aspects is available in HTM 55 - 'Windows'.

Note: HTM 55 is not endorsed for use in Scotland and if referred to should be used with caution.

2.45 Safety should be considered in the specification of all windows and internal glazing, including vision panels, light fittings, pictures and mirrors. The minimum standard for any glazing is given in BS 6262 – 'Code of practice for glazing in buildings' 1982 and its subsequent revisions. Higher specifications should be considered because of the nature of the risks.

2.46 Upstairs windows should have restricted opening to prevent people climbing out. There have been a number of incidents involving people falling from windows, mainly from hospitals. The restrictors should be tamper-proof.

2.47 Where windows are located in the wall behind the bedheads, it is necessary to ensure that the space requirements for beds, bedhead services, etc are not compromised to the disadvantage of either patients or staff.

2.48 Windows provided in the areas where patients recover will contribute to the well-being of both patients and staff. Windows should, if possible, have a pleasant outlook.

Doors and frames

2.49 Doors and frames are particularly liable to damage from mobile equipment. Materials which will withstand this should be used. All double swing doors should incorporate clear glass vision panels. Privacy, safety, or other considerations may require that the panels should be capable of being obscured. Where necessary, doors, except fire-resisting doors, should be capable of being fastened in the open position. Any locked fire exit doors must have the capability of release on the activation of the fire alarm, or a local release facility of a type not likely to tempt patients to misuse it. Magnetic door retainers should not restrict the movement of traffic. Doors should be of an adequate width to allow for the safe passage of beds, trolleys and wheelchairs where necessary.

Ventilation

2.50 Natural ventilation is usually caused by the effect of wind pressure. It will also occur to some extent if there is a temperature difference between inside and outside the building. This thermo-convective effect frequently predominates when the wind speed is low and will be enhanced if there is a difference in height between inlet and outlet openings. Ventilation induced by wind pressure can promote high air change rates through a building if air is able to move freely within the space from windward to the leeward side of the building.

2.51 Internal partitions, fire compartment walls and closed doorways can often impede the flow path of air. When this happens the process will be more dependent on single-sided ventilation. Even with this degree of obstruction to air movement, acceptable ventilation may still be obtained without excessive window openings, which could prejudice safety, security and comfort. Some types of windows, e.g. vertical sliding, can enhance single-sided air exchange by temperature difference and these will improve the overall rate of natural ventilation in protected or sheltered areas where the effect of wind pressure is likely to be minimal. Section 2.3 of HTM 55 and BS 5925 provide further guidance on this subject.

Heating

2.52 Space heating should be designed for continuous operation and should be available during the summer months for use on cold days and nights. Heat emitters should be free of sharp edges and should be easy to clean. Emitters should not create an obstruction and should not be located behind beds. Exposed hot water pipework, accessible to touch, should be insulated.

Furnishings and finishes

2.53 Designers should aim to create an interior which is comfortable and pleasant to look at. Colour can be used to good effect for decorative and other purposes. Colour schemes can be devised to aid in the identification of particular rooms or parts of the department. Drab colours should be avoided.

2.54 The choice of fittings and furniture should form an integral part of the design process, and should be co-ordinated within the overall design scheme. Finishes should be functional and be compatible with the need for comfort, cleanliness and safety. The quality of finishes should, in general, conform to the standard of finishes specified for the rest of the hospital. Cleaning regimes should be considered when materials are selected. For further information see NHSScotland Firecode guidance SHTM 87 – 'Textiles and furniture'. Fittings should be free from sharp corners or projections to prevent accidents, particularly in areas where children are involved as patients or visitors.

Natural and artificial lighting

2.55 Décor should be light and pleasant. Natural lighting is essential to the well-being of patients. The provision of a comprehensive artificial lighting installation is also essential; it makes an important contribution to the aesthetic appeal of a department. It should be possible to vary the level of illumination to suit functional activities. Task lighting of the required intensity with low-contrast glare-free background illumination should be provided.

2.56 Artificial lighting, as well as providing levels of illumination to suit particular activities, can make an important contribution to interior design. Designers should develop a lighting scheme that will help to promote a high-quality image of the service being offered and a non-clinical, soft environment in as many spaces as possible. Levels of artificial light can be varied easily by the use of dimmer switches.

2.57 Artificial lighting provided in patient assessment, treatment and recovery areas should enable changes to a patient's skin tone and colour to be clearly defined and easily identified.

2.58 Orientation is an important consideration in any development. Sunlight enhances colour and shape and helps to make a room bright and cheerful. Glare can be reduced by attention to the detail of window design, and can be controlled by curtains or blinds. The harmful effects of undesired solar gain can be mitigated by external screens – a costly solution – or by architectural detail of the shape of windows and depth of reveals. Properly controlled solar gain contributes to energy efficiency. Further guidance is given in CIBSE Lighting Guide LG 10 1999 – 'Daylighting and Window Design'.

Internal rooms

2.59 Internal rooms may contribute to economy in planning, but the resulting continuous need for artificial lighting and mechanical ventilation will add to both capital and running costs. Such rooms do not provide good working conditions and should be used only for activities of infrequent or intermittent occurrence or which demand a controlled environment. Rooms that are likely to be occupied for any length of time by staff or patients should have windows.

Privacy

2.60 The design of the accommodation must preserve the privacy and dignity of patients particularly where men and women are treated in adjacent areas and share certain accommodation and circulation spaces. This must be reconciled with the need for unobtrusive observation which is vital for the care of the patient.

2.61 Within the department there will be different levels of rights of access and privacy. This will range from very public areas such as the reception and dining room to patients' individual bedrooms where a very high level of privacy will be required. Between these extremes there will be activity areas where patients congregate and clinical areas where patients and staff hold confidential discussions. There will also be staff only areas. This gradient of access/privacy should be clear from the design, both between and within the functional elements.

Art in hospitals

2.62 Works of art and craft can make a significant contribution towards the desired standard of the interior of wards and day hospitals. This need not be limited to the conventional hanging of pictures on a wall. Every opportunity should be taken to include works by local artists, children and craftspeople. These may include paintings, murals, prints, photographs, sculptures, decorative tiles, ceramics and textile hangings.

2.63 Often it is works of art and craft which lend special identity and which help give a sense of locality.

2.64 Specialist advice should be sought regarding the effect of different types of art on the emotional state. Landscapes and seascapes are generally considered to be relaxing, while close-up views of animals looking directly at the observer are thought to increase stress. Viewers in a seated position should be considered when determining the height at which works of art are displayed.

2.65 When installing art in health premises, especially residential premises, it is always advisable to consult with users of the facility. This will increase the level of acceptance. Display of art created by the users themselves should be encouraged.

2.66 Advice should be sought from experts on:

- obtaining funding;
- ensuring quality in all art and craft works;
- appropriately locating art and craft works;
- selecting artists and craftspeople.

People with a disability

2.67 It is essential to ensure that suitable access and facilities are provided for people who have problems of mobility or orientation or other special needs. This category includes, besides people who are wheelchair-bound, those who

for any reason have difficulty in walking, those with a sensory handicap such as visual or hearing impairment, and those whose first language is not English.

2.68 Readers should refer to SHFN 14 – Disability access. Project teams are reminded of the need to comply with the provisions of:

- The Chronically Sick and Disabled Persons Act 1970;
- The Chronically Sick and Disabled Persons (Scotland) Act 1972;
- The Chronically Sick and Disabled Persons (Amendment) Act 1976;
- The Disabled Persons Act 1981;
- The Disabled Persons (Services, Consultation and Representation) Act 1986;
- The Disability Discrimination Act 1995.

2.69 Attention is drawn to BS 5810: 1979 Code of Practice for Access for the Disabled to Buildings. One of the effects of the 1981 Act is to apply this British Standard to premises covered by the 1970 Act, which includes those open to the public.

2.70 Project teams should refer to HBN 40 – 'Common activity spaces' and HBN/SHPN 40 Volume 5: Scottish Appendix, a set of five volumes which includes guidance and ergonomic data sheets on access, space and equipment relating to disabled users of health buildings. SHFN 14 – 'Disability access' and SHFN 20 – 'Access audits of primary healthcare facilities' may also be of interest to project teams. 'Disabled People Using Hospitals', published by the Royal College of Physicians in 1998, includes guidelines on the design of hospital buildings that meet the needs of disabled people. It also describes how a hospital's provision for disabled people, including the physical environment, might be audited.

2.71 It is recommended that project teams consult local representatives of disabled people with regard to the planning of spaces used by patients and escorts.

2.72 In locations where public telephones are provided, the need for access to a telephone by people in wheelchairs must be considered. A telephone should be mounted at a suitable height. Fitting the handset with an inductive coupler will assist anyone using a hearing aid. A text-phone should be provided for deaf people, and staff should know how to operate it. Organisations should be registered with Typetalk to enable hearing people to communicate with text-phone users through an operator. All telephones should be clearly signposted. See also HBN 48 – 'Telephone services'.

2.73 If a deaf person communicates by means of signing it is important that any interpreting is done by fully qualified personnel. Staff who are interested can be given the opportunity to learn British Sign Language, but it must be

remembered that in the medical field misunderstandings due to incorrect interpretation can be dangerous.

2.74 It is recommended that project teams consult with the Royal National Institute for the Deaf, which offers communication services (signers, lip-readers and speech-to-text transcribers) and training in sign language.

Wayfinding

2.75 To encourage patients and visitors to look after themselves, to use their initiative and to have freedom of movement about a hospital or department, particular attention should be paid to wayfinding. The form of signposting used and the method of displaying notices should not detract from the desired environment but should be sufficiently explicit to be understood by patients who may be either confused or are from a different culture. Only certain doors require conventional labelling, e.g. fire exit doors, bathrooms, WCs and offices. Further guidance is available from Property and Environment Forum Executive publication 'Wayfinding: Guidance for healthcare facilities'. When designing signage, reference must be made to NHSScotland's Identikit Folder.

Waste disposal

2.76 The segregation, storage and the safe disposal of waste should comply with the Health and Safety Commission - Health Service Advisory Committee guidance 'Safe Disposal of Clinical Waste', TSO 1992, issued with letter reference NHS MEL(1993)2 and the guidelines on Clinical Waste Management issued with NHS MEL(1994)88.

Reference should also be made to SHTN 3: Management and Disposal of Clinical Waste and 'Model Waste Disposal Operational Policy on the Forum web site; www.show.scot.nhs.uk/pef

2.77 The waste disposal provision of used items should be consistent with the current policy of the health body for the disposal of clinical waste. A room for the temporary holding of waste should be provided at the entrance to the department.

Maintenance and cleaning

2.78 Materials and finishes should be selected to minimise maintenance and to be compatible with their intended function. Finishes, fittings and fixtures should be attractive and sufficiently robust to withstand heavy use and abuse.

2.79 Maintenance will generally be undertaken as part of a planned maintenance routine. Some repairs may need to be carried out promptly on an “as-needed” basis. There is evidence to suggest that leaving vandalism or damage unrepaired leads to further degradation of the environment.

2.80 Building elements that require frequent redecoration or are difficult to clean should be avoided. A compromise is sometimes necessary between items that have a low acquisition cost but are expensive to maintain and those with a high acquisition cost which are nevertheless relatively inexpensive to maintain. The life-cycle cost of the building elements, in these instances, should be analysed and used to assist the project team in their decision-making process when there is a choice of product available.

2.81 Special consideration should be given to corners, partitions, counters and other elements which may be subject to heavy use. Wall coverings should be chosen with cleaning in mind.

Guidance on these aspects is given in HTM 56 – ‘Partitions’, HTM 58 – ‘Internal doorsets’, HTM 61 – ‘Flooring’ and HTM 69 – ‘Protection’.

Provision for Automatic Data Processing (ADP)

2.82 Information technology has a central role in health management. The use of computers and telecommunications, and the rate of technological innovation, continues to increase. The implications for project teams are threefold:

1. A requirement for the housing of the computers.
2. A requirement for the provision of ducts for transmission cabling.
3. Sufficient space and adequate power supplies for modems, visual display terminals (VDUs) and printers, and associated software and stationery.

Even if the introduction of automatic data processing (ADP) is not proposed at the time that the project team completes its brief, it will be advisable to design in such a way that equipment can be introduced easily and quickly at some later date.

2.83 There are two principal matters of concern: visibility and noise. VDUs are now a familiar sight, and it will easily be appreciated that they cannot be reduced beyond a certain size. Consequently, sufficient and convenient space must be provided for them. Since the brightness of the letters displayed on the screen cannot exceed a certain limit, special attention must be given to the ambient lighting to ensure that the contents of the screen are legible. Additional space will be required in front of the screen for a keyboard. Printers are often noisy. Noise may not be too noticeable in bed areas during normal working hours but during quiet hours it will probably not be acceptable. If it is not possible to

position a printer at a site remote from patient areas, expenditure on a quieter printer or on means of quietening a noisy printer can be justified.

2.84 Computer expertise is now widely available in the NHSScotland. Project teams should ensure that, at an early stage, they inform themselves concerning current and projected local computing policies, and that their proposals conform with them.

3. Hospital clinical and operational policies

Catering

3.1 Every department should have facilities for serving meals to patients in accordance with the hospital's catering policy. These facilities should comply with current food hygiene and safety legislation, for example the 'Food Safety Act, 1990' and the 'Food Hygiene Amendment Regulation, 1990'.

3.2 Two common methods of meal delivery service are:

- **central tray service** – meals which have been assembled to the individual patient's requirements and delivered to the ward in a trolley. The food is kept hot by a heat retaining base under each plate or in a heated tray trolley. On arrival at the ward, meals are served at the earliest opportunity. Space should be provided to accommodate the delivery trolley without obstructing normal circulation.

- **cook-chill service** – chilled meals which have been assembled to the individual patient's requirements and delivered to the ward in a trolley. This may incorporate a reheating compartment. A separate reheating unit may be provided at ward level or in a shared trolley holding room. Meals must be stored and heated under controlled conditions before being served to patients. Space, in addition to that needed for the bulky delivery trolleys, must be provided for activities associated with the controlled reheating process – for example temperature monitoring. An electric power supply will be needed.

3.3 Whatever the chosen system, it is important that patients have a choice of meal and that any specific dietary needs, including cultural or religious requirements, are catered for.

3.4 Further guidance on catering is contained in HBN 10 'Catering department'.

3.5 It is assumed that in most departments staff will attend the hospital staff dining room for main meals although facilities are required in each department where staff can relax, and prepare and consume snacks and beverages.

Domestic services

3.6 A domestic services manager (or equivalent if the service is contracted out) will be responsible for organising domestic cleaning services. Most of the work will

be carried out by domestic services staff based in the department, but some work may be carried out by a Whole Hospital team.

3.7 Accommodation is required where cleaning equipment can be stored and cleaned, and as a base for domestic services staff. The size and content of the space will be determined by the scope and extent of the services provided from it, as determined by the Whole Hospital policy. The type and number of items of equipment and materials to be stored will depend upon the finishes provided, the number and deployment of domestic services staff, and the frequency of cleaning.

Supply, storage and disposal

3.8 The concept of Materials Management involves the supply, distribution, storage and disposal or re-cycling of a wide range of goods and equipment essential to the efficient management of departments. The range of items is provided by a number of different hospital departments.

These include:

- Central Store;
- Sterilizing and Disinfecting Unit;
- Pharmacy;
- Laundry;
- Kitchen;
- Laboratory;
- Engineering Services.

The methodology adopted by the hospital to provide an effective Materials Management System requires detailed planning and co-ordination.

3.9 The consequences of supply, storage and disposal policies for capital, revenue and service all interact. Increasing space and stock increases both capital and revenue costs. Reducing space reduces capital outlay but demands an increase in the frequency of delivery, resulting in increased running costs. Insufficient stock can adversely affect patient care and nursing service. Staff are distracted by the need to seek or collect items required. An unreliable supply encourages defensive overstocking.

3.10 Project teams should give careful consideration to supply, storage and disposal systems. The quantity and distribution of storage space can only be specified in terms of known policies. Space will be required for various types of waste, allowing for proper segregation procedures as outlined in SHTN 3: Management and Disposal of Clinical Waste.

3.11 Project teams should consider:

- Whole Hospital materials handling: supplies, storage and disposal policies. The frequency of deliveries, the amount of storage space required in the department and the delivery and storage policy of the supplying department, are interrelated. The lower the frequency of delivery, the greater the capital outlay on working stocks. This is particularly significant in respect of items reprocessed by the sterile services department (SSD);
- the types of items supplied, for example, sterile supplies, office supplies, catering supplies and clean laundry;
- the delivery and collection points;
- the volume and location of storage spaces (including spaces where items are held awaiting collection for reprocessing or disposal);
- specialised storage requirements, for example, for pharmaceutical supplies (especially Controlled Drugs).

3.12 Suppliers should be encouraged to adopt good transport management principles as outlined in the Government's White Paper 'New Deal for Transport: Better for Everyone'. This includes route planning, full load delivery and driver training.

3.13 Control of stock, which may require computer support, increases efficiency and can effect appreciable or even substantial reductions in costs. The value of a departmental stores management system will be enhanced if it can be linked to an existing hospital materials handling system.

3.14 Organising an efficient and economical system for supply, storage and disposal is demanding and complex. Systems and timetables for ordering supplies, for delivery, and for disposal, should be devised and agreed with the managers of relevant hospital departments, including hospital stores, SSD, pharmacy, laundry, catering and portering services. Good working relationships and communications with other hospital departments are of fundamental importance.

3.15 Disposal of pressurised containers requires special attention - see SAB(88)79 - 'LPG Aerosol Containers: Risks arising from storage, use and disposal'. Specially constructed containers (see BS 7320:1990) should be used for "sharps", particularly needles. Use of sharps containers minimises the risk of injury to staff, particularly portering staff handling waste for incineration (see also paragraphs 2.71 and 2.72).

3.16 Further guidance on materials management is contained in HFN 29 – 'Materials management (supply, storage and distribution) in healthcare facilities'.

Information handling

3.17 Information management and technology (IM&T) is fundamental to the successful operation of a comprehensive health service. The system selected should offer a wide range of facilities, and be consistent with local and NHSScotland IM&T strategies. A national overview of the networking systems is contained in 'Building the Information Core: Implementing the NHS Plan' which may be obtained from the NHS Executive. More detailed guidance on local area networks (LANs) is contained in 'A handbook for IM&T specialists', which may also be obtained from the NHS Executive.

3.18 The IM&T strategy must operate for the whole mental health service.

3.19 Developments in telepsychiatry, and in computer-supported diagnostic packages, may produce a requirement for the transmission of video images between departments and centres of specialist expertise.

3.20 The choice of systems and matters such as the location of computer terminals, the functions to include on the system, and the levels of access to information, should be decided locally. Examples of data handling needs, which could be met by the installation of a comprehensive IM&T system, include:

Within a department:

- operating a patient administration system;
- maintaining the appointment system for day patients and out-patients;
- providing management information, including clinical audit;
- managing materials, including health and safety and environmental audits;
- managing statistical information, including feedback from patients, GPs and community nurses;
- the exchange of information between community nurses and other appropriate professionals;
- storing reference material;
- maintaining records.

With other health service departments/hospitals:

- operating a patient administration system;
- making out-patient appointments;
- receiving results from pathology departments;
- receiving radiology reports.

With GPs:

- advising on admission;
- advising on attendance and/or requesting follow-up visit;
- advising on discharge and confirming post-discharge care plan.

3.21 Project teams should:

- consider the IM&T needs of the service at an early stage;
- review current IM&T developments;
- check that proposals conform with local IM&T policies;
- ensure that sufficient account is taken in terms of space and engineering services at the design stage to meet the anticipated need for special power supplies, modems, visual display terminals (VDUs), printers and associated software, stationery, and conduits for cables;
- where necessary, and if a suitable space is not available elsewhere, ensure that a room is provided within the premises to accommodate the IM&T equipment. The space and environmental requirements should be obtained from the equipment manufacturer;
- ensure that VDU screens are sited so that the displayed text is not visible to members of the public (although it may be considered an advantage to be able to turn the screen to enable the person to check the accuracy of the information entered);
- ensure that where VDUs are to be used, the lighting is designed to avoid bright reflections on the screen and to ensure that the contents of the screen are legible. Further guidance is contained in the CIBSE Lighting Guide LG 3 and the Health and Safety (Display Screen Equipment) Regulations 1992;
- ensure that equipment noise is controlled within acceptable limits. The choice and use of quiet printers has a significant contribution to noise reduction;
- ensure that adequate provision is made for the security of data and devices.

Staff changing

3.22 Staff may change from outdoor clothes into hospital or department uniforms in changing accommodation located within the department, or elsewhere in the hospital, as determined by local policy.

3.23 If changing accommodation is located elsewhere, then it will be necessary to provide within the department:

- a staff cloakroom;

- small lockers for secure storage of small items of personal belongings;
- a shower;
- a WC.

3.24 It is essential that project teams assess as accurately as possible the expected local usage of staff change/locker rooms. The following issues require particular attention:

- the total number of users. Account should be taken of part-time as well as full-time staff;
- the greatest number of users present at one time;
- the number of “permanent” users and of “occasional” users;
- the proportion of the total contributed by each sex;
- the policy for the allocation of lockers (lockers should not be shared).

3.25 Experience suggests that it is advisable for permanently employed staff to be assigned personal lockers. If training courses are regularly held in the unit, then some lockers should be reserved for students.

Education and training

3.26 If it has been agreed that the teaching of undergraduate medical students will take place, and their number necessitates additional space, then the relevant accommodation should be increased. Reference should be made to ‘Teaching Hospital Space Requirements’ issued 22 April 1974 by SHHD/DS(74)99.

3.27 Teaching requiring special facilities should take place in a post-graduate medical centre, or in a hospital education centre.

4. Engineering services

Introduction

4.1 This Chapter describes aspects of engineering services which are common to health buildings generally. The guidance will acquaint the engineering members of the multi-disciplinary design team with the general design criteria needed to meet the functional requirements of the various departments of a DGH and of other healthcare buildings.

Model specifications

4.2 A series of model specifications including Scottish Supplements, for the specialised engineering services in healthcare buildings, is available from NHS Estates, England and is sufficiently flexible to meet local needs.

Economy

4.3 Engineering services are a significant proportion of the capital cost, and remain a continuing charge on revenue budgets. The project design engineer should therefore ensure:

- economy in initial provision, consistent with meeting functional requirements and maintaining clinical standards;
- optimum benefit from the total financial resources these services are likely to absorb during their lifetime;
- whole life-cycle costs to ensure that the most energy-efficient equipment is provided wherever possible – meeting the joint aims of reducing energy bills and harmful carbon emissions.

4.4 Where various design solutions are available, the consequential capital and running costs should be compared using the procedures outlined in the Scottish Capital Investment Manual.

4.5 The economic appraisal of various locations and design solutions should include the heat conversion and distribution losses to the point of use. Where buildings are located remote from the development's load centre, these losses can be significant.

4.6 Where the facility is part of a hospital complex, the energy management and accounting system should be part of the hospital building management system

(BMS), and should include metering of all services where practical. If a hospital BMS is not available, or if the facility is not located on the hospital site, the energy management and accounting system for the department should, where applicable, stand alone. It should be suitable for subsequent integration with a future BMS. Further detailed guidance is contained in SHTM 2005 – 'Building management systems'.

4.7 The design proposals should be assessed at an early stage from an energy efficiency aspect, to obtain an Energy Efficiency Performance Indicator expressed in total energy consumption units of J/100m^3/Annum. In view of the increasing cost of energy, the project team should consider the economic viability of heat recovery and combined heat and power systems (CHPs). Further guidance on CHPs can be found in NHS Estates 'A Strategic Guide to Combined Heat and Power'. Designers should ensure that services that use energy are efficient and are metered where practicable.

Maximum demands

4.8 User demand on engineering services is often difficult to predict, but experience indicates that services designed for simultaneous peak conditions are seldom fully utilised in practice. The estimated maximum demand and storage requirement (where appropriate) for each engineering service will need to be assessed individually to take account of the range, size and shape of the functional units, geographical location, operational policies and intensity of use. The Property and Environment Forum Executive may provide estimates of the maximum demands and storage requirements for a specific project if required by the project team. Details of power consumption and load patterns of significant individual items of equipment must be sought from manufacturer and/or suppliers. The finding of this information will take place most commonly as part of the equipment tendering process. Designers must ensure that the electrical loads are balanced across the infrastructure network and that there is sufficient capacity to meet current and potential future demands.

Space for plant and services

4.9 The satisfactory performance of plant in healthcare buildings is particularly important and the building design should allow for:

- easy and safe means of access protected as far as possible from unauthorised entry;
- frequent inspection and maintenance with sufficient access panels being provided for this purpose;
- eventual removal and replacement of plant with particular attention being paid to the requirements of the Manual Handling Operations Regulations (1992) and succeeding legislation.

4.10 Recommended spatial requirements for mechanical, electrical and public health engineering services in health buildings are given in SHTM 2023 – 'Access and accommodation for engineering services'. The information in this publication is specifically intended for use during the initial planning stages when precise dimensional details of plant are not available. It also makes reference to the Construction (Design and Management) Regulations.

4.11 The distribution of mechanical and electrical services to final points of use should, wherever possible, be concealed in walls and above ceilings. Where heat emitters take the form of wall mounted radiators or convectors, these should be contained within a 200mm wide perimeter zone under window sills and critical dimensions should be taken from the boundary of this zone. The 200mm zone includes the floor area occupied by minor vertical engineering ducts and is included in the building circulation allowance.

4.12 Services contained in the space above the false ceiling, with the exception of drainage should be confined to those required for the accommodation immediately below the false ceiling. Provision of satisfactory access should be provided to pipework, fittings and valves concealed in partitions, walls and ceilings.

4.13 Particular care should be taken to ensure that accesses for resetting fire dampers are not located in positions which would compromise fire doors and emergency circulation.

Control access

4.14 Devices for control and safe isolation of engineering services should be:

- located, where possible, in circulation rather than working areas to avoid disruption of clinical work;
- protected against unauthorised operation, for example switchgear and fuseboards should be housed in secure cupboards and, where appropriate, water stopcocks and drain down valves should be designed/positioned to prevent deliberate flooding;
- clearly visible to and accessible where intended for operation by the department's staff;
- easily accessible and visible to commissioning and maintenance personnel.

Activity data

4.15 Environmental and engineering technical data and equipment details are described in the Activity Data Base sheets. They should be referred to for space temperatures, lighting levels, outlets for power, telephones, equipment

details etc, and when positioning equipment and outlets. Any item that involves patient operation should be of a simple pattern and designed to prevent interference (see also Chapter 6).

Safety

4.16 Statutory duties are imposed on employers and designers to ensure, as far as is reasonably practical, that design and construction is such that articles and equipment will be safe and without risk to health at all times when being set, used, cleaned or maintained by a person at work. This is set out in the Health and Safety at Work etc., Act 1974 as partly amended by the Consumer Protection Act 1987, together with the Management of Health and Safety at Work Regulation 1999, the Workplace Regulations, the Work Equipment Regulations, the Construction (Design and Management) Regulations Amendment 2000 and the Provision and Use of Work Equipment Regulations 1998. Engineering components, e.g. pipework, terminals, etc, are covered by the term 'articles' and thus these duties apply to the designers of engineering services for non-domestic buildings.

Fire safety

4.17 Fire safety measures should not only meet the requirements of the Building Standards (Scotland) Regulations and be to the satisfaction of the local fire brigade, but should also conform with NHSScotland Firecode. Firecode gives design guidance and requirements for fire safety in healthcare buildings through a series of Scottish Health Technical Memoranda and Scottish Fire Practice Notes. Project team members should familiarise themselves with NHSScotland Firecode, which is part of “NHSScotland Fire Safety Management” suite of documents. This can be viewed on the Property and Environment Forum Executive web site.

Noise

4.18 Excessive noise and vibration from engineering services, whether generated internally or externally and transmitted to internal areas, or noise from other sources e.g. speech which can be transmitted by the ventilation system, can adversely affect the operational efficiency of the department and cause discomfort to patients and staff. In addition to designing for control of noise levels, there may also be a need to ensure speech privacy so that confidential conversations are unintelligible in adjoining rooms or spaces. This will be important in consulting/examination and treatment rooms, particularly where these are located adjacent to waiting areas. The noise limits and means of control advocated in SHTM 2045 – ‘Acoustics’ should provide an acceptable acoustic environment.

Engineering commissioning

4.19 It is essential that engineering services should be fully commissioned. Adequate test facilities and devices should be included in the design to facilitate flow measurement and regulation of all water, ventilation and gaseous services. The services should be commissioned in accordance with the methods identified in relevant Health Technical Memoranda. Engineering services for which a specific SHTM or HTM is not available should be commissioned in accordance with the following as appropriate:

- Engineering Commissioning published by The Institute of Healthcare Engineering and Estate Management (IHEEM).
- Engineering Services Commissioning Codes published by the Chartered Institute of Building Services Engineers (CIBSE).
- IEE Regulations for Electrical Installations (BS 7671) and associated Guidance Notes (current edition).
- Trade associations commissioning codes.

Commissioning should also be carried out and documented in accordance with the requirements of Scottish Hospital Technical Note 1 – 'Post commissioning documentation for health buildings in Scotland'. It is essential that full information regarding commissioning codes and test methods to be used are included in the specification for engineering services. Flow measurement and proportional adequate balancing of air and water systems require test facilities to be incorporated at the design stage. Guidance is also contained in commission code A and W published by the Chartered Institute of Building Services Engineers.

Mechanical services

General scope

4.20 Mechanical services include the provision of heating, ventilation/air conditioning, hot and cold water services and medical gas supplies. The distribution of all piped systems is deemed to commence at their point of entry into the accommodation and includes ductwork, pipework, fittings, controls and connections to equipment and outlets.

4.21 For environmental requirements in individual spaces reference should be made to the Activity Data Base sheets. Recommended room temperatures, air change rates, hot water service temperatures, etc are grouped under 'Technical Design Data' on each A-Sheet (see also Chapter 6).

Heating

4.22 It is recognised that space heating may be provided by a variety of techniques. However, the selected method should ensure that surface temperatures shall not exceed 43^{o}C. Exposed hot water pipework, accessible to touch, should be insulated. Further guidance is contained in Scottish Health Guidance Note – '"Safe" hot water and surface temperatures'.

4.23 Radiators should be easy to clean, should not harbour bacteria and should normally be located under windows or against exposed walls. There should be sufficient clear space between the top of the radiator and the window sill to prevent curtains reducing the output. With the exception of radiators fitted with full-length covers, there should be adequate space underneath to allow cleaning machinery to be used. Where a radiator is located on an external wall, back insulation should be provided to reduce the rate of heat transmission through the building fabric. Special care is needed when radiators are installed in rooms where unsealed or liquid radioactive sources are used. Protection of such fittings against radioactive contamination will be essential.

4.24 Radiators in toilet or bedroom areas used by people with physical and/or sensory disabilities should not be sited next to the toilet or bed and should be free of sharp edges. They should also have safety guards or be cool to the touch to prevent burns.

4.25 All radiators should be fitted with thermostatic radiator valves. These should be of robust construction and selected to match the temperature and pressure characteristics of the heating system. The thermostatic head, incorporating a tamper-proof facility for presetting the maximum room temperature, should be controlled via a sensor located integrally or remotely as appropriate. To provide frost protection at its minimum setting, the valve should not remain closed below a fixed temperature.

4.26 Radiators may also be used to offset building fabric heat loss in mechanically ventilated spaces.

4.27 Heating should be controlled by the building management system to "set back" temperatures to 10°C during "out-of-use" hours. A manual override should restore all plant promptly to full operational status.

4.28 Flow temperatures to heating appliances should be controlled by the BMS, where fitted, in accordance with space requirements and external temperatures. The system should be zoned to suit the building.

Ventilation (general)

4.29 Wherever possible, individual spaces should be naturally ventilated. Deep planned spaces may need mechanical ventilation. Planning should, therefore, seek to minimise the need for mechanical ventilation by ensuring that, wherever practicable, core areas are reserved for:

- rooms that require mechanical ventilation for clinical or functional reasons, irrespective of whether their location is internal or peripheral, for example, sanitary facilities, dirty utility and beverage preparation areas;
- spaces which have only transient occupation and, therefore, require little or no mechanical ventilation, for example, circulation and some storage areas. In all instances the ventilation design must comply, as a minimum, with the standards set out in the current edition of the Building Standards (Scotland) Regulations.

4.30 Air movement induced by mechanical ventilation should be from clean to dirty areas, where these can be defined. The design should allow for adequate flow of air into any space having only mechanical extract ventilation, via transfer grilles in doors or walls. Such arrangements, however, should avoid the introduction of untempered air and should not prejudice the requirements of fire safety or privacy.

4.31 Fresh air should be introduced via a low-velocity system and should be tempered and filtered before being distributed via the appropriate outlet type for the particular application. Diffusers and grilles should be located to achieve uniform air distribution within the space, without causing discomfort to patients and staff.

4.32 The supply plant for ancillary accommodation should be separate from operating theatre plant.

4.33 A separate extract system will be required for “dirty” areas, for example sanitary facilities. It should operate continuously throughout working hours of the facility. A dual motor fan unit with an automatic changeover facility should be provided.

4.34 External discharge arrangements for extract systems should be protected against back pressure from adverse wind effects and should be located to avoid reintroduction of exhausted air into the project building or adjacent buildings through air intakes and windows.

4.35 Further detailed guidance is contained in SHTM 2025 – ‘Ventilation in healthcare premises: Design considerations’.

Ventilation (substances hazardous to health)

4.36 Local exhaust ventilation will be required where exposure by inhalation of substances hazardous to health cannot be controlled by other means. The Health and Safety Executive publication EH40, 'Occupational Exposure Limits', updated annually, sets limits which form part of the Control of Substances Hazardous to Health Regulations 1994 (COSHH).

Hot and cold water services

4.37 Guidance on the design and installation of hot and cold water supply and distribution systems is contained in SHTM 2027 – 'Hot and cold water supply, storage and mains services'.

4.38 All cold-water pipework, valves and fittings should be insulated and vapour sealed to protect against frost, surface condensation and heat gain.

4.39 The domestic hot water supply should be taken from the general hospital calorifier installation or from a stand-alone calorifier at a minimum outflow temperature of 60°C ± 2.5°C, and distributed to all outlets so that the return temperature at the calorifier is not less than 55°C. Outlet temperatures and fittings for sanitary equipment are shown in the Activity Data Base sheets. (See also Scottish Health Guidance Note - "Safe" hot water and surface temperatures.) Generally, the outlet temperature for domestic hot water should nor exceed 43ºC unless a higher temperature is required for functional reasons. The water temperature at all outlets accessible to patients should not exceed 43°C, or lower in certain circumstances. Thermostatic mixing valves should be of a type that has limited variation in temperature control with water pressure variation and which automatically closes the hot water supply if the cold water supply fails. The provision of one thermostatic mixing valve to serve a group of baths or showers is not acceptable. Guidance on thermostatic mixing valves is available in Scottish Health Guidance Note - '"Safe" hot water and surface temperatures'.

4.40 The requirements for the control of legionellae bacteria in hot and cold water systems are set out in SHTM 2040 – 'The control of legionellae in healthcare premises – a code of practice'.

Piped medical gases and vacuum

4.41 Guidance on piped medical gas systems, anaesthetic gas scavenging and gas storage is contained in SHTM 2022 – 'Medical gas pipeline systems'.

Electrical services

General scope

4.42 The electrical installation includes:

- the main intake switchgear;
- lighting;
- power (including supplies to ventilation plant);
- system earthing and equipotential bonding of extraneous metal work;
- telephone wiring;
- wireways for data links;
- clocks;
- fire alarms;
- staff location;
- staff call;
- security systems.

The installation shall conform in all respects with BS 7671 – Requirements for electrical installations (current edition), IEE Wiring Regulation 16th Edition (and subsequent amendment), SHTM 2007 'Electrical Services – supply and distribution' and SHTM 2020 – 'Electrical safety code for low voltage systems'. Emergency electrical supplies shall be provided in accordance with SHTM 2011 – 'Emergency electrical services'. Zonal earth circuit provision should be considered in consultation with equipment manufacturers.

4.43 Reference should be made to the Activity Data Base sheets for the recommended levels of internal illumination, disposition of outlets for power, telephones, call systems and clocks, etc in individual spaces.

4.44 The point of entry for the electrical supply will be a departmental switchroom housing the main isolators, the main distribution equipment and metering. The switchroom will also be the distribution centre of subsidiary electrical services. Wherever possible, all equipment should be mounted at a height to give easy access from a standing position. The switchroom should be positioned as close to the load centre as possible, to minimise the cost of cabling required to serve the accommodation. All distribution boards and main switches should be contained in secure cupboards, preferably in areas where there is normally a continuous staff presence.

Electrical installation

4.45 The electrical installation in occupied areas should be concealed in screwed steel conduit and steel trunking using appropriately insulated copper conductors – see SHTM 2007. In certain circumstances however metal sheathed or steel wired armoured (SWA) cables may be used. External installations should use screwed galvanised steel conduit with waterproof fittings. Plant areas should use screwed galvanised steel conduits and galvanised steel trunking. Steel conduits and trunking wireways for communications and data systems should also be concealed wherever possible.

Electrical interference

4.46 Care should be taken to avoid mains-borne interference, radio frequency and telephone interference affecting physiological monitoring equipment, computers and other electronic equipment used here or elsewhere on the site.

4.47 Electrical products, systems and installations should not cause, or be unduly affected by, electromagnetic interference. This requirement is in the form of an EC Directive on Electromagnetic Compatibility (89/336/EEC as amended by 91/263/EEC and 92/31/EEC). This Directive has been implemented in UK law by the Electromagnetic Compatibility Regulations 1992 (SI No 2372).

4.48 Guidance on the avoidance and abatement of electrical interference is contained in SHTM 2014 – 'Abatement of electrical interference'.

4.49 Fluorescent luminaires should comply with BS EN 55015: 1996.

4.50 The Independent Expert group on mobile phones chaired by Sir William Stewart, produced a report published in April 2000 advising that mobile phones should be switched off within hospital premises and signage should be prominently displayed.

Lighting

4.51 Internal occupied spaces should, where possible, utilise daylight to enhance the environment. Colour finishes and lighting throughout departments should be co-ordinated to create a calm and welcoming atmosphere. Practical methods are contained in the CIBSE Lighting Guide LG2 – 'Hospitals and Health Care Buildings'.

4.52 Architects and engineers (also artists and landscape designers if appropriate) should collaborate to ensure that decorative finishes are compatible with the colour-rendering properties of the lamp, and that the spectral distribution of the light sources is not adversely affected.

4.53 General lighting should be manufactured and tested in accordance with the requirements specified in the relevant sections of BS EN 60598. Their location should afford ready access for lamp changing and maintenance, but with the overriding requirement that the recommended standard of illuminance is provided to the task area.

4.54 The number and location of lights connected to a circuit, and the number of switches and circuits provided, should allow flexibility in the general and local level of illumination, particularly in areas away from windows, where daylight can vary significantly. Some areas of a department, which may be unoccupied for long periods, may also be suited to automatic/presence switching.

4.55 Generally, energy-efficient lights should be used wherever possible. Intermittently and infrequently used lights may be fitted with compact fluorescent or incandescent lamps.

4.56 Mobile examination lamps, where provided, should comply with BS EN 60598-2-25. They should also operate at extra low voltage (normally fed from an in-built step-down transformer), be totally enclosed and be equipped with a heat filter. The temperature of external surfaces should be such as to avoid injury to patients and staff.

4.57 Where visual display units (VDUs) are to be used, the lighting should be designed to avoid bright reflections on the screen and to ensure that the contents of the screen are legible and meet the Health and Safety (Display Screen Equipment) Regulations 1992, which came into force on 1 January 1993. The Regulations implement a European Directive, No 90/270/EEC of 29 May 1990, on minimum safety and health requirements for work and display screen equipment. Further guidance is contained in the CIBSE Lighting Guide LG3.

4.58 The lighting of corridors, stairways and other circulation areas, which generally are areas not covered by Activity Data A-Sheets, should be in accordance with the guidance contained in HBN 40 - ‘Common activity spaces, Volume 4 – Circulation areas’ and HBN/SHPN 40 Volume 5: Scottish Appendix.

4.59 Emergency escape and standby lighting should be provided on primary escape routes and identified rooms in accordance with SHTM 2011 – ‘Emergency electrical services’ and BS 5266.

Task lighting for activity spaces

4.60 Task lighting should be provided in activity rooms to provide adequate, shadow free illumination of working surfaces such as desks, workshop work benches and domestic room worktops.

Controlled drugs cupboard

4.61 A red indicating lamp should be provided on each controlled drugs cupboard and, where appropriate, outside the doorway to the room in which the cupboard is located and at a continuously staffed location. The lamps should be interlocked with the cupboard and alarm system to give visual and audible indication at the continuously staffed location of unauthorised entry to the cupboard.

4.62 An indicating lamp denoting that the circuit is energised should also be fitted to each cupboard. The supply circuits for the lamps and alarm system should be derived from essential circuits. The cupboards should comply with BS 2881. Further information is contained in HTM 63 – 'Fitted storage systems'. More general information is contained in HC(77)16 and 'Guidelines for the safe and secure handling of medicines, a report'.

Socket-outlets and power connections

4.63 Sufficient 13 amp switched and shuttered socket-outlets, connected to ring or spur circuits, should be provided to supply all portable appliances likely to be used simultaneously.

4.64 Switched socket-outlets should be provided in corridors and in individual rooms (where considered necessary) to enable domestic cleaning appliances with flexible leads (9 m long) to operate over the whole department.

4.65 Appliances requiring a three-phase supply, or those rated in excess of 13 amp single phase, should be permanently connected to separate fused sub-circuits. The sub-circuits should be fed from the distribution board and terminate at a local isolator. Fixed appliances, less than 13 amp rating, should be permanently connected to a double-pole switched 13 amp connector unit. The connector unit should contain an indicating light, where appropriate, and a suitable fuse.

4.66 Depending on local circumstances, consideration may need to be given to the quality of the electrical supply to computer and other equipment. Much equipment has over-voltage and surge protection built-in, but susceptibility to harmonics and other supply distortion should be discussed with the manufacturer to establish the parameters required.

4.67 Additional power-factor correction should be built in as required. Advice should be sought from manufacturers/suppliers at an early opportunity.

4.68 Disconnection switches should be provided adjacent to all engineering plant and equipment for use by maintenance staff.

4.69 The electrical supply connections to electro-medical equipment should comply with BS EN 60 601-1-2:1993.

4.70 Socket-outlets should be connected to essential circuits in accordance with the guidance contained in SHTM 2011 – 'Emergency electrical services'.

4.71 The electrical supply connections and socket outlets to all medical electrical equipment should comply with BS EN 60 601-1-2: 1993 and current edition of BS 7671 – Guidance Note 7 Medical Locations and Associated Areas. These are identified by use of red toggle switches or switchplates.

4.72 An analysis should take place for at least 24 hours, during normal working hours to investigate surges, spikes, sags and electrical variation in the earth. The data collected should be reviewed with the original equipment manufacturer to ensure that it meets their specification in terms of tolerance values.

Emergency electrical supplies

4.73 Guidance on emergency electrical supplies is contained in SHTM 2011 – 'Emergency electrical services', and BS7671 – Guidance Note 7 – 'Medical Locations and Associated Areas'. The grade of standby lighting provision is shown on the Activity Data Sheets. Safety lighting in accordance with SHTM 2011 and BS5266 should be provided on primary escape routes.

4.74 Requirements for connection of individual circuits and items of equipment to UPS and/or standby generation systems should be discussed with user and with equipment supplier. Items for consideration include potential discomfort and any medical implication for the patient, and the memory capabilities and reversion characteristics of the equipment.

4.75 The use of uninterruptible power supply units should also be considered for some units to protect against surges, spikes etc. Their use is advised where there may be a significant risk to the patient in the event of power failure or there is either a significant single point of failure, for example in a computer network, and the transient disruption of power services may have a considerable impact of the viability of the provision of a service.

Personal alarm transmitters

4.76 Local security policies should determine at the planning stage whether or not staff are to be issued with personal alarm transmitters. If personal alarm transmitters are not "self-contained", conduits and accommodation for transmitting/receiving equipment and propagating devices, such as induction loops and/or aerials, will be required to suit the selected system.

Security alarm

4.77 A security alarm actuating switch or button may be required located unobtrusively at the reception desk and staff base. It should be connected to a continuously staffed area such as the hospital telephone switchboard on the porters' room. Guidance should be sought from the project team and end-users.

Main entrance security systems

4.78 The main entrance and department entrances may need to be controlled by a door security and/or closed-circuit television surveillance system which provides for verbal communication with, and an electro-magnetically operated door lock to be controlled from, the reception desk. An intruder alarm system may be required for after working hours for part or all of a department, depending on location.

4.79 Further guidance is contained in Scottish Office PAN 46 'Planning for crime prevention', and the NAHAT Security Manual.

Patient/staff and staff/staff call systems

4.80 The patient/staff and staff/staff call systems may be hard-wired or radio systems. Further guidance is contained in SHTM 2015 – 'Bedhead services'. In all cases they must be electromagnetically compatible, taking account of electromagnetic interference likely to be generated.

4.81 Patient/staff call points should be provided in all spaces where patients may be left alone temporarily, such as consultation/examination/treatment rooms and patient WCs, showers etc. Each call unit should comprise a push button or pull cord as appropriate, reassurance lamp and reset unit. The audible alarm signal initiated by patients should operate for one second at ten-second intervals, with corresponding lamps lit continuously until cancelled.

4.82 Staff/staff call points should be provided in all spaces where staff consult, examine and treat patients. Call units should generally comprise a switch (pull to call, push to reset) and reassurance lamp. The audible alarm signal initiated

by the staff should operate intermittently at half-second intervals, with corresponding lamps flashing on and off at the same rate.

4.83 A visual and audible indication of the operation of each system should be provided at the staff base to give responding staff unambiguous identification of the call source, with a repeater unit in the staff room. Further guidance is contained in SHTM 2015 – 'Bedhead services'.

Telephones

4.84 Where available, the central telephone facilities for internal and external calls should be extended to serve all departments. Telephones will normally be of the desk pattern. Wall mounted hands-free telephones should be provided in dirty areas.

4.85 Self-contained intercommunication systems are relatively inflexible and limited in the extent of their economic application. Any subsequent modification to them usually involves disproportionate cost. In only very rare instances can such systems be justified for functional or clinical reason.

4.86 A properly planned telephone system will provide prompt intercommunication facilities between all extensions. Abbreviated dialling can be used for a range of frequently called extension numbers. Consequently, reasons for providing a separate intercommunication system should be clearly shown.

4.87 Coin and/or card-operated payphones, depending on local policy, should be provided in the main waiting area.

4.88 Further guidance on telephone systems is contained in HBN 48 – 'Telephone services' (joint NHS Estates and NHSScotland Property and Environment Forum document) and HTM 2055 – 'Telecommunications (Telephone exchanges)'.

Data links

4.89 Conduits will be required for cables to interconnect electronic equipment. The extent to which these conduits should link all workstations in a department and the main hospital system or elsewhere will depend on the local policy for automatic data processing. If a structured cable system is to be installed within the hospital, departments should be provided with all outlets wired and connected. Conduits may also be required to link closed-circuit television between seminar rooms and treatment areas.

CCTV

4.90 CCTV systems may be installed into waiting areas and connected to monitors in staff circulation areas such as staff rest rooms in order that staff are able to oversee people entering the department.

4.91 Security closed-circuit television provided within departments may be required to interface to the whole hospital system.

4.92 The interference to which CCTV may be subject should be taken account of, to ensure acceptable electromagnetic compatibility. Care should be taken in the positioning of monitors in order to preserve patient privacy.

Clocks

4.93 Clocks may be operated in conjunction with a master clock system. If such a system is not available, synchronous clocks may be installed using a common-clock circuit. The circuit should be suitable for future connection to a master system. Clocks should be installed only where they can be viewed by a number of staff, patients and visitors.

4.94 Alternatively, clocks may be battery/quartz type. The majority will be of a domestic nature.

Music and television

4.95 Conduits for television/video and background music system outlets should be provided in the main waiting area, and other areas as required.

Lightning protection

4.96 Protection of the building against lightning should be provided in accordance with SHTM 2007 and BS 6651:1992, with secondary effect protection of electrical and electronic installations as necessary.

Internal drainage

General scope

4.97 The primary objective is to provide an internal drainage system which:

- uses the minimum of pipework;
- remains water and air-tight at joints and connectors;

- is sufficiently ventilated to retain the integrity of water seals; and
- indicates waste pipes which may contain radioactive waste or effluent.

Design parameters

4.98 The design should comply with the relevant British Standards and Codes of Practice, including BS EN 12056 and the current Building Regulations. Recommendations for spatial and access requirements for public health engineering services are contained in CIBSE guide G and SHTM 2023.

4.99 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 considerations, usually limit the minimum gradient to about 1:50 (20 mm/m). For larger pipes, for example 100mm diameter, the gradient may be less, but this will require workmanship of a high standard if an adequate self-cleaning flow is to be maintained. It is unlikely that pipes larger than 100mm diameter will be required within interfloor or ground floor systems serving a department.

4.100 Provision for inspection, rodding and maintenance should ensure “full bore” access and be located to minimise disruption or possible contamination. Manholes should not be located within a department.

Materials specification

4.101 The materials specified for the drainage system in a department will depend upon their location and the nature of the effluent being discharged. Waste pipework should as far as practicable be concealed. Although adequate for drainage requirements, UPVC may not always be acceptable to the fire officer and should not be installed above 'sensitive' areas, e.g. operating theatres, intensive therapy, radio-diagnostic, catering departments, electrical switch-rooms.

4.102 Maintenance problems may arise as a result of misuse of the system, for example, disposal of paper towels down WCs. Appropriate disposal facilities, therefore, should be provided. Warm-air hand dryers can reduce the problem.

Pneumatic tube transport

4.103 Pneumatic tube transport may provide a viable alternative to porters for moving specimens to the pathology department. Factors to be assessed will include:

- distance, time and cost of travel between the two locations;
- time to process specimens in the laboratory;

- proportion of specimens which require urgent results;
- whether general post, etc, will be transported in the system.

4.104 The total capital and revenue cost of each option should be determined in accordance with the principles set out in the Scottish Capital Investment Manual. Further guidance on pneumatic conveyor systems will be contained in guidance SHTM 2009 – 'Pneumatic air tube transport systems'.

5. Building cost and revenue expenditure

Introduction

5.1 For all types of health buildings it is clearly of vital importance that building costs and revenue expenditure should be kept as low as possible consistent with acceptable standards. Within this general context Scottish Health Planning Notes provide a synopsis of accommodation for health buildings which NHSScotland recommends for the provision of a given service.

Scottish Capital Investment Manual

5.2 The Scottish Capital Investment Manual, published by the National Health Service Scotland Management Executive, provides detailed guidance for each of the main stages of capital schemes including those that may ultimately be delivered using private finance. It gives practical guidance on the technical considerations of the full capital appraisal process and also provides a framework for establishing management arrangements to ensure that the benefits of every capital investment are identified, evaluated and realised. Projects will not get Scottish Executive approval unless adequate project management arrangements can be demonstrated to be in place.

5.3 The Management of Construction Projects section of the Manual provides guidance on mandatory procedures and best practice for the planning and implementation of construction projects. It covers the stages of a project from the full business case through to technical commissioning and handover. The procedures are divided into six stages:

- full Business Case, leading to approval;
- design;
- tender and contract;
- construction and equipment supply;
- technical commissioning and handover;
- post-completion.

Cost guidance

5.4 The NHSScotland Property and Environment Forum Executive no longer publish their Healthcare Construction Project Price Guide. Cost guidance should be obtained by reference to BCIS costing guides and, when appropriate, by the appointment of a cost consultant.

Equipment

5.5 The cost of Group 1 items should be included in the general building costs. Specific guidance on Group 2 and 3 equipment is available from the Common Services Agency's Scottish Healthcare Supplies.

Equipment is categorised into four groups:

Group 1:

Items (including engineering terminal outlets) supplied and fixed within the terms of the building contract;

Group 2:

Items which have space and/or building construction and/or engineering service requirements and are fixed within the terms of the building contract but supplied under arrangements separate from the building contract;

Group 3:

As Group 2 but supplied and fixed (or placed in position) under arrangements separate from the building contract;

Group 4:

Items supplied under arrangements separate from the building contract, possibly with storage implications but otherwise having no effect on space or engineering service requirements.

Essential complementary accommodation (ECA)

5.6 ECA comprises activity spaces which are essential to the running of a department, but which in certain circumstances may be available in a convenient location elsewhere in the hospital.

Optional accommodation and services (OAS)

5.7 Where appropriate, Notes draw attention to other ways of providing services or facilities. This information will allow project teams to select solutions which are most suitable to their needs. The Optional Accommodation and Services are listed in the respective SHPNs.

Dimensions and areas

5.8 At the early stages of a project, designers should use the brief to make an approximate assessment of the total area of accommodation involved. Schedules of areas are given in individual SHPNs. It is emphasised that these areas are for guidance in assessing options and planning schemes only.

5.9 In determining spatial requirements, the essential factors are the critical dimensions, i.e. the minimum linear dimensions within which activities may be performed with reasonable efficiency. The area required for an activity space is the product of the critical dimensions. Reference should also be made to the ergonomic diagrams in 'Common Activity Spaces' HBN 40 Volumes 1-4 and HBN/SHPN 40 Volume 5: Scottish Appendix.

5.10 It is emphasised that the areas published do not represent recommended room sizes, nor are they to be regarded in any way as specific individual entitlements.

5.11 Efficient planning of the building may also necessitate variation of areas, for instance, in the refurbishment or conversion of older property:

- rooms tend to be larger than the recommended area;
- 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 space

5.12 The circulation space comprises space for all corridors, a heating and ventilation zone adjacent to external walls, small vertical ducts and spaces occupied by partitions, walls and planning flexibility.

Communications space

5.13 Staircases, lifts and plant rooms, with the exception of electrical switch cupboards, are designated "communications space".

Engineering space

5.14 "Engineering space" is the space taken by mechanical and electrical service routes and for small vertical ducts. The space is included in the Schedules of Accommodation as part of the circulation provision.

6. Activity data and critical dimensions

Activity data

6.1 The Activity Data Base is a computerised information system developed by NHS Estates to help project and design teams by defining the users' needs more precisely.

6.2 The Activity Data Base is not designed for Scottish application and therefore, if used by an NHSScotland Trust, should be adapted with caution.

6.3 In particular, a number of Activity Spaces in common use in Scottish Hospitals may not be included in the Activity Data Base and the individual room activities, technical data and components may well be different in a Scottish context. Where this is the case Trust project teams can draw up sheets to their own requirements.

6.4 Further information about the use and preparation of activity data can be obtained from The Learning Centre, NHS Estates, Winsor House, Cornwell Road, Harrogate, HG1 2PW, Telephone [redacted].

6.5 It is unlikely that the NHSScotland Property and Environment Forum Executive will be publishing a Scottish version of the Activity Data Base.

Critical dimensions

6.6 Critical dimensions are those dimensions which are critical to the efficient functioning of an activity. The size of components, their position and the space around them may all be critical to the task being performed. Guidance on these dimensions for a particular activity is provided in the form of ergonomic drawings**.** These illustrate components, that is equipment, furniture and fittings, and provide ergonomic data on the space required for users to move, operate or otherwise use the component. Information about the component, for example fixing heights, and the users, for example reach, is also provided.

Ergonomic data

6.7 Ergonomic data common to the design of a number of departments is contained in NHS Estates publication 'Common Activity Spaces' HBN 40 Volumes 1-4 and HBN/SHPN 40 Volume 5: Scottish Appendix, to which reference should also be made.

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4.73 **SHTM 2011 - Emergency electrical services**. NHSScotland Property and Environment Forum Executive 1999.

4.79 **Planning for crime prevention (Planning Advice Note 46)**. Scottish Office Environment Department, TSO 1994.

NHS Security Manual (issued with Management Executive Letter MEL(1992)35). National Association of Health Authorities and Trusts (NAHAT) 1992.

4.80 **SHTM 2015 - Bedhead services**. NHSScotland Property and Environment Forum Executive 1999.

4.83 **SHTM 2015 - Bedhead services**. NHSScotland Property and Environment Forum Executive 1999.

4.88 **SHPN 48 - Telephone services**. The Scottish Office NHS in Scotland Management Executive, TSO 1997.

HTM 2055 – Telecommunications (Telephone exchanges). NHS Estates, TSO 1994.

4.96 **SHTM 2007 - Electrical services supply and distribution**. NHSScotland Property and Environment Forum Executive 1999.

BS 6651:1992 Code of practice for protection of structures against lightning. BSI 1992.

4.98 **BS EN 12056: Gravity drainage systems inside buildings**. BSI 2000.

BS 6367:1983 Code of practice for drainage of roofs and paved areas. BSI 1983.

BS 8301:1985 Code of practice for building drainage. BSI 1985.

CIBSE guide G.

SHTM 2023 – Access and accommodation for engineering services. NHSScotland Property and Environment Forum Executive 1999.

5.2 **Scottish Capital Investment Manual**. The Scottish Office NHS in Scotland Management Executive, TSO.

5.4 **Healthcare Construction Project Price Guide**. NHSScotland Property and Environment Forum Executive (no longer published).

5.9 **HBN 40 - Common Activity Spaces, Volumes 1-4**. NHS Estates, TSO 1995.

SHPN 40 - Common Activity Spaces, Volume 5: Scottish Appendix. NHS Estates, TSO 1996.

6.7 **HBN 40 - Common Activity Spaces, Volumes 1-4.** NHS Estates, TSO 1995.

SHPN 40 - Common Activity Spaces, Volume 5: Scottish Appendix. NHS Estates, TSO 1996.

Publications in Scottish Health Planning Note series

Given below is a list of all Scottish Health Planning Notes. This list is correct at time of publication of this Note. Refer also to the Health Building Notes and Scottish Health Planning Note Reference Guide published by NHSScotland Property and Environment Forum Executive.

03 **General design guidance**. NHSScotland Property and Environment Forum Executive 2001.

04 **In-patient accommodation: Options for choice**. NHSScotland Property and Environment Forum Executive 2000.

08 **Facilities for Rehabilitation Services**. NHSScotland Property and Environment Forum Executive 2001.

27 **Intensive Care Unit**. NHSScotland Property and Environment Forum Executive 2000.

35 **Accommodation for people with mental illness Part 1 – The acute unit**. NHSScotland Property and Environment Forum Executive 2000.

35 **Accommodation for people with mental illness Part 2 – Treatment and care in the community**. NHSScotland Property and Environment Forum Executive 2000

52 **Accommodation for day care Part 1 – Day surgery unit**. NHSScotland Property and Environment Forum Executive 2001.

52 **Accommodation for day care Part 2 – Endoscopy unit**. NHSScotland Property and Environment Forum Executive 2001.

52 **Accommodation for day care Part 3 – Medical investigation and treatment unit.** NHSScotland Property and Environment Forum Executive 2001.

Publications in Scottish Hospital Planning Note series

Given below is a list of all Scottish Hospital Planning Notes. Those Notes which have to be read along with their counterpart Health Building Note (HBN) are marked with an *. This list is correct at time of publication of this Note, but refer also to the Health Building Notes and the Scottish Health Planning Note Reference Guide published by NHSScotland Property and Environment Forum Executive.

1 **Health Service building in Scotland**. TSO 1991.

2 **Hospital briefing and operational policy**. TSO 1993.

6 **Radiology department**. TSO 1995.

12 **Out-patients department (with DBS)**. TSO 1993.

12 **Out-patients department Supplement A - Activity space data sheets**. TSO 1993.

12 **Out-patients department Supplement 1 - Genito-urinary medicine clinics**. TSO 1993.

12 **Out-patients department Supplement 2 – Oral surgery, orthodontics, restorative dentistry**. TSO 1996.

13 **Sterile services department**. TSO 1994.

15 **Accommodation for pathology services**. TSO 1994.

20 **Mortuary and post-mortem rooms**. TSO 1993.

20 **Mortuary and post-mortem rooms Supplement 1 - Activity space data sheets**. TSO 1994.

21 **Maternity department**. TSO 1996.

22 **Accident and emergency department in an acute general hospital**. TSO 1995.

22 **Accident and emergency department in an acute general hospital Supplement 1 – Trauma care and minor injury**. TSO 1996.

26 **Operating department***. TSO 1992.

26 **Operating department Supplement 1 - Activity space data sheets**. TSO 1993.

34 **Estate maintenance and works operations***. TSO 1992.

34 **Estate maintenance and works operations Supplement I - Activity space data sheets**. TSO 1993.

40 **Common activity spaces Volume 5 – Scottish appendix***. TSO 1996.

45 **External works for health buildings***. TSO 1994.

47 **Health records department**. TSO 1995.

51 **Accommodation at the main entrance of a District General Hospital** TSO 1992.

51 **Accommodation at the main entrance of a District General Hospital Supplement A - Activity space data sheets**. TSO 1993.

51 **Accommodation at the main entrance of a District General Hospital Supplement 1 - Miscellaneous spaces in a District General Hospital**.TSO1992.

51 **Accommodation at the main entrance of a District General Hospital Supplement 1A - Miscellaneous spaces in a District General Hospital Activity space data sheets**. TSO 1993.

NHSS Assure: Response to Additional Questions re 'Design/NHS Assure' from Scottish Hospitals Inquiry

What guidance is in place for prospective tenderers surrounding the use of the ADB system or its equivalents and how health boards can demonstrate, where equivalents are used, that it is of equivalent value?

CEL 19 (2010) states that NHSScotland Bodies *"must use and properly utilise"* ADB *as a "tool for briefing, design and commissioning."* It goes on to state that "*If deemed inappropriate for a particular project and an alternative tool or approach is used, the responsibility is placed upon the NHSScotland Body to demonstrate that the alternative is of equal quality and value in its application."* NHSScotland Assure, and formerly Health Facilities Scotland, do not provide any formal guidance on how an NHSScotland Body should demonstrate that equivalence.

If, however, NSS were asked to support an NHSScotland Body with regards to an *"alternative tool or approach,"* we would state that it should provide the same range/level of detail as a starting point to brief for the project. This would be with reference to the requirements in CEL 19 (2010). For example, the data should be *"consistent and compliant with Scottish-specific guidance."* It would need to be developed throughout the design based on the design team response to the *"project-specific briefs and designs."* And then it should be used as a checking point during the commissioning stage to ensure that the design complies with the brief.

To be of equal quality and value it would need to encompass, as a minimum, the same types of information (i.e. the same data sets) as ADB. An example of ADB sheets can be found within our most recent repeatable rooms document (**A47107425 – NHS NSS Repeatable Rooms Report-Draft -Dec 2020 – Bundle 13, Volume 10 Page 159**). As a short summary, this data would include;

A. Room name, departmental location and room activities including occupancy;
B. Space data including minimum floor area and height;
C. Design notes and room notes highlighting key considerations and assumptions;
D. Detailed technical compliance data relating to temperature and ventilation, lighting, noise and fire safety as well as patient risk category;
E. Minimum specification data for the relevant components of the Healthcare Built Environment. Wall, floor, ceiling finishes and the like as well as internal and external fenestration (doors, windows and glazing);
F. A list of components and equipment, including supplier grouping, necessary for completion of the activities and use of the room; and
G. A drawing indicating a potential room layout

To provide that 'alternative' a Body would need to have a database available from which they can draw upon or produce these as part of their briefing process. NSS is not aware of any such database available either nationally or at a Board specific level.

What plans are in place surrounding CEL 19 (2010) and whether CEL 19 (2010) is going to be reconsidered or refreshed to avoid similar issues such as occurred on the RHCYP/DCN project in the future?

CELs, and now DLs, belong to Scottish Government rather than NHSScotland Assure so replacement or refreshing would need to be discussed with them directly.

Our understanding is that the requirements of the CEL and the use of an ADB equivalent for briefing, design, and commissioning was not followed. Without knowing the root cause of the issues, it is hard to speculate over the effectiveness of any particular policy in mitigating them. From our involvement with the Inquiry we understand that there are several contributing factors emerging, including a possible transposition error. To the extent that transposition error is the cause then neither a policy, the ADB system, nor any other database system would fully mitigate that risk – designers, clients and commissioning bodies have a responsibility to mitigate such issues through process, internal quality assurance and good governance.

NSS also notes that CEL 19 (2010), as well as containing the provisions regarding the ADB, also contains other requirements. For example, the NHSScotland Design Assessment Process ("NDAP") process, the three stage design reviews (also mandated via HDL 58 (2006), and the defined list of project specific technical standards. Where these requirements are met, they further mitigate risk.

What is NHS Assure's position and practice in relation to RDSs produced using ADB? What work is being done to create standard rooms for Scotland? I appreciate the latter aspect may be more for NSS rather than an NHS Assure.

Our position is in line with policy, recognising the mandated use of ADB as a fundamental starting point for producing accurate briefing and design information. We encourage boards to undertake rigorous due diligence to ensure briefing and design data aligns with their project-specific requirements, room activities and the subsequently identified relevant "Scottish-specific guidance". Where relevant this information may be reviewed through the NDAP, KSAR, HAI-SCRIBE, or one or more of NSS's other support processes – e.g., NSS's equipping service.

References to the ADB process are included within NHSScotland technical guidance to help support and highlight the link between the two. An example of this would be General Design guidance SHPN 03 v1 Jan 2002 (ARCHIVED Oct 2014) (nhs.scot) **(A33662157–396 SHPN 03 v1 Jan 2002– Bundle 13, Volume 10, Page 230)** which would have been a core piece of guidance during the project development.

NHSScotland Assure continues to develop Scotland-specific standard rooms through the Repeatable Rooms project. This is in conjunction with the Building Design and Construction national advisory group including representatives for NHS Scotland Bodies across the country. It creates a standard room based on agreed activities. This started in 2019 with a working group being established to produce the first set of rooms with a focus on the most frequently repeated room types. In December 2020, this delivered three room types from primary healthcare, including variants such as Mental Health specific bedrooms and en-suites, as well as differing configurations to aid designers plan a new facility. The work has continued and it is hoped that a further seven rooms, again including variants, will be issued at the start of next year. It is however worth highlighting that NHSScotland bodies are free to determine what activities will take place within a room and as such any deviation from the activities listed within the Repeatable Rooms would require the Board to reconsider the entire data set held within the ADB sheets.

What role (if any) does NHS Assure have at the procurement stage in terms of assessing design and briefings for a project? What is the nature of NHS Assure's role at the design and briefings stage? Can I explore what NHS Assure would expect to see for any project that was not using RDSs produced using ADB as the briefing tool?

CEL 19 (2010) and the Scottish Capital Investment Manual give NHSScotland Assure a role in assessing briefing and design. The NDAP has, since its inception, sought to understand and obtain a copy of the briefing information developed by NHSScotland bodies. As part of the NDAP, the Brief will be reviewed to understand the requirements and ambitions of the service to be delivered. NHSScotland Assure will then make appropriate recommendations on how the project should develop. These recommendations follow an assessment which focusses on design quality, sustainability, equality, and compliance with appropriate guidance. NHSScotland Assure and HFS, however, do not author or have responsibility for the content of the brief. This always remains the responsibility of the client body.

Boards, and ultimately the Scottish Government, determine which procurement route to follow and therefore when to procure advisors/contractors. Typically, this will depend upon the capacity of their own internal resources and capital and revenue funding streams. NSS cannot, therefore, definitively state how its role aligns with procurement.

NHSScotland Assure will also provide Boards with support during procurement, design and briefing stages through a number of services. For example, the equipping service, KSAR, Frameworks Scotland 3 etc. NHSScotland Assure subject matter experts can also provide support to boards upon request throughout the entire lifecycle of a project including the briefing and design stage.

As noted within our response above, we would expect RDS to be produced through the use of ADB and, at a minimum, we would expect to see the same types of information (i.e., the same data sets) which are detailed and room specific. A room datasheet including all the associated information typically included within the ADB datasheet is always required for a project, although project teams may choose to develop this across one or more documents (e.g., room layout, environmental matrix, finishes schedule and so on).

NHSS Assure
21.12.2023

Ventilation & Engineering Technical Guidance – NHSScotland Assure Response to Scottish Hospitals Inquiry – 12 February 2024

1. The following paper has been produced by NHSScotland Assure (NHSSA) at the request of The Scottish Hospitals Inquiry, in relation to the following topics:

    - NHSSA's knowledge of on-going research into air- changes
    - The process for developing engineering technical guidance prior to the establishment of NHSSA, including whether any change has been effected since the establishment of NHSSA
    - Current NHSSA work on ventilation guidance
    - NHSSA's view on the practicability and utility of reviewing guidance, particularly on ventilation, including a view on the effectiveness of the processes and procedures which are in place

NHSScotland Assure's knowledge of on-going research into air-changes

2. When a health board and their project team develop a ventilation strategy for a space within the healthcare-built environment, the ventilation rate, typically defined within SHTM 03-01 in air changes per hour (ACH), should be considered as part of the overall facility design and ventilation strategy. In addition, consideration should be given to the effects of how air is distributed within the space (grille and diffuser selection / position) and the direction of airflow between rooms (determined by the pressure differential between rooms or spaces), along with other components including, but not limited to, the temperature, temperature differentials, air filtration, controls and minimum fresh air requirements. In this respect, full scale trials looking at air change rates and their link to infection risks in various settings are often challenging and impractical to undertake within a live healthcare environment. Typically, research in this field tends to be based on laboratory mock-ups or computer modelling, using Computational Fluid Dynamics (CFD) software to simulate and analyse air flow scenarios.

3. There has been an increased focus on ventilation research in general, as a result of the COVID-19 pandemic. The ventilation research set within the healthcare-built environment since 2019 has focused on the influence that ventilation has, within a series of control measures, to reduce infection risks from airborne pathogens. This has included work on air change rates and the use of technologies, such as air scrubbers (also known as portable HEPA (high-efficiency particulate absorbing) filter devices), to support existing ventilation systems by reducing the concentration of contaminants in the air. These devices do not introduce fresh air into a space.

4. NHSSA has also been asked to provide more detail on our knowledge of air scrubbing. In this context air scrubbing is in reference to the use of portable HEPA filter devices, which are standalone units which can be deployed locally within a room. These use the concept of air filtration to reduce airborne pathogens in the air. NHSSA, together with the other devolved administrations has been part of a working group, established by NHS England in September 2021, to review research in relation to air scrubbing technology and to develop guidance on the application of these technologies within the healthcare-built environment. This work resulted in a guidance document being published by NHS England in May 2023 (www.england.nhs.uk/long-read/application-of-hepa-filter-devices-for-air-cleaning-in-healthcare-spaces-guidance-and-standards/). This document also references research demonstrating the effectiveness of HEPA filter devices against particles and microorganisms in the air, and on the application of HEPA devices in healthcare settings. There is ongoing work within this group to develop further guidance considering the practicalities of deploying portable air scrubbers within the healthcare environment. NHSSA is currently reviewing how this document can be incorporated into a forthcoming revision of SHTM 03-01 Part A, which is targeted for publication in 2024. In the interim, health boards within Scotland can utilise the document produced by NHS England.

5. The working group noted above, has also been considering the use of ultraviolet technology in the healthcare-built environment, which has resulted in guidance being published by NHS England in May 2023 (www.england.nhs.uk/long-read/application-of-ultraviolet-uvc-devices-for-air-cleaning-in-occupied-healthcare-spaces-guidance-and-standards/). Ultraviolet technology in this context uses short wavelength ultraviolet-C light in the spectrum 200-280nm (known as UVC), often using a lamp using 254nm wavelength. UVC has been shown to inactivate microorganisms, leaving them unable to replicate. The guidance noted above focuses on the use of in-duct units (which use UVC lamps installed within the ductwork of the mechanical ventilation systems) and standalone units, which are installed locally within a room and use a fan to draw air through the unit, exposing the air to the UVC. As with the guidance on portable HEPA filter devices, this guidance is available for health boards to reference and NHSSA is assessing how this document can be incorporated with the future SHTM 03-01 revision.

6. The NHSSA Research Service has secured funding for research within the healthcare-built environment, which includes research on ventilation. This includes a potential project, currently being reviewed (January 2024), which aims to understand, from an engineering perspective, the various complex and interdependent factors which may influence the quality of air, to help develop the evidence base for both ventilation and infection control research undertaken in a live healthcare environment, and to inform future research topics and guidance.

The process for developing engineering technical guidance

The process prior to the launch of NHS Scotland Assure on 1st June 2021

7. The process for developing engineering technical guidance prior to the launch of NHSSA on 1st June 2021, was set out in a witness statement submitted to the Scottish Hospitals Inquiry from Mr Edward McLaughlan, a former Assistant Director for Health Facilities Scotland.

   In that witness statement Mr McLaughlan stated "*Most HFS guidance originates from HTMs, produced for the Department of Health in England. Four nations input is part of the process in the drafting of the HTMs. It is important to have a common approach to the thrust of the guidance across the UK, as patients should expect to be treated in facilities of a consistent standard and the engineering principles do not change depending where in the UK the building is. The contractors in the NHS supply chain also typically operate throughout the UK, so consistency of guidance reduces the risk of errors. In the process of developing SHTMs the drafting is primarily concerned with putting the HTM guidance into a Scottish context, referring to the relevant Scottish organisations, legislation and regulation. Where a need is identified in Scotland, HFS may take the lead in production and guidance produced in this way is then available to feed the production processes in England, Wales and Northern Ireland.*"

   In that same witness statement, he further stated "*In the 1990s and earlier, guidance was produced UK wide, and a cover letter went out from Scottish Office, to deal with how it was to be adopted in Scotland. Northern Ireland and Wales take a similar approach, although each administration has taken variations on adopting or developing guidance at different times. For pragmatic reasons, we do not always adapt UK wide guidance for the Scottish context. We will sometimes advise boards to use a UK document as it is. This is more common with Health Building Notes than HTMs.*"

8. The table below provides a summary of recent publications of SHTM 03-01, which followed the model outlined above. The technical content was primarily developed by NHS England as a HTM and was then ratified through the NHSScotland technical governance process, to be adopted as a SHTM in

Scotland. This would have involved HFS formatting the HTM into the SHTM format and then issuing a draft to health boards, SETAG and the National Heating & Ventilation Advisory Group, for consultation and approval prior to publication.

Guidance Document
SHTM 03-01 Part A February 2022(Interim Version)
SHTM 03-01 Part B February 2022 (Interim Version)
SHTM 03-01 Part A 2014
SHTM 03-01 Part A 2013
SHTM 03-01 Part B 2011

Engagement with Devolved Nations

9. NHSSA has a working relationship with the devolved nations and is a member of the "Devolved Nations Meeting", which is a 4 Nations stakeholder meeting to discuss estates and infrastructure strategy and key issues. All the devolved nations have very senior representation. The Director of NHSSA also meets regularly with the National Deputy Director of Estates, NHS England, and the New Hospitals Team NHS England. NHSSA is looking at how it can work collaboratively across the nations to produce guidance and share good practice and governance processes to reduce risk in the healthcare-built environment.

10. Devolved nation engineering colleagues are also part of SETAG.

11. The prioritisation of updating guidance documents is currently driven by NHS England through their Future Standards Working Group. NHSSA and the other devolved nations are represented on that forum. NHS England issues for consultation both an initial scoping document and later a draft Guidance document for technical engagement, across all 4 Nations. "Scottish" Guidance priorities are discussed within SETAG and are then fed into discussions with the devolved nations.

Process for updating engineering technical guidance in the future

12. NHSSA is committed to continually reviewing its approach to producing guidance and has an internal "Guidance Improvement Group" set up to review the current processes and potential opportunities to improve the way guidance is produced. Key initiatives include looking at how guidance is prioritised and how it can be updated more dynamically when learning presents itself, including the use of digital tools.

13. Looking to the actual production of engineering technical guidance in the future, NHSSA will continue to adopt the "devolved nations approach" to ensure quality and safety, as well as commonality. As the NHSSA engineering Subject Matter Expert (SME) resource continues to increase, it may be possible that NHSSA will look to take the technical lead in the production of engineering technical guidance – for example NHSSA currently has an agreement in place with NHS England to provide technical leadership on the production of a revised HTM 02-01. This would be discussed and agreed in the forums described earlier in this paper.

Current work on ventilation guidance

14. SHTM 03-01 Part A and B were issued as an "Interim" document in 2022. This document was based on the HTM 03-1 document published by NHS England in 2021. The SHTM was issued as an "interim" version, due firstly to ongoing challenges in response to the COVID pandemic being faced by health boards across Scotland and, secondly, it offered an opportunity to revisit and update the guidance in

2022, particularly if there was any further learning that would have been appropriate to include arising out of the COVID pandemic.

15. Due to workforce challenges within NHSSA and health boards, the update of SHTM 03-01 planned for 2022 was delayed. SETAG, in conjunction with NHSSA, have noted the production of SHTM 03-01 is a key priority and as a result it is planned that revised versions of SHTM 03-01 Part A and Part B will be published in 2024. SETAG and its National Heating & Ventilation Advisory sub-group are currently reviewing key stakeholder feedback on the interim version as part of this exercise.

16. In addition to the primary work on SHTM 03-01, NHSSA is involved in the development of other guidance documents as part of the devolved nations approach to producing guidance. Many of these guidance documents will also consider ventilation for specialist applications, including HBN 04-01 Supplement 1 Isolation Rooms.

17. NHSSA has also been involved in the production of "*NHS Estates Technical Bulletin (NETB 2023/01B): application of ultraviolet (UVC) devices for air cleaning in occupied healthcare spaces: guidance and standards*", in partnership with NHS England and it continues to be involved in the UVC focus group.

NHSScotland Assure's view on the practicability and utility of reviewing guidance

18. Engineering technical guidance in the form of HTMs/SHTMs is generally formed on the basis of both evidential research and subject matter expert opinion. When reviewing and updating guidance a key component is wide consultation to seek multiple stakeholder feedback, to enable those responsible for the creation of guidance to understand how the guidance will be been implemented in practice.

19. When creating the engineering technical guidance, including SHTMs, NHSSA will appoint a lead Subject Matter Expert – typically a Principal Engineering Manager. They will oversee a group of stakeholders, who will be collectively tasked with updating the specific guidance document. For ventilation that would typically include NHSSA engineering colleagues, ARHAI colleagues, SME representatives from health boards (through SETAG and the National Heating & Ventilation Group) and devolved nation colleagues. This will often be supplemented by academic institution colleagues, who may have supported research and industry partners who may be responsible for the manufacture or installation of ventilation equipment. Ultimately, it is about ensuring that there is robust representation of subject matter experts who can review and assess the information presented in the course of updating a guidance document, and also reaching a consensus on the published technical content. The consensus is important as differing views can be presented which must be interrogated fully to ensure that the content of guidance is appropriate.

20. With respect to the practical application of technical engineering guidance, it is not possible to cover every potential scenario that could occur in the healthcare estate. Guidance is intended to frame a set of overarching principles that will assist designers, builders, maintenance, and operational staff to design, construct and maintain buildings and systems in a safe manner. It is not always intended to provide an absolute value or solution, rather it relies on competent professionals developing solutions based on the overarching principles of the guidance document. With specific respect to ventilation, it is important to note that it is only one of a series of measures that can be implemented to reduce the potential spread of infection within a healthcare facility – there are many other complex variables that must also be considered.

21. The production of engineering technical guidance can be a complex and time-consuming process as it requires wide consultation and review by experts from multiple fields. It typically takes 12-18 months, and during the pandemic this was considerably longer due to competing priorities, including from clinicians. Appropriate time is required to collate stakeholder feedback to inform the scope of the review, then to collate the necessary research outcomes and to work through multiple stakeholder review sessions relative to the written contents of each draft document.

22. Once a draft has an agreed technical content, it will then go through publishing checks and be subject to a robust approvals process prior to issue. In the case where a document (such as the ventilation HTM, HTM 03-01) has been created by NHS England, it will first go through their governance processes prior to formal publication. NHSSA will then go through its "local" governance process, involving the document being reviewed by relevant internal subject matter experts (including engineering and ARHAI colleagues), in addition to review and approval by SETAG and the National Heating & Ventilation Advisory groups.

23. Guidance may lose "currency" after publication, as a result of emerging learning or feedback from stakeholders. That is currently a challenge, as typically we work to a 5-year rolling update cycle. One of the points that NHSSA is currently reviewing as part of its Guidance Improvement Group is how we (NHSSA) can become more agile in the production of guidance to reduce update "lag" – for example through the use of Corrigenda/Addendums to address specific issues (which is a similar approach adopted in the creation of many British Standards).

Date published: 9 May, 2023
Date last updated: 2 October, 2023

NHS Estates Technical Bulletin (NETB 2023/01A): application of HEPA filter devices for air cleaning in healthcare spaces: guidance and standards

Publication (/publication)

Content

Applicability

This NETB applies to all healthcare spaces with ventilation requirements.

Objective

To provide additional technical guidance and standards on the use of HEPA filter devices for air cleaning in healthcare spaces.

Status

The document forms an addendum to Health Technical Memorandum 03-01 Specialised Ventilation for Healthcare Premises (HTM 03-01) (https://www.england.nhs.uk/publication/specialised-ventilation-for-healthcare-buildings).

Point of contact/feedback

Point of contact for any queries: england.estatesandfacilities@nhs.net (mailto:england.estatesandfacilities@nhs.net)

Executive summary

Ventilation* is an important line of defence for infection control in the healthcare environment. Its design and operation are described in Health Technical Memorandum (HTM-03-01) (https://www.england.nhs.uk/publication/specialised-ventilation-for-healthcare-buildings/). The current focus on ventilation has highlighted areas of high risk due to poorly performing and inadequate ventilation in hospitals and other healthcare settings. This may be due to change of room use, age, condition of air handling plant, lack of maintenance, challenges with effective use of natural ventilation or other. It is therefore important to bring these facilities up to the minimum specification of current standards, particularly recognising the challenges of COVID-19 and other infections.

Local HEPA filter-based air cleaners (also know as air scrubbers) are one option for improving and supplementing ventilation. The installation of a high efficiency particulate air (HEPA) filter air cleaner can reduce the risk of airborne transmission.

This guidance has been written as an interim specification to set the basic standard required for HEPA filter devices to be utilised in healthcare and patient-related settings. This edition is primarily aimed at portable and semi fixed (wall-mounted) devices. Devices relying on ultraviolet light (UVC) are the subject of a separate guidance document: Application of ultraviolet (UVC) devices for air cleaning in occupied healthcare spaces (https://www.england.nhs.uk/long-read/application-of-ultraviolet-uvc-devices-for-air-cleaning-in-occupied-healthcare-spaces-guidance-and-standards/).

* Ventilation is the process by which ‘fresh’ air (normally outdoor air) is intentionally provided to a space and stale air is removed. This may be achieved by mechanical systems using ducts and fans, or natural ventilation most commonly provided through opening windows. The local redistribution of air may also be construed as ventilation.

1. Introduction

Ventilation is an important feature in the control of airborne infection. However, the emergence of SARS-CoV-2 as a highly contagious virus has demanded new and innovative solutions to safeguard patients, staff and visitors. Health Technical Memorandum 03-01 Specialised Ventilation for Healthcare Premises (HTM-03-01) (https://www.england.nhs.uk/publication/specialised-ventilation-for-healthcare-buildings/) is a robust standard for ventilation of higher risk clinical spaces based on high air change rates using outdoor air to continually flush indoor spaces. The COVID-19 pandemic has shown that greater attention must be paid to the improvement and maintenance of ventilation in healthcare settings.

The focus on ventilation has also highlighted areas of high risk due to poorly performing and inadequate ventilation, particularly in older hospitals and other healthcare settings such as primary care and dental suites, which increase risks of nosocomial infections.

In cases, where current ventilation does not meet HTM-03-01 standards, this may be due to age, condition of air handling plant, lack of maintenance or other design or operational issues. In the case of naturally ventilated spaces, there is a reliance on staff or patients opening windows. Weather conditions, external noise and air pollution and restricted window openings for safety affect the ability to open windows and means that ventilation in some settings can fall below recommended rates.

Local HEPA filter air cleaners are one option for improving and supplementing ventilation. The correct installation and operation of a HEPA filter air cleaner can reduce the risk of airborne transmission.

Healthcare trusts are under pressure to improve ventilation and in the meantime are considering options including filter-based air cleaning. This standard will assist trusts in selecting and implementing good quality, reliable equipment.

There is substantial evidence from laboratory studies and real-world settings that filtration is an effective technology for reducing airborne pathogens within room air and HVAC systems. A number of research studies have been carried out which indicate that measured levels of microorganisms in air are greatly reduced by air filters [R1-R5, R7]. There is also evidence which directly associates use of filter-

based air cleaners with reductions in infection rates of environmentally-derived aspergillus [R8]. The potential of air scrubbers employing UVC or HEPA technology to mitigate SAR-CoV-2 risks is the subject of a rapid review (September 2022) [R.9]. Filter based air cleaners also remove other particulate matter and so can also reduce exposure to other air pollutants. However, air cleaners should not be used as a reason to reduce ventilation and care must be taken to ensure sufficient fresh air changes are provided for the dilution of medical gases and noxious odours, and the maintenance of appropriate oxygen and carbon dioxide levels to satisfy the Building Regulations Part F.

This document aims to serve as interim guidance and regulatory reference point for the design and correctly engineered deployment of HEPA filter devices in real-world settings with regard to effectivity and safety

It focuses on HEPA filter-based devices which can be positioned locally within a room; the document does not cover HEPA filters used within HVAC ducts. Local filter-based devices require fan assisted circulation to introduce the room air into the device, pass it through the filters and then to reintroduce the processed air into the room.

An important consideration regards the flow of the air which is induced, processed and distributed by the device external to the device itself. The design and placement of the device should promote efficient air distribution in the room space and avoid short-circuiting of air circulation relative to furniture, obstructions, and occupancy.

2. HEPA filter technology

HEPA filters comprise a porous structure of fibres or membrane which remove particles carried in an air stream. The mechanism by which particles are removed depends on the size of the particle. Larger particles are removed by impaction onto the filter while smaller particles <1 μm are removed through interception and diffusion. Interception occurs where the particle makes physical contact with the media fibres because particle inertia is not strong enough to enable the particle movement to continue. Diffusion is where random motion (Brownian motion) of the particle enables it to contact the media. These effects are enhanced by the electrostatic charges present on filters.

2.1 Selection of filters

Filter efficiency defines the fraction of particles removed and varies by size of particle. The most difficult size of particles to remove, known as the most penetrating particle size (MPPS), for the majority of filters is around 0.3 μm;

particles larger or smaller than this size are captured more effectively. For healthcare applications it is recommended that devices should contain filters classified as High Efficiency Particulate Air Filters (HEPA) under BS EN 1822-1 (https://www.iso.org/obp/ui/#iso:std:iso:29463:-1:ed-2:v1:en) or ISO 29463-1 (https://www.iso.org/standard/67816.html). HEPA filters have a filter efficiency of at least 99.95% (H13 filter) or 99.995% (H14 filter) for the MPPS, however the performance in situ is sometimes lower depending on the filter and device design and the air flow rate (section 5.1 (https://www.england.nhs.uk/long-read/application-of-hepa-filter-devices-for-air-cleaning-in-healthcare-spaces-guidance-and-standards/#5-engineering-design-specification-and-performance-validation)).

Microorganisms range in size from around 0.1 µm for the smallest viruses to several µm in diameter for larger bacteria and fungi. Some fungi and bacteria may be dispersed independent of other material, however, many pathogens will be released on or within another material and therefore the size of the particle that needs to be captured is larger than the pathogen itself. For example, respiratory and gastroenterology viruses will be released within liquid media that contains proteins, salts, surfactants, etc and evaporates to form particles that are larger than the virus itself. Similarly, many skin associated bacteria are released on skin squame which are larger than the bacteria.

Some filter-based air cleaning devices contain lower grades of filter. These devices may be appropriate in non-clinical areas, but as the filters have a lower performance for particles relevant to the size of airborne pathogens they are not recommended in settings with vulnerable patients.

It is common for HEPA filter-based devices to incorporate a coarse grade of filter (typically ISO ePM10 >50% under ISO 16890-1 (https://www.iso.org/standard/57864.html)) to act as a dust filter. Some also include a carbon filter to manage odours and volatile organic compounds. Some devices contain several separate filters, while others incorporate the different stage filters into a single cartridge type unit.

2.2 Inclusion of other technologies

Devices which include germicidal ultraviolet (UVC) light alongside HEPA filters are likely to be effective [R4]. Where these devices are considered, this standard takes precedence in terms of clean air performance if the UVC lamp is located after the HEPA filter (i.e. the HEPA filter is the primary device for microbial removal). However, all the safety requirements pertaining to the UVC within that standard should also be complied with.

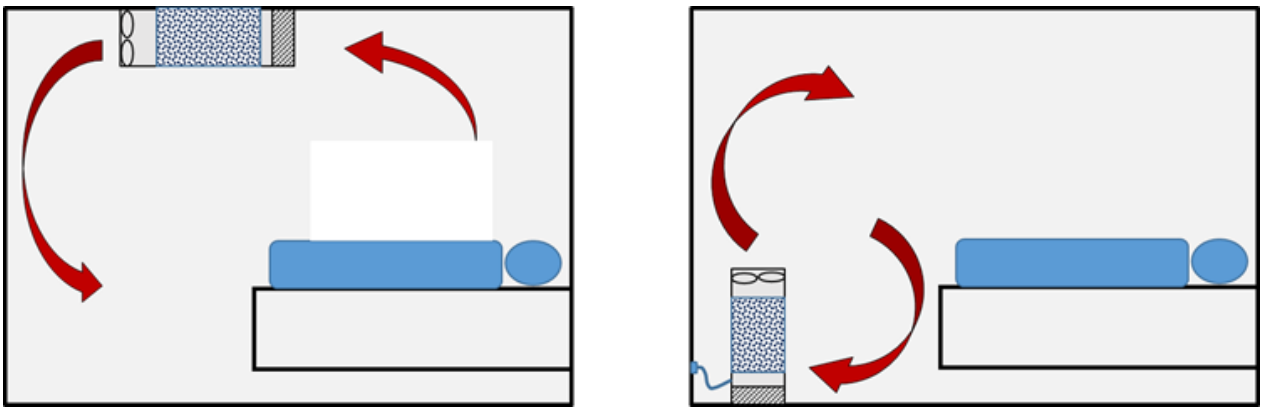
Devices which incorporate ionisation, photocatalytic oxidation, electrostatic precipitation or other similar technologies alongside filters are not currently recommended for healthcare use unless there is clear evidence for both effectiveness and safety. These devices can sometimes introduce, or create through secondary reactions, chemical by-products into a room which may themselves have an adverse health effect [R4, R11]. The independent research evidence that these products are any more effective at safely reducing microbial loads in air is still emerging.

3. Applications and sizing

Standalone, floor mounted devices can be positioned at any suitable location in a room. These devices are plugged into a standard electrical socket so do not require any installation, although location is important as detailed in sections 8.2 and 8.3.

Fixed devices are semi-permanently mounted to a wall or ceiling. These devices will normally be permanently wired into the room electrical systems rather than plugged into a wall socket. Some manufacturers offer local systems that can be interfaced with the ventilation system and are able to offer pressure differential control in a room.

Figure 1: Representation of typical air flows with respect to a recumbent patient in a regular room for two filter device locations: fixed, wall- or ceiling-mounted **(left); mobile, floor-standing (right)**



(https://www.england.nhs.uk/wp-content/uploads/2023/05/typical-air-flows.png)

In rooms without natural or mechanical ventilation, or where the ventilation falls short of statutory requirements or regulatory advice, auxiliary devices may be deployed to enhance the equivalent air changes.

The installation of HEPA filter-based air cleaners can be considered to contribute additional ‘equivalent’ air changes (eACH). For example, a treatment room with 6 ACH could achieve the equivalent of 10 ACH by installing a local filtration unit

which recirculated and cleaned the equivalent of 4 eACH. Hence, to meet the requirements that comply with HTM-03-01, the number of devices required will be dictated by the existing background levels of ventilation.

The high filter efficiency of HEPA filters means that the single pass efficiency of an air cleaning device for the MPPS should result in at least a 99% (2 log) reduction in the concentration of particles, including microorganisms, that pass through the device when in normal operation. However, the performance within a room depends on both the flow rate through the device and how it distributes the air in a room.

The performance of filter-based devices is described by some manufacturers in terms of a Clean Air Delivery Rate (CADR) which is usually expressed in metres cubed per hour (m^3h^{-1}) (some devices quote the CADR in cubic feet per minute, cfm). Where a CADR is given it should be derived from measurements of how well the device removes a defined size of particles in a test room environment; CADR is usually measured using particles rather than microorganisms. CADR is a function of the airflow rate through the device, the quality of the filter and the way the device distributes air in the test room.

Other manufacturers adopt different metrics such as the time to reduce particle concentrations in a room by a specific percentage.

The CADR or other metrics can be used, with care, for design purposes as they express how the device will perform in a standardised test room. However, it is important to note that the actual performance will depend on the particular location and operation of the device, including the room size, layout, background ventilation, device design and maintenance (section 8 (https://www.england.nhs.uk/long-read/application-of-hepa-filter-devices-for-air-cleaning-in-healthcare-spaces-guidance-and-standards/#8-maintenance)).

It is not recommended to use an air cleaning device with a lower grade of filter even if the quoted CADR is high, as the device may be less effective against the smallest pathogen carrying particles.

The CADR used for design purposes should be the rate applicable to the device setting at which the device is most likely to be operated and where the noise level is during operation is at a level of ≤50 dB measured at 3 m (dB_{3m}) (section 5.3 (https://www.england.nhs.uk/long-read/application-of-hepa-filter-devices-for-air-cleaning-in-healthcare-spaces-guidance-and-standards/#5-engineering-design-specification-and-performance-validation)).

4. Engineering implementation

4.1 Regulatory and standards compliance

If selecting a device that incorporates both UVC and HEPA filters the device should also comply with Application of ultraviolet (UVC) devices for air cleaning in occupied healthcare spaces (https://www.england.nhs.uk/long-read/application-of-ultraviolet-uvc-devices-for-air-cleaning-in-occupied-healthcare-spaces-guidance-and-standards/).

Standards are an integral part of product design and development and are important in medical applications. The Low Voltage Designated Standards (about:blank) should be followed implicitly as a minimum.

IEC 60601 is a series of technical standards which apply to medical electrical equipment and medical electrical systems for basic safety and essential performance. The basic scope of IEC 60601 is the safety of patients and users. It is recommended that the design of standalone HEPA filter devices should follow the principles of the 60601 Standard to ensure risks to patient and user safety within a medical environment are recognised and mitigated (section 4.1.2 (https://www.england.nhs.uk/long-read/application-of-hepa-filter-devices-for-air-cleaning-in-healthcare-spaces-guidance-and-standards/#4-engineering-implementation)).

4.1.1 CE and UKCA marking

CE and UKCA marking are standards that appear on products traded on the extended single market in the European and UK economic areas. The marking signifies that the product has been assessed to meet high health, safety, and environmental requirements.

- Selling products in Europe:
  - use of the CE-mark declares that the product meets the legal requirements for sale throughout the European Union. Note: note that some products are marked China Export (CE) which should not be confused with the EU standard.
- Selling products in the UK:
  - the UKCA-mark is the product marking used for products being placed on the market in Great Britain (England, Scotland, and Wales)
  - the UKCA-mark applies to most products previously subject to the CE-marking. The technical requirements (sometimes referred to as ‘essential requirements’) must be met.

4.1.2 Electrical safety

- Compliance with the Low Voltage Directive is mandated implicitly.
- Compliance with the IEC 60601standard is recommended.
- Class I (exposed metal components connected to earth):
  - protective earth continuity <0.2 MΩ
  - insulation tests: ≥50 MΩ
  - earth leakage: ≤5 mA in normal condition (NC), ≤10 mA in SFC (single fault condition)
  - enclosure leakage current: ≤1 mA in NC, ≤0.5 mA in SFC.
- Class II (double-insulated enclosure):
  - insulation tests: ≥50 MΩ
  - enclosure leakage current: ≤0.1 mA in NC, ≤0.5 mA in SFC.

Class III devices are not recommended.

4.1.3 Electrical wiring

Electrical wiring should be in accordance with IET Regulations BS 7671:2018 Requirements for Electrical Installations (about:blank).

4.2 Ozone and other emissions

Devices which operate using filters only do not produce ozone or other chemical emissions. Devices which incorporate other technology alongside filters are not recommended, however, if they are used manufacturers are required to provide assurance that devices do not produce ozone levels or other chemical pollutants in excess of the Workplace Exposure Limits (UK Workplace Exposure Limit (WEL) for ozone of 0.2 ppm (15 minute reference period)).

5. Engineering design, specification and performance validation

5.1 Device verification

As the performance of a HEPA filter is determined by the size of particles rather than the species of microorganism, it is not necessary for a manufacturer to conduct validation tests using microorganisms. Performance and validation tests carried out by manufacturers can be carried out using inert particles of an appropriate size, usually in the 0.5–2 μm size range. -0

Manufacturers should provide evidence that the HEPA filter used within the device meets BS EN 1822-1/ISO 29463-1 or an equivalent standard, and that the air cleaning device with filters in situ has been tested to an appropriate protocol that demonstrates how the device is likely to perform in a typical healthcare setting. Performance data including airflow rate through the device, filter pressure drop

and measured impact of the device on particle concentration in a suitable test environment should be provided for each operational fan speed and for the MPPS.

Device verification, as defined by the manufacturer, should be carried out on first installation to ensure filters are correctly installed and at every filter change. If filters are not correctly installed in devices, leakage around the edge of the filter can result in significant underperformance of the device. A verification check to ensure the device is operating correctly is also recommended if a device is moved to a different location within a hospital.

The verification test is designed to provide assurance that there is no unfiltered air bypassing the filter. This should be carried out by visual inspection to ensure the filter is intact and correctly seated, followed by appropriate measurement, usually through the pressure drop across the clean filter. Manufacturers should either provide a mechanism by which this is carried out in an automated way or by providing ports for a manual pressure drop measurement. Data on the expected pressure drop across the filters at each device flow rate should be provided and should be measured automatically within the device or manually by a qualified person at filter change. Where devices incorporate automated processes for measurement and calibration, manufacturers should provide evidence that this is robust and has been verified in a laboratory setting.

5.2 Filter life

Devices should be optimised to minimise filter replacement times and allow for a straight-forward replacement schedule. A pre filter typically of grade ISO ePM10>50% should be installed within the unit to maximise the life of the HEPA filter

In most healthcare environments devices should be selected such that filters should last around 12 months. Some may last longer than this, however, in environments which are more contaminated or at higher humidity filters may need replacing more frequently.

Devices should incorporate a dirty filter warning indicator or alarm for both the pre filter and the HEPA filter, to provide an easy visual indication to healthcare staff when a filter requires changing or when any other device maintenance is required. This should be in addition to the ability to measure the filter pressure drop for verification (section 5.1 (https://www.england.nhs.uk/long-read/application-of-hepa-filter-devices-for-air-cleaning-in-healthcare-spaces-guidance-and-standards/#5-engineering-design-specification-and-performance-validation)).

5.3 Noise considerations

Devices in occupied areas should normally operate at a sound level of ≤50 dB measured at 3 m (dB_{3m}). Exceptionally, for operation at boost such that might be used to purge a room higher sound levels may be acceptable; this should be assessed based on the use of the room.

Noise is a particular consideration when devices are used in rooms where patients are sleeping, and lower sound levels than stated here may be required depending on local environmental conditions. Further guidance on wider considerations around acoustics in healthcare is given in HTM-08-01 (about:blank).

6. Competent persons

In the present context, competent persons (it should be noted that competent person may be defined differently in other documents, including in HTM03-01) are recognised as individuals who are suitably qualified and experienced with professional expertise in one or more of the following areas in the healthcare setting: the design and specification of HEPA filter-based systems (including with airflow assessment), the technical maintenance of HEPA filter devices and systems, and the implementation of schemes employing HEPA filter devices.

Competent persons should have training and familiarity with the HEPA filter-based devices used within the particular healthcare setting to be able to size, specify, operate and maintain devices effectively.

Further, involvement of appropriate people with particular expertise in infection prevention and control are essential during the process of specifying and deploying devices.

7. Engineering and operational considerations

7.1 Hazard, risk and operational delivery

A ventilation design incorporating HEPA filter-based air cleaners will require a hazard and operational study (HAZOP). This process will be convened by the local Ventilation Safety Group (VSG) (a group of individuals with recognised expertise in the design and operation of ventilation devices and systems responsible for the governance of the device deployments, as defined in HTM 03-01) which will include competent persons (section 6 (https://www.england.nhs.uk/long-read/application-of-hepa-filter-devices-for-air-cleaning-in-healthcare-spaces-guidance-and-standards/#6-competent-persons))

including the Authorising Engineer (Ventilation) and representation from infection and prevention control, nursing and clinical engineering and/or estate management departments. The process will require considering infection control and health and safety aspects specific to the clinical requirements and patient groups within the particular setting and the safe installation of a portable electrical device.

7.2 Ventilation and device effectiveness

The Ventilation Safety Group will consider air flow strategies which achieve the most effective ventilation of occupied spaces. This requires that all factors such as air flow rate, mixing and distribution, dilution, thermal buoyancy and the impact of occupant movements and must be considered.

Airflow patterns and ventilation rates can be evaluated using measurements of air velocities, indoor air quality (IAQ) monitoring and visual methods such as smoke tracing. Computational Fluid Dynamics (CFD) modelling can also be a useful tool to assist the ventilation design engineer to assess airflow patterns in the rooms where HEPA filter devices are to be located. CFD, particle tracing and other forms of airflow assessment can be used to identify the optimal locations to place devices. CFD modelling requires specialist knowledge, and any simulations should be carried out by a competent person.

Airflow and particle/IAQ measurement, visualisation and CFD simulations can illustrate typical airflow patterns but unless carried out over a sustained period of time may not be able to capture all of the fluctuations that occur in real environments, particularly those that are naturally ventilated.

Air cleaner device performance depends on both the flow rate through the HEPA filter and the way the device distributes the air in a room, and both are important factors for ensuring devices are effective and properly positioned. Assessing how a device affects the air flow in a room using the approaches described above can give greater assurance that the device is sufficiently sized for the room and is positioned to be able to distribute air properly.

Although many devices are supplied as portable, they should be sized to the space where they are normally used. If a device is moved to a new location then it is recommended that a suitable risk assessment is undertaken by a competent person to ensure that the device is still likely to be effective.

7.3 Installation

The installation of any HEPA filter-based devices should comply with all building regulations and electrical guidance. A risk assessment should be undertaken by competent persons (section 6 (https://www.england.nhs.uk/long-read/application-of-hepa-filter-devices-for-air-cleaning-in-healthcare-spaces-guidance-and-standards/#6-competent-persons)) including representation from infection and prevention control, nursing and clinical engineering and/or estates departments.

Units should be positioned so that they do not interfere with the provision of care or provide an obstruction. Floor standing devices can be a trip hazard in some locations and need to be positioned to ensure they or their cables do not pose a risk to patients and staff and do not impede access. This includes ensuring that power cables or other elements of the device do not pose a ligature risk. Consideration should include risks for people who have visual impairments or restrictions on their mobility.

Devices should consider the manufacturer's recommendations around the best positioning to maximise the effectiveness alongside practical considerations around space available in a room and access to power supply, cable routes, etc.

Devices should ideally be positioned so that there is effective airflow into and out of the unit. Airflow inlet and exhaust panels on devices should not be blocked by furnishings and devices should be designed such that objects cannot be placed on top to cover the vents. Patient comfort should also be considered with devices positioned such that they do not create uncomfortable draughts.

Consideration should also be given to whether portable devices could be deliberately or accidentally moved or pushed over by patients or visitors. Device design should be stable and not easily toppled. In some settings it may be prudent to ensure there are design features that enable devices to be secured so that they cannot be moved. Devices which rely solely on remote controls or app-based controls are not recommended for healthcare settings. Remote controls tend to get lost and there may be privacy or Wi-Fi connectivity issues with app-based control. Devices which use voice activated controls linked to the internet (eg Alexa type systems) should not be used in healthcare settings as there are likely to be concerns around privacy.

7.4 Commissioning

Commissioning shall involve 'acceptance testing' according to local SOPs and include electrical safety testing to IEC 60601 (section 4.1.2 (https://www.england.nhs.uk/long-read/application-of-hepa-filter-devices-for-air-cleaning-in-healthcare-spaces-guidance-and-standards/#4-engineering-

implementation)). An audit of document compliance to the Low Voltage Directive (about:blank) is to be recorded. Where medical device classification is claimed, regulatory compliance with ISO 13485 Class 1 should be evidenced.

7.5 Verification and validation of performance

Manufacturers should evidence claims of engineering specifications (verification) and efficacy (validation) (section 5.1 (https://www.england.nhs.uk/long-read/application-of-hepa-filter-devices-for-air-cleaning-in-healthcare-spaces-guidance-and-standards/#5-engineering-design-specification-and-performance-validation)).

Devices should be checked every time the filter is changed (section 8.2 (https://www.england.nhs.uk/long-read/application-of-hepa-filter-devices-for-air-cleaning-in-healthcare-spaces-guidance-and-standards/#8-maintenance)) or the device is moved and periodically to ensure that performance is maintained. This can be accomplished by automated or manual measurement of the filter pressure drop under all of the device flow rate conditions as detailed in (section 5.1 (https://www.england.nhs.uk/long-read/application-of-hepa-filter-devices-for-air-cleaning-in-healthcare-spaces-guidance-and-standards/#5-engineering-design-specification-and-performance-validation)).

7.6 Training

Clinical and nursing staff in areas where HEPA filter-based air cleaning devices are located should receive training on operational and safety issues. A protocol should be in place such that staff can notify clinical engineering and/or estates management departments of suspected device malfunction. In a healthcare context, such training can often be manufacturer or supplier provided and might be included in staff mandatory training programmes.

7.7 Labelling

All HEPA filter devices should be labelled to inform users of operating procedures and potential hazards. Labels should serve to make users aware of how to interact with HEPA filter devices.

8. Maintenance

Day-to-day cleaning of devices and routine visual inspection (eg damage to casing, wear on cables, etc) can be carried out by healthcare or cleaning staff. Maintenance including filter replacement should only be conducted only by a designated competent person.

8.1 Cleaning

The outside surfaces of devices should be designed to be easily cleaned as part of standard cleaning regimes in the healthcare setting and should not have features which are prone to collecting dust and dirt. The device should be robust to cleaning materials routinely used in healthcare settings. Cleaning instructions should be provided by the manufacturer and easily visible to staff attending the unit.

8.2 Filter replacement

SOPs must be in place for both replacing and safe disposal of used filters. Evidence suggests that the hazards posed by filters are small (Mittal, 2011 (http://doi.org/10.1177/153567601101600305)), but there could be potential risks from pathogens that have been trapped by the filter and hence risk assessments and guidance should be in place.

Filter changes should follow the manufacturer guidance regarding the process and internal cleaning of the device. Filters should not be changed in clinical areas due to the possible hazards of microorganism and dust dispersal during the procedure. Those carrying out filter changes should wear appropriate PPE as agreed with their infection control team.

Disposal of used filters requires a suitable risk assessment for safe bagging, handling and appropriate waste disposal for the used filter as it is potentially contaminated with pathogenic microorganisms.

When new filters are installed they must be correctly seated as per manufacturer guidance to ensure there are no airflow leaks around the filter. Verification tests should be carried out after the new filter is installed (section 5.1 (https://www.england.nhs.uk/long-read/application-of-hepa-filter-devices-for-air-cleaning-in-healthcare-spaces-guidance-and-standards/#5-engineering-design-specification-and-performance-validation)).

8.3 Annual checks

All devices should undergo at least annual checks to verify their continuing performance. These checks should include, but are not limited to, the following:

- visual inspection of external and internal
- electrical safety test (section 4.1.2 (https://www.england.nhs.uk/long-read/application-of-hepa-filter-devices-for-air-cleaning-in-healthcare-spaces-guidance-and-standards/#4-engineering-implementation))
- check alarms simulate failures

- check filter run times and replace if necessary (section 8.2 (https://www.england.nhs.uk/long-read/application-of-hepa-filter-devices-for-air-cleaning-in-healthcare-spaces-guidance-and-standards/#8-maintenance))
- clean internals of the device.
- replacement and safe disposal of any filters (section 8.2 (https://www.england.nhs.uk/long-read/application-of-hepa-filter-devices-for-air-cleaning-in-healthcare-spaces-guidance-and-standards/#8-maintenance))
- check and document air flow rate measurements at different fan speeds against manufacturer's characteristic-specification (section 5.1 (https://www.england.nhs.uk/long-read/application-of-hepa-filter-devices-for-air-cleaning-in-healthcare-spaces-guidance-and-standards/#5-engineering-design-specification-and-performance-validation))
- check and document noise levels against manufacturer's characteristic-specification (section 5.3 (https://www.england.nhs.uk/long-read/application-of-hepa-filter-devices-for-air-cleaning-in-healthcare-spaces-guidance-and-standards/#5-engineering-design-specification-and-performance-validation))
- for devices that also include UVC, ensure checks set out in Application of ultraviolet (UVC) devices for air cleaning in occupied healthcare spaces: guidance and standards (https://www.england.nhs.uk/long-read/application-of-ultraviolet-uvc-devices-for-air-cleaning-in-occupied-healthcare-spaces-guidance-and-standards/), have also been completed
- apply annual check sticker.

9. Building Management System (BMS) module

The incorporation of a BMS (Building Management System) module into HEPA filter devices is recommended to afford the assurance of effective operation and to support maintenance scheduling. This can also be used to help identify any devices which have been inadvertently switched off, as well as the physical location of devices that are portable. Modules should be enabled with the Modbus or BACNet* open protocol for interfacing with existing an BMS.

*BACnet is a communication protocol for building automation and control (BAC) networks using the ASHRAE, ANSI and ISO 16484-5 standards protocol.

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Annex 2 – Acknowledgements

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Annex 3 – Glossary

- **Active operational life:** A product's operational life is the period for which a product is in use before it becomes obsolete, in terms of UVC lamps it is typically 70% of original efficacy.
- **Air changes per hour:** Air changes per hour (ACH) is the measurement at which air volume per hour is added to a room divided by the total volume of the room. It represents the number of complete air exchanges in one hour under perfect air circulation conditions. See also Equivalent air changes per hour.
- **Air circulation:** Mixing of the air from natural or mechanical ventilation sources inside an enclosure.
- **Air circulation efficiency (%):** A measure of the effectiveness of air circulation in a real enclosure with obstructions such as occupancy and furniture, compared with perfect mixing as quantified by ACH/eACH. CFD studies in hospital and high-street treatment rooms indicate that the air circulation efficiency can vary between 40% and 80% depending on the device placement and proximity of furniture, equipment and occupancy. Similar variance applies to AGP-clearance and therefore will affect fallow time.
- **BMS (Building Management System):** A computer-based control system installed in buildings that controls and monitors the building's mechanical and electrical equipment such as ventilation, lighting, power systems, fire systems and security systems.
- **Building regulations:** Building regulations set standards for the design and construction of buildings to ensure the safety and health for people in or about those buildings. They also include requirements to ensure that fuel and power is conserved, and facilities are provided for people, including those with disabilities, to access and move around inside buildings. Current standards require that Health Care buildings conform to NHS standards. For ventilation NHS HTM-03 applies.
- **CFD (computational fluid dynamics):** Computer-based fluid dynamics modelling providing a means to simulate air flow combined with

convective/buoyant/conductive/radiative heat transfer, particulate transport (aerosols and droplets) and turbulence.

- **Characteristic specification (Characteristic verification):** A measurable property of the device that can employed routinely by the user to provide assurance of device operation to the verification model. See Verification.
- **Clean Air Delivery Rate (CADR):** Experimentally derived data that expresses the performance of a filter-based air cleaning device in a test room. CADR is a function of the airflow rate through the device, the quality of the filter and the way the device distributes air in the test room.
- **Clearance:** The relative removal of a contaminant usually expressed as %. See Log reduction.
- **Decontamination:** Decontamination describes the reduction of pathogenic microorganisms to a safe level for human use. Technically, this means reduction by a minimum of 1 log step, meaning 90%.
- **Disinfection:** The term disinfection is not clearly defined in a technical sense. Generally, for the purposes of this standard, it means a reduction of pathogenic microorganisms by a minimum of 3 log steps Or 99.9%
- **Equivalent air changes per hour, eACH:** Equivalent air changes per hour, or eACH, is a measure of the 'equivalent' amount of air that is cleaned by a HEPA or UVC device as a ventilation rate of new outside-air changes would achieve in one hour. See ACH. Note that this applies to decontamination and does not obviate the need for meeting minimum fresh air standards.
- **Electrical Safety Test (EST):** Requirement of the Low Voltage Directive to demonstrate general electrical safety.
- **Electrostatic precipitation (ESP):** A method of removing particles from air by applying a charge to the particles (often through an ioniser) and then capturing onto a plate which has an opposite charge. Some filter-based air cleaners incorporate ESP.
- **Fallow time:** Time (s/min/hr) allocated to a treatment room without occupancy to allow for clearance of the room after a contamination event (eg an AGP) to recover safe levels for occupancy.
- **Germicidal ultraviolet/germicidal ultraviolet irradiation:** Referred to commonly as GUV and UVC. Both are one and the same in that they refer to ultraviolet C spectrum light that is germicidal.
- **Hazard assessment:** A hazard assessment is a thorough check of the occupational environment. The purpose of a hazard assessment is to identify potential risks and hazards in the area, as well as to identify appropriate safety measures to be used to mitigate, eliminate or control the identified hazards.
- **HAZOP:** [Hazard Analysis and Operational study] – a systematic way to identify hazards in a work process.
- **HEPA:** High Efficiency Particle Air Filter, used to describe a filter with a very high particle filtration efficiency with over 99.95% removal for the smallest

particles (see MPPS).

- **IAQ (Indoor Air Quality):** A generic term used for air quality in enclosed spaces, usually referring to the combination of harmful gases (eg. CO2 and CO levels measured in parts-per-million, ppm), temperature (for thermal comfort), total volatile organic content (TVOCs measured in parts-per-billion, ppb), relative humidity (%) and particulate matter size (respiratory irritants/hazards) measured in micrograms/m3, eg. PM2.5, PM10.
- **Infection:** The process by which pathogens penetrate the body of an organism and multiply therein. Depending on the transmission route, we distinguish between contact infections and airborne infections.
- **Infectiousness:** Measure for describing the ability of a pathogen to cause actual infection in a host after transmission occurs.
- **Ioniser:** A device that uses a high voltage to electrically charge air molecules and particles in air. Ionisers are sometimes used as part of electrostatic precipitators or are used to emit ions into a room. There is evidence that ionisation of air can result in ozone generation.
- **Ionising radiation:** Ionising describes the type of radiation capable of permanently removing electrons from atoms or molecules. Note: UVC radiation has no ionising power.
- **Log reduction:** The reduction of a contaminant can be quantified in log stages. A Log reduction of ‘x number’ therefore means a reduction by ‘x number Log’ stages starting from a given population. The reduction by 1 log stage means a reduction of 90%, since only 10% have survived from the original population. See Clearance.
- **Log stage (a.k.a. Log step):** A log stage or log step describes the reductio n of a population by a (further) power of ten: in other words, 1 log stage = 90%, 2 log stages = 99%, 3 log stages = 99.9%, etc. See Log reduction.
- **Microorganism (microbe):** A microorganism is an organic structure so small that they can generally only be seen with the aid of a microscope and include viruses, bacteria and fungi. Such structures are usually single-celled, although they are occasionally multi-celled.
- **MPPS:** Most Penetrating Particle Size. The size of particle that leads to the lowest performance for a filter. For HEPA filters this is typically in the region 0.2-0.5 µm diameter particles.
- **Nosocomial infection:** An infection contracted in a hospital or care institution.
- **Ozone:** Represented as O3. Ozone is a gas with strong oxidation properties that is toxic in low concentrations. Ozone can result from the oxidation of O2 irradiated by far UVC.
- **Pathogen:** Pathogens are microorganisms capable of causing disease or illness in living creatures.
- **Photocatalytic oxidation (PCO):** Use of ultraviolet light with a catalyst (usually titanium dioxide) to generate hydroxyl radicals. These can

potentially react with air pollutants to break them down, however they may also produce ozone or act to convert some pollutants into other chemicals.

- **Sanitisation:** The process of reducing microbiological contamination. See Clearance and log reduction.
- **Single pass effectiveness:** The percentage (or log) reduction in particles or microorganisms in the air that directly passes once through an air cleaning device. This is determined by the grade of the filter and the air flow rate through the device.
- **SOP:** (Standard operating procedure) A set of step-by-step instructions compiled by an organization to help workers carry out routine operations.
- **Sound pressure level: dB3m:** The acoustic output pressure represented by dB measured at 3 m from the source.
- **Validation (bio-validation):** The process to provide assurance that the device is effective as claimed by the manufacturer. For the purposes of this standard, assurance that particle removal or microorganism reduction is achieved as claimed.
- **Verification:** The process to provide assurance that the device performs to the manufacturer's specification. For the purposes of this standard, assurance that air flow and filter performance are as claimed.
- **Viruses:** Viruses are particles or information carriers dependent for survival and replication upon the metabolism of a host cell since they themselves have no cytoplasm and are incapable of metabolism. Viruses are thus, de facto, not living organisms.

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NHS Estates Technical Bulletin (NETB 2023/01B): application of ultraviolet (UVC) devices for air cleaning in occupied healthcare spaces: guidance and standards

Publication (/publication)

Content

Applicability

This NETB applies to all healthcare spaces with ventilation requirements.

Objective

To provide additional technical guidance and standards on the use of UVC devices for air cleaning in healthcare spaces.

Status

The document represents advice for consideration by all NHS bodies. It is to be read alongside Health Technical Memorandum 03-01 Specialised Ventilation for Healthcare Premises (HTM 03-01) (https://www.england.nhs.uk/publication/specialised-ventilation-for-healthcare-buildings).

Point of contact/feedback

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Executive summary

Ventilation* is a key line of defence for infection control in the healthcare environment. Its design and operation are described in Health Technical Memorandum (HTM-03-01) (https://www.england.nhs.uk/publication/specialised-ventilation-for-healthcare-buildings/). The current focus on ventilation has highlighted areas of high risk due to poorly performing and inadequate ventilation in hospitals and other healthcare settings due to age, condition of air handling plant, lack of

maintenance, challenges with effective use of natural ventilation or other creates areas of high risk. It is therefore important to bring these facilities up to the minimum specification of current standards, particularly recognising the challenges of COVID-19 and other respiratory infections.

Ultraviolet (UVC) air cleaners (also known as air scrubbers) using ultraviolet light are one option for improving and upgrading ventilation. The installation of a UVC air cleaner can reduce the risk of airborne transmission.

This document has been written as an interim specification to set the basic standard required for UVC devices to be utilised in healthcare and patient related settings. This edition is primarily aimed at portable and semi fixed (wall-mounted) devices. The series will extend to in-duct and upper room devices in future iterations. Devices relying on HEPA filters or similar filter-based technology can have similar benefits to UVC devices but are not considered in this document. The potential of air scrubbers employing UVC or HEPA technology is the subject of a rapid review (September 2022) (https://doi.org/10.1101/2022.10.25.22281493).

*Ventilation is the process by which ‘fresh’ air (normally outdoor air) is intentionally provided to a space and stale air is removed. This may be achieved by mechanical systems using ducts and fans, or natural ventilation most commonly provided through opening windows. The local redistribution of air may also be construed as ventilation.

1. Introduction

Ventilation is a critical feature in the control of airborne infection. However, the emergence of SARS-CoV-2 as a highly contagious virus has demanded new and innovative solutions to safeguard patients, staff and visitors. Health Technical Memorandum 03-01 Specialised Ventilation for Healthcare Premises (HTM-03-01) is a robust standard for ventilation of higher risk clinical spaces based on high air change rates using outdoor air to continually flush indoor spaces. The emergence of COVID-19 has shown that greater attention must be paid to the removal or deactivation of airborne pathogens in areas where ventilation rates are lower.

The focus on ventilation has also highlighted areas of high risk due to poorly performing and inadequate ventilation, particularly in older hospitals and other healthcare settings such as primary care and dental, which increase risks of infection spread viz nosocomial infections.

In cases, where current ventilation does not meet HTM-03-01 standards, this may be due to age, condition of air handling plant, lack of maintenance or other design or operational issues. In the case of naturally ventilated spaces, there is a reliance on staff or patients opening windows. Weather conditions, external noise and air pollution and restricted window openings for safety affect the ability to open windows and means that ventilation in some settings can fall below recommended rates.

UVC air cleaners using ultraviolet light are one option for improving and upgrading ventilation. The correct installation and operation of a UVC air cleaner can effectively reduce the risk of airborne transmission.

NHS trusts are under pressure to improve ventilation and are considering options including UVC air cleaning. This standard will assist trusts in selecting and implementing good quality, reliable equipment.

There is substantial evidence from laboratory studies and real-world settings that UVC is an effective technology for reducing airborne pathogens within room air and HVAC systems. A number of trial ‘case studies’ have been carried out which indicate that measured levels of microorganisms in air are greatly reduced and infection rates have decreased.

These trials have also shown that UVC within HVAC systems safely allows some levels of air recirculation and can achieve substantial energy reductions compared to the normal 100% fresh air approach set out in HTM-03-01. For example, a scheme with 50% fresh air and 50% recirculated air would reduce heat demand by 50%. However, care must be taken to ensure sufficient fresh air changes are provided for the dilution of medical gases and noxious odours, and the maintenance of appropriate oxygen and carbon dioxide levels.

This document aims to serve as interim guidance and regulatory reference point for the design and correctly engineered deployment of germicidal UVC devices in real-world settings with regard to effectivity and safety.

2. UVC germicidal effects

There are a wide range of UVC devices which aim to inactivate microorganisms in the air and/or on surfaces. This document focuses on contained UVC devices which can be positioned locally within a room or within an HVAC duct. These devices usually require fan assisted circulation to introduce the room air into the device, expose it to ultraviolet light and then to reintroduce the processed air into the room. Therefore, aerodynamics internal to the device together with the lamp specification determines the air and microbial particle UVC exposure time and hence the radiation dose.

These devices are known as active UVC air cleaning devices. Not considered in this document are passive UVC devices, aka upper room devices, which rely on the natural air currents within rooms.

An important consideration regards the flow of the air which is induced, processed and distributed by the device external to the device itself. The design and placement of the device should promote efficient air circulation in the room space and avoid short-circuiting of air circulation relative to furniture, obstructions, and occupancy.

The ultraviolet-C (UVC) spectrum lies in the interval [200…280] nm. UVC irradiation as a means of microbial inactivation has been used for over 100 years in multiple sectors including medical, scientific, water disinfection, manufacturing and agricultural.

UVC germicidal activity inactivates microorganisms rendering them unable to replicate. Most commonly, germicidal activity is generated by mercury ionisation lamps with the major spectral line at 254 nm wavelength. This is sometimes also known as germicidal ultraviolet (GUV) or ultraviolet germicidal irradiation (UVGI). This standard uses the term UVC.

Recent studies suggest that devices based on far-UV (222 nm wavelength) may also be effective; however, these are not covered here.

The photo-toxicity risks associated with UVC is universally recognised. The design, specification and implementation of germicidal UVC solutions currently lacks rigorous governance and the requirement for regulatory change is recognised. The purpose of this standard therefore is to establish the key criteria for successful and reliable long-term application of UVC air cleaning while avoiding the potential safety hazards and operational pitfalls, particularly when equipment is used in spaces occupied by non-technical people.

3. Applications

This standard covers the types of UVC air cleaners used as standalone or in-duct units where the principal active element is UVC at the nominal wavelength of 254 nm.

In rooms without natural or mechanical ventilation, or where the ventilation falls short of local requirements or regulatory advice, auxiliary devices may be deployed to enhance the effective air changes. The installation of UVC air cleaners can be considered to contribute additional ‘equivalent’ air changes (eACH). For example, a treatment room with only 2 ACH could achieve the equivalent of 10 ACH by installing a UVC unit which recirculated and cleaned the equivalent of 8 ACH (eACH) for the microorganisms of concern. Hence, to meet the requirements that comply with HTM-03-01, the number of devices required will be dictated by the existing background levels of ventilation.

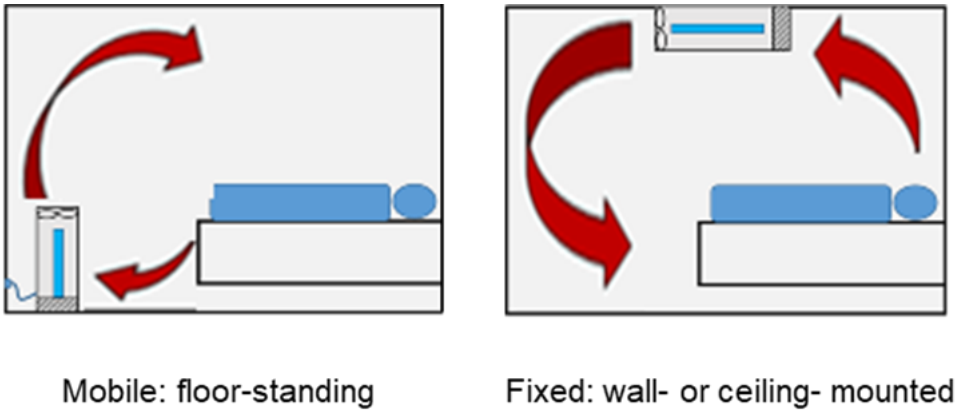
In-duct HVAC systems

In buildings with existing HVAC systems which have recirculation of air, it can be effective to install UVC lamps directly into the ducts, placing them downstream of pre-existing particulate filters. This allows for the treatment of all rooms in the building covered by the HVAC system or within branch ducts serving various zones and the rooms within those zones.

Due to the lamps being contained within the ducts, the risk of direct exposure to UVC is low. However, maintenance can be carried out safely shut-down interlocks should be fitted and hazard notices compliant with BS EN ISO 7010 prominently displayed.

Standalone devices

Standalone devices maybe portable (floor-standing) or fixed (wall- or ceiling-mounted).



(https://www.england.nhs.uk/wp-content/uploads/2023/05/standalone-devices.png)

Figure: Representation of air flows with respect to a recumbent patient in a regular room for 2 device locations. i. mobile: floor-standing; ii. fixed: wall- or ceiling-mounted.

254 nm devices covered in this standard

- **In-duct UVC:** UVC lamps are installed directly into the HVAC system or are contained within a locally installed ventilation device which is connected into the HVAC system, similar to a fan-coil unit. Devices may use the fans and filters within the existing HVAC system or, in some cases, may have local fans and filters to provide the recirculation. Significant modelling and design are required to implement such systems.
- **Floor standing UVC 'mobile' devices:** UVC lamps are contained within a standalone floor mounted device that can be positioned at any suitable location in a room. These devices provide local air cleaning within a room and are plugged into a standard electrical socket so do not require any installation. The device contains lamps, dust filters and a fan to draw room air through the device. Devices are portable and so can be easily moved.
- **Fixed UVC devices – wall or ceiling mounted:** Similar to floor standing units but fixed to a wall or ceiling. These devices will normally be permanently wired into the room electrical system rather than plugged into a wall socket.

UVC devices not covered in this standard

- **Decontamination UVC devices:** High intensity open-field UVC devices that are designed for periodic surface decontamination in unoccupied spaces. These devices are sometimes known as UVC robots.
- **Upper-room UVC devices:** UVC devices which utilise an open UV field within the room above the heads of occupants. These are passive devices which rely on the general circulation of room air and are sometimes assisted by ceiling fans.
- **Devices based on other parts of the UV spectrum:** The devices covered in this standard are based on 254 nm wavelength lamps. There are a number of other UV technologies including Far UV (222 nm) which has early data showing it is likely to be effective.
- **Devices that incorporate other technologies alongside UVC:** There are a number of devices which use UVC alongside other technologies such as titanium dioxide catalysts or ionisers. These devices often emit by-products into the room, either intentionally or deliberately. The health impacts of any emissions must be carefully considered.

4. Safety

4.1 Accidental exposure

Safety is of paramount importance when working with UVC devices. Direct exposure to UVC light can cause damage to the skin and eyes.

The manufacturer of a germicidal UVC device should provide assurance in the device specification that the maximum UV (total) irradiance at 20 cm distance from any part surface of the device is ≤1 $mW.m^2$ (noting that this is based on an accumulated exposure of 8 hours). Exposure limits to UVC are specified in the directive Control of Artificial Optical Radiation at Work Regulations (AOR) 2010 (https://www.legislation.gov.uk/uksi/2010/1140/made).

Fail-safe systems are required to prevent lamps from operating when the cover of the device is removed.

4.2 Wider safety considerations

Care needs to be taken during maintenance and in operation that lamps are not broken. Appropriate safety protocols need to be in place to minimise risk of exposure to mercury vapour where devices contain mercury based lamps.

As electrical devices, UVC devices must comply with the Low Voltage Designated Standards (Electrical Equipment (Safety) Regulations 2016) (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1096713/ds-0061-22-low-voltage-equipment-notice.pdf).

Manufacturers should be aware that wiring and other components are liable to degradation under UV radiation.

5. Engineering implementation

5.1 Regulatory and standards compliance

Standards are an integral part of product design and development and are important in medical applications. The Low Voltage Directive (section 5.1.2 (https://www.england.nhs.uk/long-read/application-of-ultraviolet-uvc-devices-for-air-cleaning-in-occupied-healthcare-spaces-guidance-and-standards/#5-engineering-implementation)) should be followed implicitly as a minimum. There are other standards and regulations which apply when using UVC air cleaning devices.

IEC 60601 is a series of technical standards which apply to medical electrical equipment and medical electrical systems for basic safety and essential performance. The basic scope of IEC 60601 -1 is the safety of patients and users. While compliance to IEC 60601-1 is not mandated in this standard, the design of standalone germicidal UVC devices should follow the principles of the 6061 standard to ensure risks to patient and user safety within a medical environment are recognised and mitigated (section 5.1.2 (https://www.england.nhs.uk/long-read/application-of-ultraviolet-uvc-devices-for-air-cleaning-in-occupied-healthcare-spaces-guidance-and-standards/#5-engineering-implementation))

5.1.1 CE and UKCA marking

CE and UKCA marking are standards that appear on products traded on the extended single market in the European and UK economic areas. The marking signifies that the product has been assessed to meet high health, safety and environmental requirements.

- Selling products in Europe:
  - use of the CE-mark declares that the product meets the legal requirements for sale throughout the European Union.
- Selling products in the UK:
  - the UKCA-mark is the product marking used for products being placed on the market in Great Britain (England, Scotland and Wales)
  - the UKCA-mark applies to most products previously subject to the CE- marking. The technical requirements (sometimes referred to as ‘essential requirements’) must be met.

5.1.2 Electrical safety

- Compliance with the Low Voltage Directive is mandated implicitly.
- Compliance with the IEC 60601-1 standard is explicitly mandated.
- Class I (exposed metal components connected to earth):
  - protective earth continuity <0.2 MΩ.
  - insulation tests: ≥50 MΩ
  - earth leakage: ≤5 mA in normal condition (NC), ≤10 mA in SFC (single fault condition)
  - enclosure leakage current: ≤1 mA in NC, ≤0.5 mA in SFC
- Class II (double-insulated enclosure):
  - insulation tests: ≥50 MΩ.
  - enclosure leakage current: ≤0.1 mA in NC, ≤0.5 mA in SFC

Class III devices are not recommended.

5.1.3 Electrical wiring

Electrical wiring should be in accordance with IET Regulations BS 7671:2018 Requirements for Electrical Installations (https://electrical.theiet.org/bs-7671/).

Electrical components which are contained within a UVC device must be selected appropriately. Wiring and connectors should not be exposed to direct high intensity UV light. However, where exposure is unavoidable, secondary UV-resistant sheath should be employed. Exposed cables, particularly any with PVC coverings, will deteriorate due to the effect of UVC light.

5.1.4 Optical radiation safety

Safety is of paramount importance when working with UVC devices. Direct exposure to UVC light can cause damage to the skin and eyes.

The manufacturer of a germicidal UVC device should provide assurance in the device specification that the maximum UV (total) irradiance at 20 cm distance from any part surface of the device is ≤1 $mW.m^2$ (noting that this is based on an accumulated exposure of 8 hours). Exposure limits to UVC are specified in the directive Control of Artificial Optical Radiation at Work Regulations (AOR) 2010 (https://www.legislation.gov.uk/uksi/2010/1140/made).

Fail-safe systems are required to prevent lamps from operating when the cover of the device is used.

5.2 Ozone hazard

Ozone (https://www.gov.uk/government/statistics/air-quality-statistics/concentrations-of-ozone), an allotrope of oxygen, can be produced when oxygen is exposed to UVC with a wavelength below 240 nm. Ozone above occupational exposure limits (UK Workplace Exposure Limit (WEL) of 0.2 ppm (15 minute reference period)) is harmful to human health and can affect the respiratory, cardiovascular and central nervous system. Ozone can also cause degradation of certain materials, which can lead to fire hazards.

Manufacturers shall provide assurance that devices do not produce ozone which contributes to room levels in excess of the WEL.

6. Engineering design, specification and performance validation

6.1 Characteristic specification (characteristic verification)

The manufacturer should provide a 10 mm diameter access port to the reaction chamber. This will enable the point measurement of air velocity and point measurement of UVC irradiance to provide assurance that the device is operating to the specification cited by the manufacturer under 'verification'. It is expected that this facility will be used during the annual maintenance check by the designated competent persons (section 7 (https://www.england.nhs.uk/long-read/application-of-ultraviolet-uvc-devices-for-air-cleaning-in-occupied-healthcare-spaces-guidance-and-standards/#7-competent-persons)).

6.2 Bio-validation

The microbial inactivation rate for a UVC device, and hence the equivalent air change rate it provides, depends on the microorganism and the temperature and humidity. The manufacturer should provide evidence of the germicidal effectivity of their device at a given air flow (see above) and under given environmental conditions. At the present time, the preferred method of bio-validation (the Liverpool Biovalidation Protocol for the real-world evaluation of UVC-based air purifiers (NHS England Supply Chain)) uses *Micrococcus luteus* as the bacterial challenge under ambient environmental conditions of 23 C and a relative humidity of 50%. If an alternative protocol is employed, equivalence must be evidenced with reference to *k*, the UVC susceptibility constant for the particular microorganism (k, inactivation rate constant (susceptibility rate) [$cm^2.mJ^{-2}$]).

Where devices are used in settings where particular pathogens are likely to pose hazard, it is important to ensure that the susceptibility of the pathogen to UVC is taken into account when selecting a device.

6.3 Lamp guidance

At the time of publication, the most common source of UVC radiation is the mercury-vapour lamp (*aka* the mercury gas-discharge lamp). These devices are designed to emit at the wavelength 254 nm. While other technologies are available, *eg.* light emitting diodes (LEDs) and amalgam-mercury based discharge tubes, they are not considered here. Lamps should have anti-static surface coatings to minimise the build-up of surface contamination.

6.3.1 Effective life span

Lamp lifespan should be optimised to minimise replacement times and allow for a straight-forward replacement schedule.

Lamps should have an effective operational life of no less than one year (circa 8,800 hours for 24/7 active operational life) before they need replacing. Typically, the optical efficiency of a mercury-vapour lamp will decrease by 20% over its effective life span.

6.3.2 Operating conditions

The efficiency of a mercury-vapour lamp is affected by ambient temperature. Manufacturers should provide assurance that devices deliver their germicidal potency, as claimed, over an environmental operating temperature range of [10 …35] C.

6.3.3 Lamp failure indication

An alarm (visual and/or audible) should be implemented to notify of lamp failure.

6.4 Noise considerations

Devices in normal operation in occupied areas should operate at a sound level of ≤50 dB measured at 3 m (dB_{3m}). Exceptionally, for operation at boost, such that might be used to purge a room with controlled occupancy, the sound level should not exceed $60dB_{3m}$

Noise is a particular consideration when devices are used in rooms where patients are sleeping, and lower sound levels than stated here may be required depending on local environmental conditions. Further guidance on wider considerations around acoustics in healthcare is given in HTM-08-01 (https://www.england.nhs.uk/publication/health-sector-buildings-acoustic-design-requirements-htm-08-01/).

7. Competent persons

In the present context, competent persons are recognised as individuals with professional expertise in one or more of the following areas in the healthcare setting: the design of UVC systems, the technical maintenance of UVC devices and systems, and the implementation of air sanitization schemes employing germicidal UVC.

Further, competent persons with particular expertise in infection prevention and control are essential to identify the relevant target microorganisms that UVC devices will need to mitigate.

8. Engineering and operational considerations

8.1 Hazard, risk and operational delivery

A ventilation design incorporating UVC-based air cleaners will require a hazard and operational study (HAZOP). This process will be convened by the Ventilation Safety Group (a group of individuals with recognised expertise in the design and operation of ventilation devices and systems responsible for the governance of the device deployments, as defined in HTM 03-01) which will include competent persons (section 7 (https://www.england.nhs.uk/long-read/application-of-ultraviolet-uvc-devices-for-air-cleaning-in-occupied-healthcare-spaces-guidance-and-standards/#7-competent-persons)) including representation from infection and prevention control, nursing and estates management and/ or clinical engineering.

8.2 Conventional HVAC filters

Filters should be included into UVC systems to protect the UV lamps from dust build-up such that UV fluence is not compromised. Some devices may also contain carbon filters to mitigate odour and VOCs. In normal operation, the replacement period for such filters should not be less than one year. In exceptional circumstances, such as operation in areas with high levels of large particulate contamination, more regular replacement may be required to ensure air flow is not restricted. Local Standard Operating Procedures (SOPs) should be applied.

8.3 Ventilation effectiveness

The Ventilation Safety Group (HTM 03-01) (https://www.england.nhs.uk/publication/specialised-ventilation-for-healthcare-buildings/) will consider air flow strategies which achieve the most effective ventilation of occupied spaces. This requires that all factors such as air flow rate, mixing and distribution, dilution, thermal buoyancy and the impact of occupant movements must be considered.

8.3.1 Computational fluid dynamics (CFD) modelling of air movement

CFD modelling can be a useful tool to assist ventilation engineers to assess airflow patterns in the rooms where UVC devices are to be used and to identify the optimal locations to place devices. CFD modelling requires specialist knowledge, any simulations should be carried out by a competent person. CFD simulations can illustrate typical airflow patterns but may not be able to capture all of the fluctuations that occur in real environments, particularly those that are naturally ventilated.

8.4 Installation

The installation of any UVC air scrubbing devices should comply with all local building and electrical guidance. Advice should be sought from competent persons (section 7 (https://www.england.nhs.uk/long-read/application-of-ultraviolet-uvc-devices-for-air-cleaning-in-occupied-healthcare-spaces-guidance-and-standards/#7-competent-persons)) including representation from infection and prevention control, nursing and estates management and/ or clinical engineering.

When positioning portable units engineers should consider the manufacturer’s recommendations around the best positioning to maximise the effectiveness, as well as practical considerations around space available in a room and access to power supply, cable routes, *etc*. Units should be positioned so that they do not interfere with the provision of care or provide an obstruction.

Units should always be positioned so that there is effective airflow into and out of the device. Vent panels on devices should not be blocked by furnishings and devices should be designed such that objects cannot be placed on top to cover vents. Patient comfort should also be considered with devices positioned such that they do not create uncomfortable draughts

Portable units can be a trip hazard in some locations and need to be positioned to ensure they or their cables do not pose a risk and do not impede access. Consideration should include risks for people who have visual impairments or restrictions on their mobility.

Consideration should be given to whether portable devices could be deliberately or accidentally moved or pushed over by patients or visitors. Device design should be stable and not easily toppled. In some settings it may be prudent to secure devices such that they cannot be moved.

8.5 Commissioning

Commissioning shall involve ‘acceptance testing’ according to local SOPs and include PAT testing to IEC 60601-1 (section 5.1.2 (https://www.england.nhs.uk/long-read/application-of-ultraviolet-uvc-devices-for-air-cleaning-in-occupied-healthcare-spaces-guidance-and-standards/#5-engineering-implementation)). An audit of document compliance to the Low Voltage Directive (https://www.gov.uk/government/publications/designated-standards-low-voltage) is to be recorded. Where medical device classification is claimed, regulatory compliance with ISO 13485 Class 1 should be evidenced.

8.6 Verification and validation of performance

Manufacturers should evidence claims of engineering specifications (verification) and efficacy (bio-validation) (section 6.2 (https://www.england.nhs.uk/long-read/application-of-ultraviolet-uvc-devices-for-air-cleaning-in-occupied-healthcare-spaces-guidance-and-standards/#6-engineering-design-specification-and-performance-validation)). The air velocity and UVC irradiance in the reaction chamber should be characterised at an arbitrary point specified by the manufacturer (section 6.1 (https://www.england.nhs.uk/long-read/application-of-ultraviolet-uvc-devices-for-air-cleaning-in-occupied-healthcare-spaces-guidance-and-standards/#6-engineering-design-specification-and-performance-validation)).

8.7 Training

Staff in areas supported by UVC air scrubbing devices should receive training on operational and safety issues. A mechanism should be in place such that staff can notify estates management and/ or clinical engineering departments of suspected device malfunction. In an NHS context, such training might be included in staff mandatory training programmes.

8.8 Labelling

All UVC air scrubbing devices should be labelled to inform users of operating procedures and potential hazards. Labels should serve to make users aware of how to interact with UVC devices. Explicitly, these should include a hazard label to ISO 7010 ‘Non-ionising radiation’ and an indicative label ’Does not contain user-serviceable parts’.

9. Maintenance

Maintenance shall be conducted only by a designated competent person.

9.1 Cleaning

Cleaning of UVC lamps is not required during normal operation in most environments. However, if UVC lamps are used within environments that are particularly dirty, then cleaning might be necessary (section 8.2 (https://www.england.nhs.uk/long-read/application-of-ultraviolet-uvc-devices-for-air-cleaning-in-occupied-healthcare-spaces-guidance-and-standards/#8-engineering-and-operational-considerations)). Only cleaning products in line with the UVC lamp manufacturer’s recommendations should be used.

The outside surfaces of devices should be designed to be easily cleaned as part of standard cleaning regimes in the healthcare setting and should not have features which are prone to collecting dust and dirt. The device should be robust to cleaning materials.

9.2 Lamp replacement

After lamps have exceeded their active operational life, they shall be replaced. Old lamps shall be disposed of according to local SOPs (section 6.3.1 (https://www.england.nhs.uk/long-read/application-of-ultraviolet-uvc-devices-for-air-cleaning-in-occupied-healthcare-spaces-guidance-and-standards/#6-engineering-design-specification-and-performance-validation)).

9.3 Annual checks

All mobile UVC devices should undergo annual checks to verify their continuing performance. These checks should include, but are not limited to, the following:

- visual inspection of external and internal
- PAT test (5.1.2 Electrical safety (https://www.england.nhs.uk/long-read/application-of-ultraviolet-uvc-devices-for-air-cleaning-in-occupied-healthcare-spaces-guidance-and-standards/#5-engineering-implementation))
- check alarms simulate failures
- check lamp run times and replace if necessary. (6.3.1 Effective life span (https://www.england.nhs.uk/long-read/application-of-ultraviolet-uvc-devices-for-air-cleaning-in-occupied-healthcare-spaces-guidance-and-standards/#6-engineering-design-specification-and-performance-validation)).
- lean internals of the device.

- measure UVC irradiance level against manufacturer's characteristic-specification (8.6 Verification of performance (https://www.england.nhs.uk/long-read/application-of-ultraviolet-uvc-devices-for-air-cleaning-in-occupied-healthcare-spaces-guidance-and-standards/#8-engineering-and-operational-considerations))
- replacement and safe disposal of any filters (8.2 Conventional HVAC filters (https://www.england.nhs.uk/long-read/application-of-ultraviolet-uvc-devices-for-air-cleaning-in-occupied-healthcare-spaces-guidance-and-standards/#8-engineering-and-operational-considerations))
- check air flow rate measurements at different speeds against manufacturer's characteristic-specification (8.6 Verification of performance (https://www.england.nhs.uk/long-read/application-of-ultraviolet-uvc-devices-for-air-cleaning-in-occupied-healthcare-spaces-guidance-and-standards/#8-engineering-and-operational-considerations))
- check for UVC light spillage (4.1 Accidental exposure (https://www.england.nhs.uk/long-read/application-of-ultraviolet-uvc-devices-for-air-cleaning-in-occupied-healthcare-spaces-guidance-and-standards/#4-safety))
- check noise levels against manufacturer's characteristic-specification (6.4 Noise considerations) (https://www.england.nhs.uk/long-read/application-of-ultraviolet-uvc-devices-for-air-cleaning-in-occupied-healthcare-spaces-guidance-and-standards/#6-engineering-design-specification-and-performance-validation)
- apply annual check sticker.

10. Building Management System (BMS) module

The incorporation of a BMS module into UVC air scrubber devices is recommended to afford the assurance of effective operation and to support maintenance scheduling. Modules should be enabled with the BACNet* open protocol for interfacing with existing an BMS.

*BACnet is a communication protocol for building automation and control (BAC) networks using the ASHRAE, ANSI and ISO 16484-5 standards protocol.

Annex 1 – Historical reference to UVC effectiveness

Downes and Blunt demonstrate that sunlight prevents microbial growth:

- [H.1] Downes A, Blunt TP. Researches on the effect of light upon bacteria and other organisms. Proc R Soc Lond 1877; 26: 488-500 (https://emea01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.jstor.org%2Fstable%2F113427&data=04%7C01%7C%7Cb8bec46e1b4142daf87908d9c3b5

Gates shows UV-spectral dependency with peak effectiveness around 265nm:

- [H.2] Gates FL. A study of the bactericidal action of ultra violet light: III. The absorption of ultra violet light by bacteria. J Gen Physiol 1930; 14(1): 31-42 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2141090/).

Wells proves the concept of infection via the airborne route and demonstrates the ability of UVGI to inactivate airborne microorganisms:

- [H.3] Wells WF. On air-borne infection: study II. Droplets and droplet nuclei. Am J Hyg 1934; 20: 611-8.
- [H.4] Wells WF, Fair MG. Viability of B. coli exposed to ultra-violet radiation in air. Science 1935; 82: 280-1 (https://pubmed.ncbi.nlm.nih.gov/17792965/).

Riley and Wells classic experiment which demonstrated that TB is airborne and that UVC reduces transmission:

- [H.5] Riley RL, Mills CC, O'Grady F, Sultan LU, Wittstadt F, et al. (1962) Infectiousness of air from a tuberculosis ward. Ultraviolet irradiation of infected air: comparative infectiousness of different patients. Am Rev Resp Dis 85: 511–525.

10.1 Reading list: recent peer reviewed papers demonstrating UVC effectiveness

Laboratory chamber studies demonstrating effectiveness of upper-room UV devices:

- [R.1] Ko G, First MW, Burge HA. The characterization of upper-room ultraviolet germicidal irradiation in inactivating airborne microorganisms. *Environmental Health Perspectives*, 2002; 110: 95–101. doi: 10.1289/ehp.0211095 (https://doi.org/10.1289/ehp.0211095)
- [R.2] McDevitt JJ,Milton DK,Rudnick SN,First MW. Inactivation of Poxviruses by upper-room UVC light in a simulated hospital room environment. *PLoS One*, 2008; 3: doi:10.1371/journal.pone.000318 (https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0003186).

Efficacy of recirculating UVC units:

- [R.3] Corrêa TQ, et al. Efficiency of an air circulation decontamination device for microorganisms using ultraviolet radiation. *Journal of Hospital Infection* 2021; 115: 32–43. doi: 10.1016/j.jhin.2021.06.002 (https://doi.org/10.1016/j.jhin.2021.06.002)

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- [R.4] Snelling WJ, Afkhami A, Turkington HL, Carlisle C, Cosby SL, Hamilton JWJ, et al. Efficacy of single pass UVC air treatment for the inactivation of coronavirus, MS2 coliphage and Staphylococcus aureus bioaerosols. *Journal of Aerosol Science 2022*; 164: 106003. doi: 10.1016/j.jaerosci.2022.106003 (https://doi.org/10.1016/j.jaerosci.2022.106003)
- [R.5] Lee LD, Delclos G, Berkheiser ML, Barakat MT, Jensen PA. Evaluation of multiple fixed in-room air cleaners with ultraviolet germicidal irradiation, in high-occupancy areas of selected commercial indoor environments. *Journal of Occupational and Environmental Hygiene* 2002; 19(1): 67-77. doi: 1080/15459624.2021.1991581 (https://doi.org/10.1080/15459624.2021.1991581).
- [R.6] Qiao Y, Yang M, Marabella IA, McGee DAJ, Aboubakr H, Goyal S, et al. Greater than 3-log reduction in viable coronavirus aerosol concentration in ducted ultraviolet-C (UV−C) systems. *Environmental Science and Technology* 2021; 55(7): 4174-82. doi: 10.1021/acs.est.0c05763 (https://doi.org/10.1021/acs.est.0c05763)

Reduction in infection rates using various UVC approaches:

- [R.7] Menzies D, Popa J, Hanley JA, Rand T, Milton DK. Effect of ultraviolet germicidal lights installed in office ventilation systems on workers' health and wellbeing: double-blind multiple crossover trial. *Lancet* 2003; 362(9398): 1785-91. doi: 10.1016/S0140-6736(03)14897-0 (https://doi.org/10.1016/S0140-6736(03)14897-0).
- [R.8] Leach T, Scheir R. Ultraviolet germicidal irradiation (UVGI) in hospital HVAC decreases ventilator associated pneumonia (https://www.ashrae.org/file%20library/technical%20resources/covid-19/ashrae-d-ny-c023.pdf). *Ashrae Winter Conference*, 2014
- [R.9] Escombe AR,Moore DAJ, Gilman RH, Navincopa M, Ticona E, Mitchell B, et al. Upper-room ultraviolet light and negative air ionization to prevent tuberculosis transmission. *Plos Medicine* 2009; 6: doi: 10.1371/journal.pmed.1000043 (https://doi.org/10.1371/journal.pmed.1000043).

Wider reading on UVC and air cleaning applications:

- [R.10] Wladyslaw Kowalski, Ultraviolet Germicidal Irradiation Handbook UVGI for Air and Surface Disinfection, 2009, Springer doi: 10.1007/978-3-642-01999-9 (https://doi.org/10.1007/978-3-642-01999-9)
- [R.11] SAGE-EMG paper on air cleaning devices in the context of Covid-19 (https://www.gov.uk/government/publications/emg-potential-application-of-air-cleaning-devices-and-personal-decontamination-to-manage-transmission-of-covid-19-4-november-2020)

Annex 2 – Acknowledgements

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Annex 3 – Glossary

- **Absorption (light):** Intake or retention of electromagnetic waves via conversion to heat, here: 254 nm wavelength radiation.
- **Active operational life:** A product's operational life is the period for which a product is in use before it becomes obsolete, in terms of UVC lamps it is typically 70% of original efficacy.
- **Aerosol generating procedure (AGP):** An aerosol generating procedure refers to a health care treatment (eg dentistry/endoscopy) or event (cough/sneeze) which generates particulate matter referred to as droplets or aerosols.

- **Air changes per hour:** Air changes per hour (ACH) is the measurement at which air volume per hour is added to a room divided by the total volume of the room. It represents the number of complete air exchanges in one hour under perfect air circulation conditions. See also Equivalent air changes per hour.
- **Air circulation:** Mixing of the air from natural or mechanical ventilation sources inside an enclosure.
- **Air circulation efficiency (%):** A measure of the effectiveness of air circulation in a real enclosure with obstructions such as occupancy and furniture, compared with perfect mixing as quantified by ACH/eACH. CFD studies in hospital and high-street treatment rooms indicate that the air circulation efficiency can vary between 40% and 80% depending on the device placement and proximity of furniture, equipment and occupancy. Similar variance applies to AGP-clearance and therefore will affect fallow time.
- **Age of air:** Time (s/min/h) locally the air has been inside the enclosure/room at that location since entering from a fresh/clean/purified source (natural ventilation source, mechanical ventilation source or purification device). This is a useful measure of dead or recirculating air pockets in the enclosure volume.
- **Apertures:** Windows, doors and external vents connecting the enclosure to the outside atmosphere.
- **Biofilm:** Biofilms consist of a thin slime or dry layer (film) in which microorganisms (eg. bacterial or algae) are embedded. They form mainly in water systems, either on the surface of the water or on an interface with a solid phase. Inside the biofilms the embedded organisms are active and growing so that new microbes continuously are spread into the water. By this, for example, cooling systems and water reservoirs get steadily contaminated. Furthermore, on dying biofilms moulds and yeasts can settle down.
- **BMS (Building Management System):** A computer-based control system installed in buildings that controls and monitors the building's mechanical and electrical equipment such as ventilation, lighting, power systems, fire systems and security systems.
- **Building regulations:** Building regulations set standards for the design and construction of buildings to ensure the safety and health for people in or about those buildings. They also include requirements to ensure that fuel and power is conserved, and facilities are provided for people, including those with disabilities, to access and move around inside buildings. Current standards require that healthcare buildings conform to NHS standards. For ventilation NHS HTM-03 applies.
- **CFD (computational fluid dynamics):** Computer-based fluid dynamics modelling providing a means to simulate air flow combined with convective/buoyant/conductive/radiative heat transfer, particulate transport (aerosols and droplets) and turbulence.
- **Characteristic specification (Characteristic verification):** A measurable property of the device that can employed routinely by the user to provide assurance of device operation to the verification model. See Verification.
- **Clearance:** The relative removal of a contaminant usually expressed as %. See Log reduction.
- **Construction Design and Management (CDM) regulations:** CDM regulations are a set of health and safety regulations that apply to every construction project in Great Britain.
- **D90:** Dose of UV to inactivate 90% of a microbial population. See k value.
- **Decontamination:** Decontamination describes the reduction of pathogenic microorganisms to a safe level for human use. Technically, this means reduction by a minimum of 1 log step, meaning 90%.
- **Disinfectant:** Disinfectants contain ingredients which either kill or inhibit the growth of microorganisms. Disinfectants require sufficient application time and must be used at sufficiently strong concentrations. Some well-known disinfectants are alcohols (eg. isopropanol), hydrogen peroxide (H_2O_2), ozone (O_3) and tinctures containing iodine.
- **Disinfection:** The term disinfection is not clearly defined in a technical sense. Generally, for the purposes of this standard, it means a reduction of pathogenic microorganisms by a minimum of 3 log steps. Hence, the term 'UVC disinfection' describes the inactivation of at least 99.9% of a given pathogenic population with the aid of UVC technology.
- **Dose:** aka 'Radiant Exposure'. The irradiance absorbed per unit time. Explicitly UV dose ($\mu W \cdot s.cm^{-2}$) = UV irradiance ($\mu W.cm^{-2}$) × exposure time (s)
- **Electromagnetic spectrum:** The electromagnetic spectrum is the range of all frequencies of electromagnetic waves.
- **Electromagnetic wave:** An electromagnetic wave consists of an electrical and a magnetic field component. Unlike pressure waves, electromagnetic waves do not require a medium for propagation; their propagation speed depends on the medium, with propagation in a vacuum taking place at the speed of light. The best-known electromagnetic waves are probably those described colloquially as 'light'.
- **Emission:** The sending out of electromagnetic waves.
- **Emitter:** The source of radiation is defined as an emitter.
- **Epidemic:** A localised, heavily massed occurrence of an infectious disease. See also Pandemic.
- **Exposure time or dwell time:** Length of time for which a microorganism is exposed to UVC irradiation (in the context of this standard).
- **Equivalent air changes per hour, eACH:** Equivalent air changes per hour, or eACH, is a measure of the 'equivalent' amount of air that is cleaned by a UVC device as a ventilation rate of new outside-air changes would achieve in one hour. See ACH. Note that this applies to decontamination and does not obviate the need for meeting minimum fresh air standards.
- **Fallow time:** Time (s/min/hr) allocated to a treatment room without occupancy to allow for clearance of the room after a contamination event (eg an AGP) to recover safe levels for occupancy.
- **FDA:** [Food and Drug Administration] – the FDA is the American federal agency responsible for food monitoring and drug licensing. It is subordinate to the Department of Health and Human Services.

- **Fluence:** The amount of irradiation ('dose') within an enclosed space to which the air being treated by UVC is subjected. Unit is mJ.cm-2.
- **Fungicide:** Chemical or biological agent for destroying fungal spores and moulds.
- **Germicidal:** Action destroying or deactivating a microorganism.
- **Germicidal ultraviolet/germicidal ultraviolet irradiation:** Referred to commonly as GUVC and UVC. Both are one and the same in that they refer to ultraviolet C spectrum light that is germicidal.
- **HACCP:** [Hazard Analysis and Critical Control Points] – a preventive system intended to ensure food, medicines and safety critical products safely from manufacture to the consumer.
- **Hazard assessment:** A hazard assessment is a thorough check of the occupational environment. The purpose of a hazard assessment is to identify potential risks and hazards in the area, as well as to identify appropriate safety measures to be used to mitigate, eliminate or control the identified hazards.
- **HAZOP:** [Hazard Analysis and Operational study] – a systematic way to identify hazards in a work process.
- **IAQ (Indoor Air Quality):** A generic term used for air quality in enclosed spaces, usually referring to the combination of harmful gases (eg. CO2 and CO levels measured in parts-per-million, ppm), temperature (for thermal comfort), total volatile organic content (TVOCs measured in parts-per-billion, ppb), relative humidity (%) and particulate matter size (respiratory irritants/hazards) measured in microns-diameter, eg. PM2.5, PM10.
- **Inactivation:** Prevention of microbial replication.
- **Infection:** The process by which pathogens penetrate the body of an organism and multiply therein. Depending on the transmission route, we distinguish between contact infections and airborne infections.
- **Infectiousness:** Measure for describing the ability of a pathogen to cause actual infection in a host after transmission occurs.
- **Intensity:** In physics, 'intensity' describes energy density with respect to area.
- **Ionising radiation:** Ionising describes the type of radiation capable of permanently removing electrons from atoms or molecules. Note: UVC radiation has no ionising power (See also Technology – generating UVC rays).
- **IP rating:** [Ingress Protection] – types of protection that are classified according to IEC standard 60529. The letters IP are followed by two digits, the first indicating the degree of protection afforded against the ingress of solid bodies, and the second describing the degree of protection against the ingress of water.
- **k value:** Inactivation rate constant (susceptibility rate) k = (-ln(1-0.9))/D90. Units cm2.mJ-1.
- **Lethal dose:** Lethal dose (LD) is the term referring to the dose of a toxin or radiation which is deadly or inactivates an organism (this term includes microorganisms).
- **LD 90:** LD 90 is the dose which eliminates or inactivates on average 90% of an organism's population.
- **Lethality:** Lethality describes the ratio of deaths/eliminations/inactivations to survivals after a dose of radiation, infection, or illness viz the 'mortality rate'.
- **Living organism:** In biology, life forms capable of metabolic processes, replication and evolutionary development (all three criteria must be fulfilled) are known as living organisms.
- **Log:** [common logarithm] – although the term 'log' is the usual abbreviation for base-10 logarithms, the mathematically correct term here is log10. We speak here of decadic logarithms.
- **Log reduction:** The reduction of a contaminant can be quantified in log stages. A Log reduction of 'x number' therefore means a reduction by 'x number Log' stages starting from a given population. The reduction by 1 log stage means a reduction of 90%, since only 10% have survived from the original population. See Clearance.
- **Log stage (a.k.a. Log step):** A log stage or log step describes the reductio n of a population by a (further) power of ten: in other words, 1 log stage = 90%, 2 log stages = 99%, 3 log stages = 99.9%, etc. See Log reduction.
- **Melanoma:** Also known as black-mole cancer – a melanoma is a malignant tumour appearing as an asymmetrically growing, discoloured change in the skin.
- **Microorganism (microbe):** A microorganism is an organic structure so small that they can generally only be seen with the aid of a microscope and include viruses, bacteria and fungi. Such structures are usually single-celled, although they are occasionally multi-celled.
- **Monochromatic:** Describes radiation of a precisely defined wavelength, as, for example, emitted by a laser.
- **Mutation:** The changing of the structure of a gene, resulting in a variant form that may be transmitted to subsequent generations.
- **Nosocomial infection:** An infection contracted in a hospital or care institution.
- **Optical radiation:** The electromagnetic wavelength range between 100 nm and 1 mm is referred to as optical radiation. This includes ultraviolet radiation (UV), the visible light spectrum (VIS) and infrared radiation (IR).
- **Organism:** An organism is an individual life form. See Living organism.
- **Ozone:** Represented as O3. Ozone is a gas with strong oxidation properties that is toxic in low concentrations. Ozone can result from the oxidation of O2 irradiated by far UVC.
- **PAT (portable appliance testing):** Requirement of the Low Voltage Directive to demonstrate general electrical safety.
- **Pandemic:** A pandemic is an infectious disease of temporarily exceptionally high prevalence occurring across national borders. See also Epidemic.
- **Pandemic resilience:** Pandemic resilience is the ability to withstand, protect and recover quickly from any pandemic by ensuring infrastructure and buildings are equipped with the necessary safeguards to combat, eliminate or control pathogenic hazards that are so prevalent as to be classified as a pandemic or endemic hazard.
- **Pathogen:** Pathogens are microorganisms capable of causing disease or illness in living creatures.
- **Prevention:** The taking of precautionary measures to stop undesirable occurrences.

- **Radiometer:** A radiometer serves to measure electromagnetic power These devices are generally based on photodiodes which convert the incoming radiation into a proportional electrical signal.
- **Radiometry:** Radiometry is the science of radiation measurement.
- Reflection: The (partial) return of electromagnetic waves at an interface. Reflection is the opposite of absorption. UVC air cleaners will be fitted with highly reflective materials within the air passageways in order to reflect and thereby amplify the amount of UVC in the air.
- **Residence time:** The average time taken by the air or airborne particles to pass through the UVC fluence zone. Unit seconds (s).
- **Sanitisation:** The process of reducing microbiological contamination. See Clearance and log reduction.
- **Sensitivity:** Here: responsiveness or susceptibility to UVC radiation. See k value.
- **SOP:** (Standard operating procedure) A set of step-by-step instructions compiled by an organization to help workers carry out routine operations.
- **Sound level: dB3m:** The acoustic power represented by dB measured at 3 m from the source.
- **Target:** A person, organism or thing that receives or is infected by an intervention.
- **Toxic:** The effect of a toxin is described as toxic. ‘toxic’ can also be defined as meaning ‘poisonous’.
- **Toxicity:** The degree to which a toxin is toxic or poisonous.
- **Toxin:** A toxin is a biogenic substance capable of damaging an organism by disrupting its physiological metabolic processes. The scientific discipline investigating toxins is called toxicology.
- **UV spectra:** The UV spectrum is commonly sub-divided into four regions:
  - Far UV or vacuum UV: [100…200] nm
  - UVC: [200…280] nm (NB germicidal UV)
  - UVB: [280…315] nm
  - UVA or near UV: [315…400] nm
- **Validation (bio-validation):** The process to provide assurance that the device is effective as claimed by the manufacturer. For the purposes of this standard, assurance that sanitisation is achieved as claimed.
- **Verification:** The process to provide assurance that the device performs to the manufacturer’s specification. For the purposes of this standard, assurance that air flow and UVC dose are as claimed.
- **Viruses:** Viruses are particles or information carriers dependent for survival and replication upon the metabolism of a host cell since they themselves have no cytoplasm and are incapable of metabolism. Viruses are thus, de facto, not living organisms.

The National Estates and Facilities team at NHS England is responsible for producing Standards and Guidance for the NHS estate and ensuring that the information and guidance they contain remains up-to-date and relevant for users.

NHS Estates Technical Bulletins (NETBs) enable updated guidance to be passed to local systems, ensuring we maintain our focus on patient safety. NETBs contain technical guidance and standards which systems and organisations are required to consider and implement, where applicable. Boards are responsible for their assessment and application to their organisations.

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