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

Witness Statements – Week Commencing 23 September 2024 – Volume 6

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Scottish Hospitals Inquiry

Witness Statement of

Dr Alan Mathers

This statement was produced by the process of sending the witness a questionnaire with an introduction followed by a series of questions and spaces for answers. The introduction, questions and answers are produced within the statement.

Personal Details and Professional History:

1. Full name

A. Dr Alan Moncreiffe Mathers

2. Occupation

A. Consultant Obstetrician and Gynaecologist / Chief of Medicine Women and Children Greater Glasgow and Clyde Health Board

3. Qualification(s)

A. MBChB., F.R.C.O.G.

4. Please list your professional qualifications, with dates

A. 1979 MBChB.(Glasgow); 1986 M.R.C.O.G. Royal College Obstetricians and Gynaecologists ;1998 F.R.C.O.G.

5. Please give your chronological professional history, detailing all roles held where and when- please also provide an up-to-date CV

A. See CV supplied.

6. What specialist interest / expertise / qualifications in any area of Infection control do you hold? E.g., hospital ventilation, water Legionella control and infection control related to the built environment, and epidemiology and outbreak management.

A. None

QEUH and the Infection Control Team:

7. Please describe your role in the management of infections at QEUH/RHC in the IMT structure. Who did you report to, and who reported to you? In essence we need a "mini-CV" covering this period role by role.

A. Not applicable

8. Did you have any experience with QEUH prior to this? If so, please give details.

A. Not applicable

9. What was your impression of QEUH when you saw it for the first time? Did you have any concerns from an infection control perspective?

A. Not applicable

10. Are you aware of any concern any of your colleagues had from an infection control perspective? If so, please give details.

A. Not applicable

11. The Inquiry requires to consider whether the choice of sites was appropriate or gave rise to an increased risk to patients of environmental organisms causing infections. Please explain any view that you had in this regard?

A. As far as I understand, the process deciding the site was conducted through a robust option appraisal, as presumably was the tendering process. I have been involved in the commission of other buildings in GGC HB (for example the Princess Royal Maternity tower and the North Ambulatory Hospital, plus

smaller building alterations) and had a favourable impression that these processes were conducted in a fairer and professional manner. I wasn't involved in the QEUH / RHC Commissioning process.

12. From an infection control perspective, do you have a view on whether the proximity of the hospital to sewage works causes a risk to patients? Please explain why you take this view.

A. I am not an expert in Infection Control and take no view on the matter.

13. What were your first impressions of the IPC team? Were you aware of any of the following issues:

a) existing tensions between staff?

A. I never, to my recollection met an IPC "team" as such. Without a list of individuals it is difficult to be specific, but I did meet individuals from that service in various meetings relating to infection control / management. By hearsay, I was aware that there were issues within the Microbiology / Infection Control "Team", in the same way that I was aware that the consolidation of other services on the QEUH campus had resulted in some need to agree a unified working practice, shared guidelines, etc. etc. This happens with any amalgamation of teams and of course change is difficult for many. In the context of the QEUH, as an amalgamation of 3 hospital services, it is not surprising that there were a range of perspectives crudely divided into "winners and losers". I was also aware that some internal issues were present in Microbiology regarding the then Clinical Lead, Professor Craig Williams, and other Consultants, but I was not aware of the specifics. I am not inclined by nature to participate in rumour and in my managerial role I am exposed to multiple expressed diverse opinions and have had to assess and investigate a variety of information sources, triangulate such information and address any matters if it is within the scope of my role, or escalate upwards or across the system on a "need to know" basis, as one cannot ignore such information. I was told nothing that I reckoned to need any intervention from myself, as I was contemporaneously told that processes to address any issues were in train.

b) lack of clarity around roles and decision making?

A. See above

c) relationships (i.e., between ICM and ICD)?

A. See above

d) Issues with record keeping-?

A. No

e) culture and bullying; and

A. See above. I don't know specifics but I would have considered bullying to be a serious matter and was not aware that the issues might be of that nature.

f) attitude of senior management and board to infection control issues?

A. I have been in a medical management role since 1995. GGCHB evolved from individual Trusts and 2 separate Health Boards. So over the years I have seen a number of infection control events and the wider infection prevention strategies, both on a day to day basis and when the building works I previously alluded to, and unrelated to the QEUH, were in development and realised. The majority of memorable cases involving infection control issues were within the Maternity and Neonatal Services, often in the Neonatal Intensive Care environment, some related to individual practitioners as advising / investigators and others with respect to wider system issues such as surgical prophylaxis. I have benefited from the insight and expertise of these various Clinicians (Special Nurses and Doctors) and Managers (Clinical and Non-Clinical) and have found the Senior Management to be appropriately concerned and engaged in addressing the issues on every occasion. I cannot recall coming across complacency in such matters from the highest level down.

Infection Control in General:

14. What is your understanding of how infection within the QEUH/RHC was and is monitored, investigated, reacted to and reported both internally and externally. Please provide full details.

A. I would refer to the Board Policies, which have been created and / or modified over my career and in response to evolving challenges. I note the external scrutiny provided from national bodies in Scotland (many of whose names and functions have changed over the years). I have not had a specific designated role within either of these systems.

Water System:

15. The water supply in General:

a) What concerns, if any, did you have about the water supply?

A. I had no knowledge of any concerns until made aware of same when issues arose and evolved.

b) Do you consider there to have been a risk of infection from the water supply? If so, explain.

A. As a Doctor, water borne infections to my mind are associated with matters out with a normal UK NHS Health Care environment, for example natural disasters, wars, pollution events, public health managed outbreaks, etc. So, at the basic level, I would expect water supplies to meet basic standards and be safe to use in the UK.

c) Are you aware of whether a risk assessment was carried out prior to handover in 2015? If not, are you aware of why one was not carried out?

A. I did not know of any risk assessment as specified in 2015, I am not aware of why one was not carried out if that is the case.

d) Are you aware of remedial measures being taken: e.g. room closure and cleaning; ward closure; investigative and remedial works? What were these and when were they taken?

A. Yes, as the issue unfolded in the RHC. I cannot supply a detailed time line but expect this information will have been supplied regarding the various mitigations attempted as the infection control concerns involved, as there were many meetings and interventions.

e) What is your understanding of whether any issues with the water system (including drainage) have been resolved. Are you satisfied with this, or do you still have concerns?

A. I have been reassured that the water quality is no longer an issue and have seen no data to suggest otherwise.

f) What were the impacts on staff and on patients overall?

A. It is quite impossible to underestimate the impact on patients, parents and staff (all clinical types and all non-clinical, from domestics, administration, porters, right up to senior managers). The RHC team (as a universal Paediatric service) have my highest admiration with regards to their dedication in every aspect of their care to their patients, relatives and their colleagues. They are focused on the little details that make such a difference to clinical outcomes. That they continued to excel amongst this background of uncertainty and changing spaces, rules and procedures, is a testament to their professionalism, resolve and personal strengths. There was genuine and consistent concern and at no point did this move into the type of "downwards re-set" that would beset, for example, the mid Staffordshire Hospital system: a demonstration of the RHC staff's resilience. I note that some colleagues demonstrated their concerns outward and vocally, others in different ways, and at all times they were making carefully judged risk assessments on what was in the best interest of their patients, not least in the Haemato-Oncology Service. There was a universal desire to find an answer, engage in a collegiate manner and intelligently look at potential short and long term mitigations. Of course there were some meetings in which people

robustly challenged information given, but this was always, to my mind, in a respectful way, as befits professional people. As my clinical practice is in the Glasgow Royal Infirmary, I am aware of wider impacts having been asked on many occasions “is QEUH / RHC safe?”, when people were going to have relatives treated there. I had relatives, colleagues and their children managed through the great phase of uncertainty within the QEUH / RHC, so had a personal awareness in the matter and also because my domicile is within the QEUH catchment area. The media attention (TV, radio and newspapers), in addition to the social medical activity, were additional strains to staff. Although I believe the Board through the Core Brief structure were supplying information, I would judge the impact of mainstream media to be greater than internal communications of any kind. I reiterate that my impression was that the impact was throughout the service, “management and non-management”.

g) When were you first made aware of the DMA Canyon report of 2015? How did you become aware of the report?

A. I was not aware of this report. The name is completely unfamiliar to me and doesn’t come up in any email search on my system until the Public Inquiry.

h) The report makes several recommendations. Do you know what was done to follow up on these recommendations between 2015 and 2017?

A. See g above

i) Do you know if/when the works suggested in the 2015 report were actioned?

A. See g above

j) What is your own view of the findings of the 2015 report? Do you agree with it or not? Explain your rationale.

A. Not applicable

k) The 2015 report highlights several actions required to be taken, are you aware how these actions were managed by estates? If so, please provide details of the management of the recommended actions.

A. See g above

l) DMA Canyon prepared another report in 2017. When did you become aware of this report? Do you know what works, if any, recommended in the 2015 were carried out prior to the 2017 report? What actions did you or other take in relation to the 2017 report's recommendations?

A. See g above

m) What was the impact, if any, of the failure to implement the 2015 recommendations on patient safety?

A. I cannot comment

n) We understand that Infection Control were only advised about the 2015 DMA Canyon Report in 2018. Do you know why this was the case?

A. No

o) Do you have any concerns about the way in which the water system was managed?

A. I cannot comment as I was not involved in this. My involvement was in the consequences of any clinical matters that followed.

p) What risk assessments have been undertaken in respect of the water system since the DMA Canyon Reports? Please provide details.

A. I cannot comment as I was not involved in this.

q) Following the DMA Canyon Reports, what water maintenance strategies were put in place? Who is/was responsible for these? Please provide details of any applicable strategies which were put in place.

A. I cannot comment as I was not involved in this.

r) Some witnesses (e.g., Christine Peters) have said that, had they had sight of the 2015 DMA Canyon report at the time, they would not have allowed the hospital to open. Do you agree?

A. I cannot comment as I have neither the expertise nor information about the reports cited.

Ventilation System:

16. The ventilation system in general:

a) What concerns, if any, did you have about the ventilation system?

A. None until the issue was raised through ICT / Clinical Cases

b) Do you consider there to have been a risk of infection from the ventilation system? If so, explain.

A. Not until it was raised as a potential issue

c) Are you aware of remedial measures being taken: e.g. ward closure; investigative and remedial works? What were these and when were they taken?

A. Yes, as I was an active part of the Women's & Children's (W&C) Directorate Management Team. I expect that a precise time line and details will have been supplied. Various Minutes provided and discussed in later questions describe these matters.

d) What is your understanding of whether any issues with the ventilation system have been resolved. Are you satisfied with this, or do you still have concerns?

A. My understanding is that they have been resolved in the RHC and have no data to suggest differently.

e) What were the impacts on staff and on patients overall?

A. See answer to Section C, Question 15f.

f) To what extent were you consulted or briefed about the specifications of the ventilation system of the hospital before it opened – perhaps by attending meetings or workshops run by the contractors or being sent or shown plans or specifications for particular wards?

A. I was not involved in the design and build of the RHC. I took over the Chief of Medicine's role in June 2015 but remained in post as the Clinical Director of Obstetrics & Gynaecology, until that post was filled in September 2015. I was in attendance at one meeting held at the Queen Mother's Hospital between the contractors and representatives of the Microbiology team (I recall Dr J Hood and Dr B Jones, Microbiology Consultants, both of whom I had previously met over the years, being there), Estates and non-clinical senior management. I was very much new to the specific development. From recollection, this meeting focused on a difference in understanding between the specifications of rooms dedicated for Haemato-Oncology patients and the differences between the specifications provided at the Beatson site, the QEUH adult facilities and the specialised rooms within the Haemato-Oncology Paediatric Ward (2A and Paediatric Intensive Care Unit). There was a clear difference of opinion between the construction companies understanding of the specifications and others within the room. Much of the argument focussed on a specific set of room specifications, set against National standards. Whilst this meeting was conducted in a professional manner, my recollection was that the atmosphere was quite tense, the matter unresolved and that it was elevated to (presumably) further up the project board ladder. As described elsewhere, I neither recall nor have been able to find out, whether I was cited in a minute, but wish to record this answer as my name may appear as a participant. My recollection was obviously also in the context of being new to my more senior managerial role and the project. My past experience with building projects in hospital, are that there are instances when national recommendations / specifications are changed within the timespan of a hospital construction, and so "retro fits" or other accommodations are sometimes required, areas repurposed (sometimes post-commissioning) or some form of formal acceptance that any new recommendations cannot be achieved and a risk assessment made for clarity and assurance regarding the

impact of non-compliance. An example might be that a new build Paediatric or Maternity Unit could be required to provide some or additional parental accommodation, more than was initially planned for when the building was commissioned or the building work completed. It might be an impossible aspiration after a build is completed. Returning to the meeting described above, my impression at the time was that the matters discussed could only be resolved by experts in Microbiology building systems and Contractual Law as something as an impasse had been reached.

Particular events:

17. The Inquiry understands that between July and September 2015, you attended at two meetings with Jamie Redfern and Jennifer Armstrong where concerns about the ventilation in Ward 2A were discussed. Please provide us with details of these meetings, including details of:

a) The dates and times of the meetings?

A. My diary at that time was managed by 2 now retired personnel: Ms Kathleen McGrath (O&G Directorate Personal Assistant, retired 2023) and Mrs Janice Hackett (Personal Assistant to the Directorate Team, including myself and Mr Kevin Hill, the then Director of Women & Children). IT systems have changed and my Email Archives were affected so I am unable to confirm the dates and times of this meeting from my calendar and both personal assistants' accounts are inactivated. It is possible that the meeting was never formally in the Diary as it might be at a time I would be in the Management Corridor (I shared an office with the Director, Mr Kevin Hill), was at short notice, and during a time I was known to be at the Children's Hospital. As described, my Email Archive (I tend to archive rather than delete) lost functionality during various IT changes and so, whilst I have searched, no memo or note has been retrieved.

b) Who do you recall called for these meetings?

A. Without a minute I cannot recall details of this meeting

c) Who do you recall had raised concerns about the ventilation in Ward 2A?

A. My recollection is that at this time, concerns were about whether Ward 2A treatment rooms were fit for purpose with regards to general Infection Control and practical matters rather than specifics about “the ventilation system”. So, there was interest in the control of external barriers to infection (e.g. from visitors, clothing, the optimal use of the space between corridors and actual room a patient would be in, water seals and such-like. Ventilation of air “in and out” concerns were discussed in terms of filters but we were not Estates or Infection control experts and so these discussions were not going to lead to a decision as such, but probably informed questions to pose with experts in the relevant area. For my part, I was learning a lot about things that were previously not part of my clinical or managerial experience. I also recall that at that time, the focus was very much on Fungal infection risks in general in this “at risk” population and not solely related to the ventilation system. There was a broad concern about environmental fungal spores (for example brought in on visitor’s footwear) because of the older areas of the site. I particularly remember these concerns being illustrated by Dr Inkster (at a separate meeting) regarding the yet to be demolished “old” Southern General Management Offices, because it was an area of the Hospital I had visited on many occasions (Senior Managers had offices there) over the years and was in a state of some disrepair and I understood to be scheduled for de-commissioning.

d) What were the specific concerns discussed?

A. From recollection the main issues were related to minimising risk and the type of environmental monitoring required, by this I mean using culture plates and other techniques to ascertain particle counts and grow fungi if present. Mitigations such as prophylaxis (at a completely different level than later) would have been part of these discussions.

e) What, if any actions arose from those meetings?

A. Again from recollection, expert advice had been sought regarding the potential risks described in 17D, and what monitoring practices were practiced in comparable sites.

18. On 10 August 2015, you attended at a 'RHSC BMT Meeting'. Please provide details of this meeting, including:

a) Who attended at the meeting?

A. There is no reference in any of the bundles to a minute of this meeting, hence I am unable to answer. If details can be retrieved I would appreciate sight of these.

b) What was the purpose of the meeting?

A. There is no reference in any of the bundles to a minute of this meeting, hence I am unable to answer

c) What was discussed at the meeting?

A. There is no reference in any of the bundles to a minute of this meeting, hence I am unable to answer

d) What actions arose from the meeting?

A. There is no reference in any of the bundles to a minute of this meeting, hence I am unable to answer

19. On 7 September 2015, you attended a meeting to discuss the BMT Unit in the RHC (See SHI Bundle 6, Miscellaneous Documents at page 20)

a) Who attended at this meeting?

A. There is a minute with attendees

b) What was the purpose of the meeting?

A. As per the Minute: To determine bone marrow transplant position, room status and the position from the Clinicians on starting to treat new patients.

c) What was discussed at the meeting?

A. As per the minute provided.

d) What actions arose from the meeting?

A. As per the minute provided.

20. On 11 September 2015, you exchanged e-mails with Dr Teresa Inkster regarding anti-fungal prophylaxis **(See SHI Bundle 6, Miscellaneous Documents at page 25)**

a) Why did you seek Dr Inkster's views on anti-fungal prophylaxis?

A. From reviewing the emails provided and from recollection (as previously stated I knew only a few microbiologists and they were probably all at the GRI site). I believe Dr Inkster attended and advised, either in lieu of another Practitioner, or because she was an available member of the Infection Control Team, or similar. These matters were well beyond my area of expertise, I will have made contact either by instruction or because they were the designated responsible individual for that day, or possibly assigned to the project by someone other than myself.

b) What was her view?

A. Her view is expressed in an email 11th September 2015 at 15.58 **(A 40364475- Bundle 6 – Miscellaneous Documents - Page 30).**

c) Did you agree with her view? If not, why not?

A. I took her view as presented. Appropriately, she stuck to her area of expertise and, as she describes knew that there was "a difficult risk assessment" to make.

21. On 11 September 2015, you attended at a meeting involving senior management of the RHC. The Inquiry understands that air sampling results taken by Dr Inkster were discussed at this meeting. Please provide details of this meeting, including:

a) Who attended at this meeting?

A. I cannot recall and have not found a minute of this meeting.

b) What was the purpose of the meeting?

A. From recollection of what such meetings were generally about, the purpose would be to discuss the risks associated with bone marrow transplant treatment at RHC.

c) What was discussed at the meeting?

A. See above.

d) What actions arose from the meeting?

A. For my part, I spoke to Dr Brian Jones, Consultant Microbiologist, and almost certainly from the outcome of that meeting, further weekend testing was advised (email 11.09.2015 @ 17.52) **(Bundle 6 – Miscellaneous Documents – Hearing commencing 12 June 2023 – Page 35)**

e) On what basis did you consider that infection control should sign off Ward 2A? Did others take a different view? If so, who? Please provide details of any discussions or debate which may have taken place on this issue.

A. It has always been my view that a decision with relation to infection control (or, indeed, any specialist matter) should be left to expertise in that area with necessary collaboration in “shared areas” so that a “counsel of experts” is required to achieve a measured consensus. If the question seeks to suggest an instruction was made to “sign off” the area, then I can confirm I was not privy to any such instruction and would not consider that to be something that I would be in a position to do. It has not been my experience to be exposed to such commands in my managerial career. To my mind the issue was a balance of risks relating to potential patient harm from a known lethal and progressive illness versus what seemed to be a divided opinion regarding the microbiology monitoring process and risk. The environmental testing process and results were a necessity for same, and from recollection, these were problematic: there appeared to be no consensus from comparable units

regarding a monitoring / testing regime. In addition there was appreciation that fungal infections were a risk to anyone whose immune system was severely compromised as Bone marrow transplant and cancer chemotherapy and other immunosuppressant therapy will inevitably do. The risks and benefits were debated at length and I believe in a constructive and collegiate manner and taking into account expert opinions on all sides. There appeared to be a spectrum of opinions on the microbiological side.

f) What view did you take of Dr Inkster's concerns regarding the safety of the ward considering the results of her air samples? On what basis did you reach your views?

A. Dr Inkster is an expert in her area, her concerns were clearly articulated. I recall a debate about what weight her concerns should be given in the context of other microbiological opinion and the final risk assessment regarding the Unit treating patients had to balance multiple risks. My view as such was informed by all of the risks and benefits presented. I need to emphasise that the decision making process here was not, as far as I know, down to a single member of the Woman and Children's Directorate Team.

22. From 11 to 14 September 2015, you were involved in a number of e-mail exchanges concerning re-sampling in Ward 2A of the RHC **(See SHI Bundle 6, Miscellaneous Documents, pp 29-35).**

a) Why did Professor Jones consider there was no advantage to re-sampling cubicles 18 and 19?

A. From recollection is that it related to how further testing would inform the situation. From my email he obviously described his knowledge of how pathogenic (and potentially lethal) some fungi might be. I recall much general debate about the utility of various testing approaches; the main issue was about what link could be inferred from findings on an environmental monitoring plate versus the risk of an actual organism being detected in an individual patient's body that correlated with that environmental testing.

b) Why did you disagree with this view?

A. I did not have the expertise to agree or disagree.

c) There is reference **(Bundle 6 – Miscellaneous Documents – page 29)** to a call between yourself and Professor Jones. What was discussed in that call? What was the outcome?

A. I did not have the expertise to agree or disagree.

d) What actions were taken in respect of re-sampling cubicles 18 and 19?

A. I requested that sampling was performed as per the email.

e) Why were such actions taken?

A. To further determine risk or for assurance purposes.

f) What was the result of any re-sampling undertaken?

A. The results informed further actions between the Estates and ICT (as specified in other emails)

g) What actions were taken following on from these results?

A. I do not have specific details, but simply observe that my impression was that there was always an assessment and action from the sampling processes.

23. On 15 September 2015, you wrote by e-mail to Jamie Redfern and Jennifer Armstrong in respect of two SBARs which were to follow **(See SHI Bundle 4, SBAR Documents, p13.).** Please provide details as to the discussions and debates referred to.

a) In respect of SBAR 1:

i) What was the purpose of this SBAR?

A. I believe the SBAR outlines my observations regarding the extensive discussion and debates that I had been privy to in a fair and logical manner. As described in the “situation” section, there was a need to determine if bone marrow transplant therapy could be offered as a viable treatment option in the current service at RHC for a critically dependent case that had been through the clinical multi-disciplinary team process and had an available donor. From

recollection the donor was only likely to be available for a relatively short window and therefore there was a time imperative decision required.

ii) What prompted the drafting of this SBAR?

A. The urgent need to address a specific case.

iii) On what basis did you reach your conclusions?

A. I set out the issues as described to assist in achieving the executive decision that was required. I believe I represented a logical interpretation from my listening to various debates and after reflecting on multiple pieces of information. The option was, in a narrowing window of opportunity for the index patient, to either treat at RHC or seek treatment elsewhere. Hence my "conclusion" rested on whether other expert individuals (much more expert in these matters than myself) were in accord and that the Board could determine what was to follow. I reiterate that I made it clear that I was not an expert in the matters of infection control or haemato-oncology. I was seeking what is sometimes described as a "Go / No Go" decision.

iv) How was the SBAR received?

A. It was received as a positive contribution to the situation from verbal feedback.

v) What was the outcome of production of this SBAR?

A. The Board Medical Director and, I expect, the Chief Operating Officer and/or Chief Executive made a decision on the basis of further information that indicated was necessary (i.e. presumably the opinion of the Head of Microbiology and Dr Brenda Gibson's Team as mentioned).

b) In respect of SBAR 2:

i) What was the purpose of this SBAR?

A. As described there were other patients awaiting treatment.

ii) What prompted the drafting of this SBAR?

A. My concerns about the need to plan treatment and ensure any outstanding estate mitigations were progressed. I was not alone in the view that everyone involved needed the uncertainty about Estates matters to conclude and matters had come to a binary “start treatment in RHC or seek to refer (with all of the difficulties inherent in this for potential receiving units and the families involved)”. There was also an issue with the capacity of appropriate accommodation as the rooms were being altered to a different (higher) specification.

iii) On what basis did you reach your conclusions?

A. There was a need to plan evolving cases. The issues were the same ones addressed in SBAR 1.

iv) How was the SBAR received?

A. SBAR 2 reflected the need for more capacity to be made available (i.e. an expansion of the serviceable treatment rooms) and again was positively received.

v) What was the outcome of production of this SBAR?

A. From recollection Estates work continued to the point that capacity was increased.

24. Please refer to IMT 5 August 2016 concerning the increase in Aspergillus Infections in the Schiehallion Unit **(SHI Bundle 1, IMT Meeting Minutes, pp 22-26)**.

a) What do you recall about this incident?

A. It is described in the minutes. Two Aspergillosis cases had been identified in the Schiehallion Unit.

b) What was your involvement?

A. I received a minute and this would have resulted in discussion and a response from the Directorate Management Team.

c) When and how did concerns first arise?

A. See Minute.

d) What Investigations were done?

A. See Minute

e) Was there a hypothesis?

A. As I understand the term in ICT terms, a hypothesis is not precisely described in one sentence but areas of potential risk were described, as were potential mitigations

f) If so, was it borne out?

A. See 24E above

g) Were any interventions recommended? If so, were they sufficient?

A. See minute

25. On 19 April 2017, you attended at a meeting with Dr Teresa Inkster.

a) What was the purpose of the meeting?

A. I do not have a record of this meeting, but informal meetings to discuss the situation were not unusual and welcomed.

b) What was discussed at the meeting?

A. I do not recall specifics but I expect it was triggered from an IMT process or data.

c) What actions arose from the meeting?

A. I cannot recall specifics other than what can be inferred from the subsequent question.

d) Why did you ask Professor Gibson to conduct a review?

A. The Haematology Oncology service is data rich and has a designated clinical governance process. If I sought a review from Dr Gibson it would pertain to

whether any illumination could inform the emerging situation, or the request had arisen from a clinical governance perspective.

e) Did you take this action forward? If not, why not?

A. There were frequent discussions and exchange of data throughout the Directorate Team and with the clinical experts about the progressive actions required. These were sometimes passed on to other members of the team to follow up. I cannot be more specific other than to state that the Schiehallion service had the highest attention and would wish to dispel any thought that there was a passive approach to issues there.

g) Why did you propose Dr Armstrong explore escalation processes within microbiology/infection control with Dr Inkster?

A. I presume that Dr Inkster raised the issue about team dynamics in her Service. I was already aware that there were difference of opinion and approach to monitoring and design specifications. My routine response to any individual who raise concerns is to empower them to escalate these through the appropriate channels within their management structure, and where necessary they should involve non-clinical managers or skip a step above the hierarchy of their immediate Line Managers if this is perceived to be an issue. Microbiology and ICT functions were within another Directorate. If necessary I would facilitate an introduction but that was not necessary in this circumstance.

h) Did you take this action forward? If not, why not?

A. In the absence of a minute, or more information, I cannot answer precisely but the action needed was from the individual with concerns as described above.

26. Refer to IMT 2 March 2018- This IMT concerned Cupriavidus infection in a patient which was matched by typing from a sample in aseptic pharmacy **(SHI Bundle 1, IMT Meeting Minutes, p 54)**

a) What do you recall about this incident?

A. It was prompted by concerns about water contamination in Ward 2A

b) What was your involvement?

A. Participant in IMT that day representing Directorate Team

c) When and how did concerns first arise?

A. See minute of meeting

d) What Investigations were done?

A. See minute of meeting

e) Was there a hypothesis?

A. Yes: see minute of meeting

f) If so, was it borne out?

A. This is beyond my areas of expertise

g) Were any interventions recommended? If so, were they sufficient?

A. See minutes of meeting, all interventions were subject to subsequent testing and control processes.

h) What was your view about communication in respect of this incident?

A. There was an established communication strategy. I don't recall concerns being raised about the communications strategy, or the quality of communications, either at or after the meeting. My long standing belief is that how effective any communication is can only be determined by the recipient rather than the author.

27. Refer to IMT 9 March 2018- This IMT concerned the water incident in Ward 2A of the RHC **(SHI Bundle 1, IMT Meeting Minutes, p 60)**

a) What do you recall about this incident?

A. This was a follow up meeting from 6th March 2018

b) What was your involvement?

A. Member of group, Women and Children Directorate Team representative

c) When and how did concerns first arise?

A. See minutes of previous meeting

d) What Investigations were done?

A. See minutes

e) Was there a hypothesis?

A. The taps remained a key concerns related to biofilm build up.

f) If so, was it borne out?

A. This is beyond my area of expertise

g) Were any interventions recommended? If so, were they sufficient?

A. Yes. See minutes. As mitigations and challenges continued, it is easy in retrospect to determine these were unsuccessful

h) What was the purpose of your question concerning whether the water system could sustain an old fashioned hot/cold water mixing tap?

A. I am not an expert in water systems etc. and was simply asking if an alternative arrangement was possible, simply because, in my experience in other fields, not all innovations prove to be improvements. I can assure you that the question arose from my thoughts only and out of curiosity. I imagine that I would have prefaced the question with clarity that it might be naïve. I have never shied away from asking questions be they simple or complex.

i) What was your view about communication in respect of this incident?

A. See 26H answer.

28. Refer to IMT 16 March 2018- This IMT concerned the water incident in Ward 2A of the RHC **(SHI Bundle 1, IMT Meeting Minutes, p 63)**

a) What was the purpose of this meeting?

A. This was a follow up meeting.

b) What was your involvement?

A. I am not recorded as having attended but will probably have had access to the Minute or been informed of the outcome.

b) What was your view concerning the additional patients presenting with Cupriavidus and Stenotrophomonas?

A. Either the hypothesis was wrong or the mitigations ineffective.

c) What was your view concerning the results of testing at taps and a shower head which were discussed?

A. I was not privy to these discussions.

d) What was your view on the concerns expressed by Professor Gibson in respect of the lethality of the pathogens to immune-suppressed patients and the safety of the patients in rooms where positive test results had been returned?

A. I would defer to Prof Gibson's expertise.

e) What was your view on the situation wherein patients were unable to wash themselves?

A. This was a profoundly sub-optimal situation.

f) Did you consider that the control measures in place were sufficient?

A. This isn't my area of expertise, but the evidence suggests not. It is notable that the hypothesis was changing.

g) Did you consider the confirmed action plan to be sufficient? If not, why not?

A. The IMT process is informed by experts in infection control and those who can instruct corrective measure.

h) What was your view about communication in respect of this incident?

A. See answer to 26H

29. On 18 March 2018, you attended at a teleconference with GGC/HPS/HFS and Public Health Scotland. The Inquiry understands that an update was provided on the Cupriavidus contamination in Ward 2A **(See SHI Bundle 5, Communications Documents, p 116)**. Please provide details of this teleconference, including:

a) What was the purpose of the teleconference?

A. I do not recollect attending this tele conference, but have received the synopsis by email (18.03.18 @ 16.51) **(A38662162 - Bundle 5 – Communications Documents – Page 59)** from Dr Jennifer Armstrong, Board Medical Director

b) What was discussed on the teleconference?

A. See answer 29a

c) What was the nature of the debate referenced in respect of longer-term changes in terms of filters, shower heads, taps, water treatment and testing?

A. See 29a

d) What actions arose from the teleconference?

A. As per Dr Armstrong's email, cited above

e) What was the nature of any discussions surrounding communications?

A. See 29a and d

30. Refer to IMT 29 May 2018 **(SHI Bundle 1, IMT Meeting Minutes, p 91)**. You were not present at this meeting. However:

a) On p 92 it is noted that Dr Inkster was to e-mail you concerning the number of visiting medics. Did you receive any such e-mail from Dr Inkster? If so, when? If so, what was your view on the suggestion that numbers be kept to a minimum? What, if any, action did you take as a result?

A. See previous commentary about emails and archive access. I cannot determine whether I received an email from Dr Inkster about this matter. I have previously described my email arrangements. As nosocomial infection is a constant risk in any hospital, there are frequent reminders regarding restricting the footfall and the numbers of visitors: this includes clinical staff and teams.

31. Refer to IMT 8 June 2018 **(SHI Bundle 1, IMT Meeting Minutes, p 111).** You were not present at this meeting. However:

a) On p 111 it is noted that Dr Inkster sent you a memo which you disseminated to medical and nursing staff concerning sink hygiene. Did you receive any such memo from Dr Inkster? If so, when? If so, when did you disseminate it? What, if any, action did you take as a result of the memo beyond disseminating it? Did you agree with the terms of the memo? If not, why not?

A. The Directorate Team met regularly and agreed actions regarding such communications. These could be prompted by verbal or email information. Advice from infection control was followed and only questioned if they posed practical issues that needed further advice or clarification.

32. Refer to IMT 19 September 2018- This IMT concerned the water incident in Ward 2A of the RHC **(SHI Bundle 1, IMT Meeting Minutes, p 182)**

a) What was the purpose of this meeting?

A. This was a continuation of the incident management team, process already in train.

b) What was your involvement?

A. I attended as a representative of the Women and Children Directorate Team.

c) What was your view concerning the additional patients presenting with Cupriavidus and Stenotrophomonas?

A. This was an unresolved mystery, resisting mitigation attempts. I recall that there was clinical memory of Stenotrophomas from the Yorkhill site (it was referred to in shorthand as “Steno”, although the second part and subtype of organisms is important and there are, I expect, variations in pathogenicity). I don’t recall anyone clinically having experience of Cupriavidus species.

d) What was your view of the actions which has been undertaken following the previous meeting on 18 September 2018?

A. They were informed by ICT and clinical advice.

e) Did you consider that the control measures in place were sufficient?

A. The problem remained so the mitigations proved to be insufficient.

f) What was your view on the contingency/decant debate which was undertaken at this IMT? What view did you take in connection with decanting BMT patients to Ward 4B? What was your view concerning the proposed cleaning of Ward 6A?

A. All of this was informed by experts in the relevant areas and the debates were informed by these professionals demonstrating what appeared to me to be appropriate diligence and concern.

g) What was your view about communication in respect of this incident?

A. See previous comments about communication. It was disappointing that some families apparently received their information from external media, ahead of our in-house communication, despite this usually being constructed in a relatively short timeframe (i.e. same day and within hours of any particular need for such communication).

h) What was your view on the suggestion that the IMT no longer be chaired by a member of the ICT?

A. I could see the logic of Dr Inkster's expressed view, as the meeting was moving to a logistics emphasis. I did not interpret it as the infection control (microbiology team ceasing to be involved and the minutes reflect their continued need to be so). My observation is that in many infection control (and other clinical "hot issue") situations the Chair may be wearing both the "hat" of the meeting manager and also as an expert: this is not unique to Infection Control, I frequently Chair meetings that I also have expertise in the area: it is always an additional pressure on the Chair.

i) Do you consider that all of the actions proposed following this IMT were complete and sufficient? If not, why not?

A. Under the circumstances, yes.

33. On 9 January 2019, you attended at a meeting called in response to an IMT Cryptococcus meeting on 7 January 2019 **(See SHI Bundle 5, Communications Documents, p 162).** Please provide details of this meeting, including:

a) What was the purpose of the meeting?

A. To address matters arising from the finding of Cryptococcus infection.

b) Why was it called on an urgent basis?

A. Significant issues were raised at an IMT on Monday 7th January 2019.

c) What actions arose from the meeting?

A. See Minute.

d) What was your view on the use of prophylaxis medication?

A. I accepted expert advice.

e) What was your view on the efficacy of using HEPA filters?

A. I could not give an expert view. In general anything that might be beneficial seemed appropriate, if there were no significant dis-benefit. The effectiveness of HEPA filtration had been discussed on numerous occasions and in different contexts.

f) Did you visit the ward on 9 January 2019 as suggested? What cleaning regime was agreed?

A. I believe the AM referred to was Dr A Marek, the infection control doctor. I couldn't usefully contribute to this action myself. I am usually referred to in Minutes as AMM

g) Explain the ward sampling results which you are noted as reporting on at point 4 on page 162.

A. See 33(F). This refers to Dr Marek, the matter is not an area I could interpret or comment upon.

h) Was any re-sampling undertaken? If so, what were the results?

A. I cannot answer this.

i) What was the nature of any discussions surrounding communications? Did you consider communications to be sufficient?

A. See previous comments about communication.

34. On 9 January 2019, you received an e-mail from Jennifer Rodgers with a 6-bullet point note for consultants to use in communicating with families **(See SHI Bundle 5, Communications Documents, p 165)**

a) Was this briefing note provided to consultants? If so, when?

A. All such communications were disseminated via the Directorate Secretariat, I do not have a record on when this was done. My experience was that it was efficient and prompt.

b) What was your view on the briefing note? Did you consider it to be appropriate and sufficient? Did you consider it to be accurate?

A. My only view is that it was useful to have a consistent agreed briefing note knowing that the Consultants and other member of staff would be responding to specific questions from individual patients and relatives. I have no reason to doubt its accuracy and it covered the key points as I understood them.

c) Did you consider communications with families in general to have been sufficient? If so, why? If not, why not?

A. See previous comments about communication: only families can have an opinion on how effective were any of the communications.

35. On 9 January 2019, you received an e-mail from Jennifer Rodgers with draft lines for communication with parents **(See SHI Bundle 5, Communications Documents, p 167)**

a) What was your view on the suggested lines of communication? Did you consider it to be appropriate and sufficient? Did you consider it to be accurate?

A. Yes to all of these questions.

b) Did you consider communications with parents in general to have been sufficient? If so, why? If not, why not?

A. See previous comments about communication. I believe the whole team tried to communicate effectively.

c) Did you provide any comments on the proposal? If so, when? What were your comments?

A. Unless I was off site, I would usually have contributed to discussions about communication and how it was to be conveyed during team meetings in the Directorate management area.

36. On 13 January 2019, you received an e-mail from Jennifer Rodgers with a final briefing note for families **(See SHI Bundle 5, Communications Documents, p 169 and 170)**

a) What was your view on the briefing note? Did you consider it to be appropriate and sufficient? Did you consider it to be accurate?

A. Yes to all of these questions.

b) Were you part of the team which agreed to this briefing note? If not, who was?

A. I expect so, as there was usually a collective approach.

c) Did you consider communications with families in general to have been sufficient? If so, why? If not, why not?

A. See previous comments.

d) Did you agree with what was stated about the rigorous quality of water testing? If not, why not?

A. I was informed that the water testing remained reassuring. I recall the water supply was described as “potable”, which seemed a rather archaic term but as I am not an expert in water quality might have a significance beyond my understanding of the word.

e) Do you agree with what is stated in connection with the additional measures to ensure water quality? If so, what additional measures do you consider having been successful? If not, why not?

A. This information was accurate, as far as I was aware, by data available to the microbiology and infection control team.

f) Did you consider the use of HEPA filters to have had an impact? If so, on what basis did you reach that view?

A. Any impact could only be assessed by microbiological testing and clinical events.

37. Refer to IMT 16 January 2019- This IMT concerned Cryptococcus in Wards 6A and 4C **(SHI Bundle 1, IMT Meeting Minutes, p 261)**. Please provide details of this IMT, including:

a) What do you recall about this incident?

A. This IMT presented information about Cryptococcus details that had been identified.

b) What was your involvement?

A. I attended as a representative of the Women and Children Directorate Team

c) When and how did concerns first arise?

A. See Minutes.

d) What Investigations were done? What were the results?

A. See Minutes.

e) Was there a hypothesis?

A. Yes, that the duct work was contaminated and needed HPV cleaning as per the minutes.

f) If so, was it borne out?

A. I cannot comment.

g) Were any interventions recommended? If so, were they sufficient?

A. See Minutes.

h) What was your view about communication in respect of this incident?

A. Again these were challenging matters to communicate to non-experts but a communication was necessary.

i) Do you consider that all of the actions proposed following this IMT were complete and sufficient? If not, why not?

A. It seemed these were appropriate from my non-expert perspective.

38. Refer to IMT 17 January 2019- This IMT concerned Cryptococcus in Wards 6A and 4C **(SHI Bundle 1, IMT Meeting Minutes, p 266)**. Please provide details of this IMT, including:

a) What was the purpose of this meeting?

A. See Minutes. I was not in attendance.

b) What was your involvement?

A. I would have seen the Minute and discussed matters with the Directorate team.

c) What was your view concerning the proposed cleaning of the ventilation ducts and use of HEPA filters?

A. I am not an expert in such matters. I would accept the consensus view arrived at from drawing on available expert advice.

d) What was your view of the proposed movement of high-risk patients to Ward 4B?

A. I would accept the consensus view arrived at from drawing on available expert advice.

e) What was your view of the proposed use of mobile HEPA filters in the corridor areas of Ward 6A and 4C?

A. I would accept the consensus view arrived at from drawing on available expert advice.

f) What was your view of the proposed continued use of prophylaxis in Ward 6A?

A. I would accept the consensus view arrived at from drawing on available expert advice.

g) What was your view on the use of point of use filters in Wards 2A and 2B?

A. I would accept the consensus view arrived at from drawing on available expert advice.

h) What was your view on the proposed discontinuation of paediatric BMT and high-risk patients use of Ward 4B?

A. I would accept the consensus view arrived at from drawing on available expert advice.

i) What was the basis for your comment concerning the risk of Cryptococcus within an area the patients are being moved to (See p 272)? What, if any, was the response to this comment?

A. This relates to a later meeting from that day (1600 – 1800). The construction of the sentence recorded in the minute is poor, but I was simply asking whether we could be assured that the move to another ward had evidence that it was safer (that would be safety in all relevant risks including patient segregation and suchlike). I don't recall the comment being met with anything other than a reasoned and reasonable answer (this might have been from a number of contributors as it was an open question).

j) Did you consider that the risk management and control measures in place were sufficient?

A. In the circumstances I believe so.

k) What was your view about communication in respect of this incident?

A. See previous comments.

l) Do you consider that all of the actions proposed following this IMT were complete and sufficient? If not, why not?

A. I had no reason to believe otherwise.

39. Refer to IMT 18 January 2019- This IMT concerned Cryptococcus in Wards 6A and 4C **(SHI Bundle 1, IMT Meeting Minutes, p 266)**. Please provide details of this IMT, including:

a) What was the purpose of this meeting?

A. See the minute. I was not in attendance.

b) What was your involvement?

A. I will have seen the Minute.

c) What was your view of the progress of the actions from the meeting of 17 January 2019?

A. I cannot comment.

d) What was your view of the decision to move 3 high risk patients to Ward 4B?

A. If a collective decision is reached, taking into account expert advice, then I would support that decision.

e) What was your view about communication in respect of this incident?

A. I cannot comment.

f) Do you consider that all of the actions proposed following this IMT were complete and sufficient? If not, why not?

A. I cannot comment.

40. In January 2019 you met with Dr Inkster. Please provide details of this meeting, including:

a) What was the purpose of the meeting?

A. I met Dr Inkster a number of times and if there is not minute or subsequent email I cannot comment with any precision.

b) What was discussed at the meeting?

A. I cannot recollect details but appreciate that she was anxious about the infection control situation, which was quite understandable. She was not alone in this.

d) What was your view in respect of Dr Inkster's opinion that she was being pressured to reverse the decision to relocate patients from Ward 2A to Ward 6A?

A. If that was her recollection and opinion then my advice (see elsewhere) is to ensure that she followed the tents of GMC good medical practice and raises her concerns to parties who could hear her concerns and intervene, signposting her if required.

e) Who upheld the decision to relocate patients from Ward 2A to Ward 6A?

A. I expect that such a decision would be determined by representatives of the Senior Management Team, i.e. above the Directorate Team level.

41. In January 2019, you met with Jennifer Armstrong, Professor Gibson and Dr Inkster. Please provide details of this meeting, including:

a) What was the purpose of the meeting?

A. I do not recall this particular meeting in any detail and have no minute of this, or whether it was planned or opportunistic.

b) What was discussed at the meeting?

A. I presume it would be about the continued issues within the hospital.

c) The Inquiry understands that you produced a SBAR as a result of Dr Inkster's concerns about the water in Ward 2A. Why did you do so? What did the SBAR contain?

A. I have not been able to locate this SBAR, unless it is one of the previous presented SBAR. I would generate an SBAR if there was something I wished a response to as that is its function, rather than simply to be a memo. I will be willing to comment further if this is located.

42. On 1 March 2019, you met with Christine Peters and Dr Inkster concerns were raised regarding Cryptococcus. On 1 March 2019, you sent an SBAR by e-mail to Jennifer Armstrong following the meeting **(See SHI Bundle 4, SBARS at p 151)**. Please provide details of this meeting, including:

a) What was the purpose of the SBAR?

A. To raise concerns presented to me as set out in the SBAR.

b) Who was the SBAR shared with?

A. It was to Jennifer Armstrong alone.

c) What actions were taken as a result of this SBAR?

A. Dr Gibson was asked to arrange a review of a series of cases. Dr Armstrong replied with her response in an email dated 04.03.19 @ 14.39.

d) What recommendations were carried forward?

A. From subsequent email (Dr De Caestecker 04.03.19 @ 16.17) a review was already in train with input from Dr Ian Kennedy, Public Health Doctor.

e) Who was responsible for these actions?

A. Dr Armstrong instructed the actions and my reading of the subsequent correspondence was that others had been given or were already engaged in relevant enquiries.

f) Why was this SBAR prepared at this time given that the DMA Canyon reports of 2015 and 2017 were well known at this stage?

A. As stated elsewhere I was unaware of these reports and cannot comment about them.

g) Why were these issues not raised in 2018 and 2019?

A. I cannot comment.

h) Were you aware of subsequent infections following the reports by DMA Canyon in 2015 and 2017? If not, why not?

A. I cannot comment.

43. On 4 March 2019, you received an e-mail from Linda de Caestecker in which it was noted that Dt. Iain Kennedy (of HPS) was already analysing the data and working with Dr Inkster.

a) What was your view of the response received from your SBAR?

A. The matters were in hand by Public Health experts, it was a Public Health matter in my view.

b) Did you work with Dr Kennedy and Linda de Caestecker on the assessment as suggested?

A. I liaised with Dr Kennedy and Sandra Devine (Infection Control Nurse).

44. On 15 March 2019, you attended at a meeting with Dr Iain Kennedy and Sandra Devine. The Inquiry understands that at that meeting you provided information regarding Dr Inkster's concerns.

a) What information regarding Dr Inkster's concerns did you relay?

A. I recall that she presented me with historical data as described in a previous response.

b) What response did you receive when you relayed these concerns?

A. Dr Kennedy and Sandra Devine were very knowledgeable and already involved in the epidemiological / public health aspects.

c) What was the outcome of this meeting?

A. My impression was that they felt the matters were already being looked at and the area was concern was subject to that line of enquiry but they would do the needful as requested.

d) What was the basis of your suggestion that Professor Gibson review two cases from 2017 which had been highlighted by Dr Inkster?

A. Professor Gibson had the expertise to reflect on the particular cases and was also in a position to suitable delegate these reviews if she was conflicted by involvement in the cases or the capacity for such an undertaking with her significantly busy and burgeoning workload.

e) The Inquiry understands that you were sent a copy of an epidemiology report by Dr Kennedy on 31 July 2019 by e-mail. Why did you fail to reply to this e-mail? What, if anything, did you do in response to receipt of Dr Kennedy's report? What, if any, view did you have of the contents of the report and its findings?

A. My PA might have answered the email on my behalf, as my practice was often to write by hand on printed out emails and my secretary would then compose an email. Sometimes these were not presented from my email account. I can assure you that I didn't deliberately fail to reply, I would not ever seek to ignore or suppress any information. I hope you will appreciate that a lot of information was presented and managed in various scenarios. I would need to see the report again to comment further but all information was looked at by multiple parties and made available as required for other Reviewers, etc.

45. On 27 July 2019, you received an e-mail from Professor Gibson **(See SHI Bundle 8, Supplementary Documents at p 112).**

a) What prompted this e-mail from Professor Gibson?

A. This was a follow up to the request to look at the outcome of 3 patients from 2017.

b) What was your view of the information presented concerning the three deaths?

A. That it was appropriate to raise Dr Gibson's request with senior colleagues and arrange an external review.

c) Did you respond to this e-mail? If not, why not?

A. My response might not have been by email, but an external review of these cases was undertaken.

d) What, if any, action did you take following receipt of this e-mail?

A. My normal course would be to discuss such matters with the Director (Mr Hill), other members of the Directorate Team and the Acute Board Medical Director (or higher).

46. Refer to IMT 8 August 2019- This IMT concerned Gram Negative Bacteraemia **(SHI Bundle 1, IMT Meeting Minutes, p 338)**. Please provide details of this IMT, including:

a) What do you recall about this incident?

A. This was a follow up IMT.

b) What was your involvement?

A. Participant as Women and Children Directorate team member.

c) When and how did concerns first arise? What was your view concerning the level of infections found?

A. See Minutes.

d) What Investigations were done? What were the results?

A. See Minutes.

e) Was there a hypothesis? Did you agree with the working hypothesis? If not, why not?

A. The Minutes describe this but there isn't a specified hypothesis statement.

f) If so, was it borne out?

A. I cannot comment.

g) Were any interventions recommended? If so, were they sufficient? What was your view of the environmental testing being carried out?

A. See Minutes.

h) What was your view about communication in respect of this incident?

A. See previous comments.

i) Do you consider that all of the actions proposed following this IMT were complete and sufficient? If not, why not?

A. I cannot comment on these details.

47. On 12 August 2019, you received an e-mail from Christine Peters asking for a list of outcomes for patients with blood cultures in 2017.

a) Do you recall receiving this e-mail?

A. See previous comments about email management, I don't recall this email.

b) Were you aware of what the e-mail referred to?

A. Given previous response, 2017 had become a year of interest. However I wouldn't have the information sought therefore I expect that I would have redirected this to someone who might have the information.

c) Did you respond to this e-mail? If not, why not?

A. I expect I redirected it to an individual who would be able to locate the data, or signpost to someone who could help. I believe that it would be unusual for me not to at least acknowledge the request and re-direction and would wish to record my apologies if that is the case, but keeping up with all email traffic on a daily basis can be challenging and August is a particularly difficult month as there are multiple post-Summer challenges, not least the significant change in junior Medical staffing in the first week and ramifications thereof.

48. On 20 August 2019, you attended at a meeting to consider recent experience of IMT meetings chaired by Linda de Caestecker **(See SHI Bundle 6, Miscellaneous Documents, p 70)**

a) Do you recall attending this meeting?

A. Yes.

b) What was the purpose of this meeting?

A. To discuss IMT meetings as per the minute.

c) On what basis were you invited to the meeting?

A. As the Chief of Medicine for Women & Children

d) What were the main issues of concern raised? Did you agree with the concerns which had been raised? If so, why? Please provide details.

A. The minutes reflect issues, only some of which I had observed (I didn't attend all of the IMT meetings). For example I was aware that new information could be presented (tabled) and the style and conduct of meetings varied dependent on who was in the chair, the participants and the main subject matters.

e) The minutes detail 'behavioural issues in recent IMT meetings', do you agree with this? What were these issues and who presented these behaviours?

A. I have considerable experience in attending meetings both internal and external to the organisation and have, over decades, observed the best and worst of Chairmanship (including my own on reflection: it is an acquired skill), human nature and occasionally conduct that I would deem as poor and, rarely, close to unprofessional. I have no problem in calling out bad behaviour whether as a Chair or participant. I am also aware that how an individual behaves when an authority figure is in the room might alter the dynamic and therefore I find that collective and individual behaviours tend to be less troublesome for me to manage as I moved up the hierarchy and improved again when video conferencing was introduced. However my IMT experience was, as the minute describes, that some Chairs were less experienced at maintaining focus and discipline and this was particularly noticeable when somebody had a dual function. Some robust, but in general respectful and reasonable, challenge was underpinned by real concerns about patients, staff, and unit and personal reputations and occasionally passionately presented.

The medical staff were not passive recipients of information and in keeping with their extensive knowledge base and inquisitiveness, quite rightly sought for as much information and corroborating evidence as they could. The continued uncertainty, frequent changes in aspects of "holistic" clinical care and unsuccessful mitigations were of genuine concerns and it escalated tensions. As they are want to do, sometimes doctors strayed out of their sphere of knowledge and into areas they had no expertise in (for example my previous answer regarding plumbing and estates management). However I

don't recall witnessing unchecked extreme behaviour, or anyone excluded or leaving a room in distress. How defensive or attacked someone might feel when challenged is highly individualistic. I recall how much of a learning curve I experienced in becoming an effective Chair, and I am still learning. The nature of these meetings were challenging given the subject matter, unresolved problems and the types of illnesses the patients were suffering from. The clinicians directly facing patients and relatives were often in a very difficult position, with issues of therapy response plus the various changes required and they very much had the interests of their patients at the fore-front of their concerns.

f) The role of chair of the IMT was discussed, what do you recall about these discussions?

A. I think the Minute reflects the concerns and potential mitigations.

g) What was your view on Dr Inkster's ability to carry out the role of chair within the IMT?

A. I don't have a view with regards to this. My experience has been that IMT's tend to be Chaired by a microbiologist or a lead clinician. I appreciate the difficulty in wearing multiple hats when Chairing a meeting that you also have an expert opinion role within.

h) What was your view on the proposal to have a 'a small-group pre-meeting' in advance of IMTs and to implement an escalation process?

A. I am in favour of preparation meetings to help set and manage an agenda efficiently. I don't see that as anything other than a good thing if it is designed to ensure that everyone's time is used appropriately and all of the required information is available. Wherever possible, critical information is best not tabled and digested in real-time during a Meeting.

i) Consider Actions 1-8, are you aware if they were implemented? If they were implemented, in your view, were they successful? If not, do you know why not?

A. I don't know any details as to any implementation plan, as such. I found the IMT's I attended to be professionally conducted before and after this meeting. As matters progressed and issues became more complex, I felt the latter ones were probably more focussed and with representation from higher levels of the organisation (but the Minutes would confirm or refute that).

49. Refer to IMT 18 September 2019 - This IMT concerned Gram Negative Bacteraemia **(SHI Bundle 1, IMT Meeting Minutes, p 365)**. Please provide details of this IMT, including:

a) What was the purpose of this meeting?

A. Further management of 12 cases of Gram-negative bacteraemia.

b) What was your involvement?

A. As part of W&C Directorate Management Team.

c) Were any interventions recommended? If so, were they sufficient?

A. See the Minute.

d) Did you agree with the conclusion that Ward 6A was microbiologically safe? If so, on what basis?

A. I was not in a position to give an opinion as it is out with my expertise.

e) What was your view about communication in respect of this incident?

A. See previous comments.

f) Do you consider that all of the actions proposed following this IMT were complete and sufficient? If not, why not?

A. I cannot comment.

g) What concerns did you have regarding the number of infections which had been found?

A. They merited the scrutiny undertaken.

h) What was your view of the SBAR prepared by HPS which was discussed?

A. I don't recall seeing an SBAR before the meeting, I had no direct dealings with HPS on this matter, other than when it was represented in some way. HPS didn't give me the impression that their opinion carried authority (in terms of certainty in a very uncertain situation) but I was not close to the totality of what their involvement might have been, including other interactions with local matters out with the QEUH site. From my perspective the functional purpose of HPS was clearly established: was it for oversight and Leadership / Decision making or a collaborative associate?

i) Did you consider the risk management and control measures which were in place to be complete and sufficient? If not, why not?

A. This was beyond my area of expertise.

j) What was your view on the recommendation that all restrictions on Ward 6A be lifted?

A. The decision was arrived at through what seemed to be a reasoned consensus.

50. On 20 September 2019, you attended on a teleconference to discuss the status of Ward 6A **(See SHI Bundle 1, IMT Meeting Minutes, at p 370)**. Please provide details of this teleconference, including:

a) What was the purpose of this teleconference?

A. This was a follow up meeting as described in the Minute.

b) What was your involvement?

A. I attended as a representative of the Women and Children Directorate Team.

c) What was your view on the discussion regarding when a future IMT would be triggered?

A. This was an ICT / Public Health matter.

d) Do you recall receiving a summary report following on from the case reviews as suggested in the minutes? If so, what did that report contain? What were your views on it?

A. I would need to have any reviews linked to a specific meeting. Without that I cannot precisely answer the question.

e) Did you express any concerns regarding any of the discussions on this teleconference? If not, did you have any concerns which you did not express?

A. No and no. If I had any concerns they would have been expressed.

51. In November 2019, you prepared an SBAR in respect of three mortalities in 2017 **(See SHI Bundle 4 - NHS Greater Glasgow and Clyde – SBAR Documentation - Page 214).**

a) What was the purpose of the SBAR?

A. This was due diligence through the Women & Children's Clinical Governance structure (which I Chair). The significant clinical incident process has changed considerably over the years, it is now called a Significant Adverse Event Review (SAER), has a different framework and has also gone through a number of iterations. The Committee's secretariat has also changed as has the reporting processes.

b) Who was the SBAR shared with?

A. Members of the Women & Children's Clinical Governance Committee under strict confidentiality bounds.

c) What actions were taken as a result of this SBAR?

A. That conducting an SCI (as an internal investigation) was not appropriate, as recommended in the SBAR.

d) What recommendations were carried forward?

A. This decision would be recorded and form part of the Women & Children's Governance report to the Acute Clinical Governance Committee.

e) Who was responsible for these actions?

A. I was responsible as the Chair of the group.

f) Why was this SBAR prepared at this time given that the reports by DMA Canyon of 2015 and 2017 were well known at this stage?

A. See previous comments. I was unaware of these reports and the SCI process was used to learn from clinical incidents where possible to minimise recurrence.

g) Why were these issues not raised in 2018 and 2019?

A. I cannot answer this question.

h) Were you aware of subsequent infections following the reports by DMA Canyon in 2015 and 2017? If not, why not?

A. I was not aware of these reports.

52. Refer to IMT 11 November 2019 - This IMT concerned Gram Negative Bacteraemia **(SHI Bundle 1, IMT Meeting Minutes, p 397)**. Please provide details of this IMT, including:

a) What was the purpose of this meeting?

A. To continue management of the Gram-negative bacteremia incident

b) What was your involvement?

A. I attended as a representative of the Women and Children Directorate Team.

c) Were any interventions recommended? If so, were they sufficient?

A. See Minutes.

d) What views did you have in respect of the draft report from HPS?

A. I do not recall seeing this.

e) What was your view about communication in respect of this incident? Particularly, the letter to all parents concerning the re-opening of Ward 6A?

A. A consensus was reached.

f) Do you consider that all the actions proposed following this IMT were complete and sufficient? If not, why not?

A. I don't have enough information to comment.

g) Did you have any concerns around the introduction of Taurolock within Ward 6A?

A. There was a further intervention and in itself that was a concern. However, I believe that the use of Taurolock was thoroughly debated before implementation and that the latter required a clear standard operating procedure (SOP).

h) What was your view of the Ward 6A re-opening bundle which had been prepared? What was your view of the associated action plan?

A. This was in the hands of experts in infection control.

i) Did you have any concerns about the possible identification of a new patient case? If so, what concerns did you have? Why did you have those concerns?

A. No specific concerns beyond the issue that there was an additional case.

j) What was your view of the suggestion that the leak in the Ward 6A kitchen be included as a possible hypothesis?

A. I didn't have a view on this.

k) Did you consider the risk management and control measures which were in place to be complete and sufficient? If not, why not?

A. This was out with my area of expertise.

53. Refer to IMT 14 November 2019 - This IMT concerned Gram Negative Bacteraemia **(SHI Bundle 1, IMT Meeting Minutes, p 402)**. Please provide details of this IMT, including:

a) What was the purpose of this meeting?

A. Continuation of the IMT process regarding the Gram-negative bacteremia clusters

b) What was your involvement?

A. I attended as a representative of the Women and Children Directorate Team.

c) Were any interventions recommended? If so, were they sufficient?

A. See Minutes.

d) What was your view on the final report from HPS regarding the lifting the restrictions to admissions to Ward 6A?

A. I didn't have a particular view.

e) What was your view on the SBAR concerning the re-opening of Ward 6A?

A. I was supportive of effective communication and decision based on reasoned opinions.

f) What was your view of the future process for investigating gram negative infections?

A. That was a matter for experts in infection control.

g) Did you consider the risk management and control measures which were in place to be complete and sufficient? If not, why not?

A. I did not form a view as expert advice had been given.

h) What was your view about communication in respect of this incident? Particularly, the letter to all parents concerning the re-opening of Ward 6A?

A. This was necessary and appropriate.

54. Refer to IMT 2 July 2020 - This IMT concerned Ward 6A (**SHI Bundle 1, IMT Meeting Minutes, p 431**). Please provide details of this IMT, including:

a) What was the purpose of this meeting?

A. This was an incident management meeting after a positive Cryptococcus antigen test in one patient.

b) What was your involvement?

A. I attended as a representative of the Women and Children Directorate Team.

c) Were any interventions recommended? If so, were they sufficient?

A. See Minute.

d) What, if any, concerns did you have regarding the positive Cryptococcus antigen test?

A. I have no expertise in the matter.

e) What was your view on the environmental testing which was being carried out? Particularly, the air sampling?

A. I had no view to take as it is out with my area of expertise.

f) Were any hypotheses discussed? If so, what was discussed? Were any of the suggested hypotheses borne out?

A. Yes, and as described in the Minute

g) Did you consider the risk management and control measures which were in place to be complete and sufficient? If not, why not?

A. I cannot comment with any expertise.

h) What was your view about communication in respect of this incident?

A. I cannot comment with any expertise.

Concerns about infection patterns:

55. Do you consider that infection rates at QEUH were unusual both in frequency and type? Do you consider that there were:

a) more bloodstream/ patient infections than normal?

A. I must restrict comments to the RHC part of the QEUH site as I don't have "whole site" knowledge. To determine a frequency requires time to pass and prevalence requires specific details of infection types. The infections were unusual in variety and type (compared to the Paediatric clinician's experience) and weren't always appearing in the kind of clusters in short time period that I have experienced in other "infection clusters" identified by usual means. The normal variation of infection rates is nowadays determined by statistical process charts (SPC: sometimes referred to as "run charts"), bench marking, etc. Clinicians who worked at the Yorkhill RHC were familiar with some of the unusual bacteria, but my experience was that they were seeing an evolved pattern of microbes different from their experience or expectations and microbes that were unexpected pathogens.

b) more unusual bloodstream infections? (we take the point that water sampling/ environmental testing might show up rare organisms that are always present but never tested for)

A. See above

c) more cases of multiple bacteriaemia in one sample?

A. See above

56. Did you have any concerns, or are you aware of any concerns that patients were at increased risk of infection from exposure to pathogens via the water supply, drainage, or ventilation system? If so, please describe.

A. Concerns of mine became evident as evidence mounted and mitigations were not proving successful. My concerns were shared by others and I claim no earlier appreciation of the matter, as I believe I was receiving the same data that other were contemporaneously.

Staffing levels in ICPT:

57. What were the staffing levels like in ICP team while you were there? Were they levels appropriate to manage workload?

A. I cannot comment on this as I don't know the size of the team or any contemporaneous additional pressures on their workload or manpower.

58. Who was responsible for providing staffing and or ensuring that staffing was maintained at sufficient levels?

A. I cannot comment on this beyond referring you to the management hierarchy that leads to the relevant Director (Board Official); presumably you have a contemporaneous copy of this.

59. Did you or anybody else ever raise concern regarding staffing levels?

A. I did not personally raise concerns regarding staffing levels in the ICP Team. These were not brought to me. However I was aware at various meetings that there was a significant need for additional out of normal working hours of various staff requirements (in many areas including Microbiology, Estates, Cleaners etc.) as resources poured in to try and address the situation and concerns. It was clear that the resources needed required "over-time" arrangements.

60. If levels were insufficient, why do you think this was?

A. See answer to 58 above. I am not in a position to determine if staffing was generally insufficient or only insufficient because of the increase in work load for this team. I was not aware of any Fiscal control barriers being placed but these were not matters that were within the W&C Directorate financial reports

that I had access to in my managerial role and presented at meetings of the W&C directorate.

61. Can you comment on the working environment while you were there? What issues, if any, did you have?

A. The working environment didn't impinge on me personally, other than I will have increased my workload and spent more time attending meetings, dealing with email and other correspondence, looking at Reports and undertaking various discussions and often supportive conversations with concerned medical staff. In my managerial role it is common for different areas to become focal points and require intense periods of concentrated work, whilst ensuring other areas needs continue to be addressed. I was very aware of how much more difficult it was for staff with all of the mitigations adding to an already challenging job and environment. These concerns were regularly discussed within the Directorate team and escalated to the Director and the Senior Management Team when we were unable to offer support or responses within our resources.

62. Who did you raise these concerns with, if anyone?

A. There were plenty of opportunities to discuss this within the managerial team, local and Senior (Board level).

Concerns about infection

63. Do you, or have you ever, had any specific concerns about amounts, locations, clusters, or types of infection within the hospital? Please provide details.

A. See previous answers. I have experienced many infection clusters during my career (particularly in Neonatal Departments). The issue of concern here, was the lack of a readily identified cause and set of effective mitigations. Once an infection occurred, treatment was delivered but the underlying mystery remained. My previous experience of infection clusters was that a hypothesis

was developed, investigations and mitigations took place and the matter was resolved, and subsequent monitoring demonstrated this.

64. To what extent does your experience with infections differ from what you might have expected before the hospital commencing your role at QEUH/RHC?

A. As mentioned in other answers, this was a completely different experience (see question 63 answer).

65. Do you, or have you ever, had any concerns, or are you aware of any concerns, that patients either have been or are at increased risk of infection from exposure to pathogens via the water supply, drainage, or ventilation system?

A. With respect, this question seems somewhat redundant given the evidence and nature and need for this Inquiry. In the absence of any other explanation it seems logical to accept that some function of the environment was a factor, as other causes were excluded or eliminated. At a fundamental level, we are all vulnerable when protective initiatives and barriers to harm fail: these are usually taken for granted when we turn on a tap or buy food, etc.

Communication and infection

66. Please explain your understanding of the following processes:

a) All communication from management to clinical staff regarding infection risk where there had been or was a concern about links to the hospital environment, and as regards such concerns

A. Communications were in three broad areas, local and board written communication and verbal information and informal (as in ad hoc face to face) “question and answer” opportunities at the service level. My belief is that communications were as open, factual and timely as they could be under the circumstances. They were “two way” as clinical staff had ready access to clinical managers, and parents were given the opportunity to ask questions to

staff and some made enquiries to management colleagues. There were times when there was a risk of staff and patients / relatives being overwhelmed by so much change and information, at the same time as residual uncertainty remained. A practical issue was that staff fluctuate and so keeping a whole Team contemporaneously updated could be a challenge.

b) All instruction from management to clinical staff regarding what and how to communicate with patients

A. We sought for consistency and factual / practical information cascades. Patients, relatives and staff had multiple information sources beyond the internal communication processes, some which such as social media we had no control over. So, communication was necessarily proactive and reactive.

c) All communication from management to patients

A. These were a team effort as described above.

d) All communication from management to the media

A. These were managed by the Board communication / media teams informed by contributions from the Directorate team. My experience is that these were collaborative efforts when the Directorate team were directly involved. I would occasionally be a directly involved contributor as part of the Directorate Team. I have an “editorial eye” but did not have a final sign off role.

e) The pre-broadcast advice to staff regarding the BBC programme

A. You do not specify a particular BBC programme and I don’t recall any particular advice. I don’t watch much television and did not watch any of the programmes about the QEUH / RHC site before or after the subject of the public enquiry. Given that I was working within the situation, the media’s activities were only of interest in terms of how staff and patients and their relatives responded to this, as speculation was inevitable and rumour rife. I would observe that these did not assist in managing the situation and increased workload, as well as anxiety and uncertainty. However, much as I

would prefer the presentation of more facts and less speculation, I can appreciate how the maintenance of confidentiality by the NHS hampers the needs of the News cycle and that is how things are: a free Press is something to cherish, difficult as it might be when it is activated within one's own life experience.

f) All communication between management and external bodies such as SG, HPS and HFS

A. I believe all such communications are handled by media staff and Senior Executives informed by data and information from the local teams.

Prophylactic Medication

67. To what extent if at all were there patients in QEUH and in RHC prescribed prophylactic medication as a result of concerns about increased HAIs, the water system (including drainage) and/or the ventilation system?

A. You will be aware that prophylaxis was exhibited and modified at RHC in the Haemato-Oncology Service. Wider change in prophylaxis beyond that patient group was not required but was discussed with respect to other potentially high risk groups. Prophylaxis in general terms is a subject that is discussed as a consequence of developments in medicine and the desire to reduce avoidable complications.

68. Please identify/describe:

a) The medications in question.

A. You should have this information with the relevant specific timelines related to changes and other interventions including mitigations that fall between medical devices and medications and changed care bundles. I do not hold that level of detailed information.

b) In particular, is it the case that in contrast to the general position across UK and Scotland, the following were prescribed in QEUH/RHC as a matter of course: Ciprofloxacin, Posaconazole, Ambisome, Caspofungin, Septrin?

A. We benchmarked and sought advice across other UK and international departments. Local prophylaxis is dependent on local context and evolved in a situation that was atypical. All were concerned about the additional need for prophylaxis given the patient group involved and any change was considered in great detail, prophylaxis being a preventative intervention.

c) What was the reason for the prescription of these medicines?

A. The extension of prophylaxis was to militate against the evolving situation in a population extremely vulnerable for infections and all aspects of this were debated and decisions taken on multi-disciplinary specialist advice.

d) Was the prescription of any of these medications linked to concerns about the environment, and if so, what concerns?

A. Yes: see answer to 67(C)

69. Which group of clinicians would be responsible in an individual case for the prescription of this medication to patients: i.e. would it be treating haematologists/oncologists, or would it be somebody else?

A. An individual prescribing clinician is responsible for any prescription they write. It is common for there to be agreed medicines (or a suite of medicines) to be prescribed. Sometimes these are provide as a group of measures (occasionally under group directives) but they always require an individual's sign off unless it is part of an agreed general policy / group directive.

70. Are you aware of any general decision being taken regarding whether this additional/different medication ought to be made available to patients. If so, which bodies/individuals were involved in that?

A. I am uncertain about what is being asked here. There were many decisions over a long timeline and interventions were discussed incrementally as information was accrued. The minutes of the numerous meetings would need

to be interrogated to determine when prophylaxis or other strategies were discussed.

71. How, if at all, did the way in which these treatments were used differ from the standard use of prophylactic medications (i.e. duration of use; dosage etc)

A. I defer to those experts who advised on these matters in general terms of prophylactic measures are interventions to reduce the need for treatment. Whilst these are usually single measures (for example an antibiotic given before a surgical procedure) they sometimes lie within a bundle of measures. I am aware of longer prophylactic regimes to reduce infection in certain conditions (for example post splenectomy patients receive lifelong antibiotics prophylaxis). "Treatment" follows unsuccessful or inadequate prophylaxis and is a generic term that might require a range of medicines, procedures etc. The nature of the concerns that evolved with the extremely vulnerable haemato-oncology patients group (who had general and specific risks depending on their specific illness or any comorbidities) meant that prophylaxis required to be re-evaluated and extended. This was underpinned by surveillance data and specialist input.

72. What risks did patients face if they did not receive this medication?

A. Prophylaxis was to reduce the risk of infection. Infections carry morbidity and mortality risks (these vary with the site and type of infection and unique patient characteristics). This is greater in situations when the immune system is compromised through altered physiologically (e.g. pregnancy) or through disease processes or treatments that alter the response to infection risk and response. It is worth acknowledging that all such measures have their own risks and potential additional risks by for example filtering out some pathogens and facilitating others to flourish. All medicines have potential side effects.

73. Were staff given any guidance or was there any discussion about the use of prophylactic medication?

A. There were extensive and detailed multi-speciality discussions about the use of prophylactic medication and information to staff with regards to why these measures were being deployed, or changes made.

74. Were staff given any guidance or was there discussion about how this matter was to be communicated with patients?

A. Yes.

75. What approach was taken to discussing this issue with patients?

A. An open and tailored to their needs approach was encouraged as individual patients were at different stages of their treatment journey and had unique characteristics. Therefore an individualised approach was appropriate over a general message of underlying common general information.

76. Are you aware of any withholding of information about the prescription of prophylactic medication or any suggestion or instruction that matters to do with the use of prophylactic medication ought not to be shared with patients?

A. Not at all. That seems to be counter to what we sought to achieve as an open Women and Children Directorate Team and how the treating clinicians practiced medicine.

Whistleblowing and Communication

77. Can you explain the key aspects of the duty to communicate effectively with patients generally.

A. Different Professions have a Regulatory Body that defines best practice in this area. As a Doctor, the general tenets are enshrined in the content of Good Medical Practice GMC, which has been present throughout my career with the latest iteration being published in 2024. The basics about general communications with patients remain the same: confidentiality, treating

patients fairly and respecting their rights, treating patients with kindness, courtesy and respect, supporting patients to make decisions about treatment and care, sharing information with patients and encouraging dialogue about prognosis, management options, risks, benefits, harms, etc., communications with those close to a patient and confidentiality and legal guidance rules, caring for t he whole patient (Holistic care), ensuring patients who pose a risk of harm can access care, being open if things go wrong. I am familiar with the Legislative requirements of organisations regarding communication with patients (e.g. Duty of Candour). Beyond this, any communication requires the practitioner or organisation to communicate in a way that is comprehensible to the recipients and sometimes using multiple means to achieve this, ideally with feedback that demonstrates that the message has been received and understood and with a built-in period of reflection to avoid sub-optimal decision making. Professional interpreting services, pictures, sign-posting to good quality information, using Readability Index and similar tools to ensure the information is pitched at a reasonable level, being self-aware when talking of the same need, etc. all have a part to play. Finally, in the context of the subject of this part of the Inquiry, when communicating in an evolving and changing situation, there is a duty to ensure that communications build on the historical and current position is to ensure that any proposed change is contextualised in general and ensure there is room for individual concerns to be addressed.

78. Can you explain how the duty to communicate should be approached when it comes to telling patients about an infection; about the possible causes of the infection; and about the impact upon health; and upon future treatment.

A. See answer to 77. I see no distinction between the general duty of communicating details to an individual patient about an infection than with any other conditions (in terms of potential causes, treatment, prognosis, short and long term consequences). Particular to infections, there is a need to ensure the patient understands the difference between a person-limited infection, from an infectious communicable condition (i.e. can contacts be at risk, is there risk of epidemic). With any infection, this might be a predictable

consequence of an underlying illness (e.g. infections are more common in a number of chronic diseases) or an unexpected and unrelated event that might lead to an adverse effect or delay in a planned treatment, e.g.. delay in a surgical treatment to make anaesthesia safer and less chance of co-morbidity. If the infection is likely to alter prognosis or change therapeutic options then that is all part of good medical practice. Where there is uncertainty this should be shared. There will be some treatments that will interact with other medications or bodily functions (e.g. some antibiotics and blood thinning drugs, renal and hepatic function) and those should be considerations and communicate to the patient. There will be some infections that will be so severe that effective direct communication with a patient isn't possible (e.g. delirium, septic shock) and there is a duty to explain matters once the patient has recovered sufficiently. The "Art" of medicine is how to gauge when, how and what detail is necessary to provide in a way that doesn't negatively impact on the overall recovery of the patient: it isn't to keep secrets, nor is it to add to uncertainty and distress.

79. Can you explain how the duty to communicate should be approached where something has gone wrong during care or treatment.

A. See answer to 77 above. Being open is the key part of this and my long experience is that if the treating clinician does not explain, then leaving it for someone else to do so is sub-optimal for the patient and the practitioner alike. Often a fulsome explanation during the event or in the acute recovery phase needs follow and more detailed explanation. Explaining where something has "gone wrong" is language that isn't a universally applicable or helpful term. The literature around Clinical Risk Management and Human Factors is increasingly vast and the reality is that there often multi-factorial reasons for an outcome to deviate from what was intended or expected and some of that can be explained as a risk in initial counselling or when gaining consent but is only appreciated when the adverse or unexpected outcome occurs. Often an individual clinician, their Team or another party becomes the focus when the multi-factorial nature of delivering something as complex as healthcare is under-appreciated. However, in summary, an honest explanation should be

given, an apology if appropriate, a follow up opportunity or summary provided, and an account of what corrective or other measures are available by way of investigation or remediation.

80. Are you aware of the duty of candour and how would you explain that?

A. Yes. I have on occasions given lectures on aspects of Clinical Governance that included the Duty of Candour legislation and what it means in practice. The devolved nations have individual versions. In summary: clinicians have a duty to be open and honest as described above. The Duty of Candour legislation describes a similar organisational requirement. This is to ensure that organisation tells those affected that an unintended or unexpected incident has occurred. They should subsequently offer an apology, involve those affected in meetings about the incident, conduct a review about what happened with a view to identifying areas for improvement; and learn from the incident. This leaning should include the views of relevant persons, including the affected and/or their relatives. The Framework also requires that an Organisation must ensure that support is in place for their employees and for others who may also be affected by unintended or unexpected incidents.

81. If you had concerns about wrongdoing, failure, or inadequacy within the hospital:

a) were you aware of procedures to facilitate disclosure of this either to other GGC staff or to individuals external to GGC

A. Yes. I have been party to giving evidence to whistleblowing procedures separate to the issues in this Public Inquiry.

b) when – and how – did you become aware of these procedures

A. I have been aware of these processes before and after the formal whistleblowing guidance law enshrined it within the Employment Rights Act 1996 and its amendments. It has been necessary knowledge throughout my medical management (since 1995) career, and my clinical career. I have occasionally addressed the issue in Lectures about Clinical Governance and Risk Management over the last 30 years or so.

c) is disclosure in this manner something that has always been encouraged within GGC?

A. It seems to me to be so. I am not aware of it being supressed as an option: information seems readily available about how o raise concerns. As described above, I have been involved in whistleblowing investigations within GGCHB (unrelated to the public enquiry) and found it to be a thorough process, with a pre-interview, explanation and support (as a witness) and an explanation and assurance that the process is necessarily highly discreet in order to protect all involved, particularly the whistle-blower.

d) Are you aware of any changes made to the whistleblowing policy, do you consider that these changes improve the whistleblowing policy, and would the changes make you more inclined to disclose concerns, wrongdoing, failures, or inadequacies?

A. In general, Policies change and I endeavour to keep up with them. My position as Chief of medicine means that such Policies and local reviews of same are presented before publication. The reality is that I will be involved if requested to be, either as part of a consultation or when a situation arises that I have to look at the current Policy version. On rare occasions it has been necessary to look at previous iterations. From a specific whistle-blower policy viewpoint, I reserve my own rights to complain as an employee, using whatever avenues are available to me. Individuals will have different tolerances and thresholds, where concerns and their decisions to raise them, will be informed by their inclination and ability to effectively articulate any concerns: this is multifactorial. In my position I have access to a lot of data and a perception of “the bigger picture”, so may be in a position to see evolving patterns or concern but I freely admit that I have been “blind-sided” at times in my career: you can never know it all. My approach has been to openly share any data or information that I can, within the bounds of confidentiality, and potentially this might assuage the concern or demonstrate the concern is reasonable and needs action and indicate by whom. I have a career long interest in Clinical Governance, pattern recognition and creating an environment where identifying issues and addressing them is welcome and normal behaviour and

there is a tangible expectation that something will be done as a consequence of this.

Whistleblowing – QEUH

82. What was your involvement in the whistleblowing process? Please provide details.

A. I have had no direct involvement in the whistleblowing process related to this Inquiry and know nothing about the matter other than a process is /was in train.

83. What is your understanding of the concerns that led to the whistleblowing process? Do you agree with these concerns?

A. Other than hearing through the hospital grapevine, or media, that there was a whistleblowing enquiry that related to concerns about infections on the QEUH / RHC site, I have no specific knowledge of this matter. I can neither agree nor disagree without specific information. In general terms I have no disagreement with individuals raising concerns, as previously recorded, I was “inside” an evolving issue at the clinical and local management interface and very much peripheral to the wider “built environment” issues that arose as concerns continued.

84. Are you aware of what steps were taken to deal with each whistle blow? What is your view on the adequacy of the steps taken/the management of the concerns raised?

A. I am uncertain if this refers to multiple whistle-blow interventions by a person or it alludes to multiple separate Whistle-blows by a number of people. Surprising as this may seem, but appropriate to the maintenance of confidentiality, I have neither sought details of this matter nor been given information from within the organisation that identifies any involved parties or what has been done with respect to their concerns. They have protected

rights and I respect that to be the case until these rights are no longer applicable.

85. Do you think that the actions taken were sufficient to deal with the concerns raised?

A. I have no knowledge to comment on this.

Current Situation:

86. Are you still involved in Infection Control at QEUH?

A. Only as a recipient of infection control data / advice.

87. (If yes) How are things at QEUH now as compared to the period under investigation? Are you now seeing fewer BSIs, fewer unusual infections and /or fewer samples with multiple infections?

A. The tracking evidence and reporting structures in place suggests so, on the Paediatric (RHC) side. As a member of the Acute Clinical Governance Committee I see the QEUH reports on a monthly basis and again, this seems to be control. There is a welcome return to a “business as usual” approach. I feel that, running in the background, there was always a more than satisfactory Infection control and microbiological infrastructure. That refers to all the areas / sites I work in, or receive Reports from, with helpful colleagues in normal, cautionary or “outbreak” times.

88. Do you have any ongoing concerns as to the safety of the QEUH? If so, what are they?

A. Specific to infection control I have no specific live concerns. Given my interest in Clinical Governance I have general concerns about the whole NHS system and specific elements within it, the nature of such concerns depending on how they are brought to my attention.

89. Do you have any further observations concerning QEUH/ RCYP that you wish to share?

A. I would simply re-iterate my view that all levels of staff that I meet are very mindful of what has taken place on the ground and those who have remained in post have shown remarkable adaptability and resilience. The consequences of the services collective experience will, for many, long endure after the conclusion of the Public Inquiry. The Paediatric service were spared much of the Covid 19 pandemic pressures and so the consequences of the events this Public Inquiry has focused on, particularly in the Haemato-Oncology service are not inconsequential and many years of “normality” will be required as something of a re-set.

Any Further Information

90. Is there anything further that you want to add that you feel could be of assistance to the Inquiry?

A. Broadly, as I have worked in the NHS for over 40 years and seen and heard of many new NHS building projects be-set with delay and problems post commissioning, I would expect that the Inquiry might wish to take a broader view of how those processes are conducted and advise accordingly. Related to this but also specific, to my role as Chief of Medicine, and others in clinical managerial and administrative roles, I would wish to draw attention to making a recommendation about what resources are required to manage a hospital site move and the “bedding in period” (years rather than months depending on the project size and complexity), the resources required to manage business continuity (particularly when this includes sub-sets of very complicated activities, such as National services), whilst managing a parallel and completely unanticipated problem with multi-factorial issues including Human Factor matters (extant, predictable or unforeseeable).

Declaration

91. I believe that the facts stated in this witness statement are true. I understand that proceedings for contempt of court may be brought against anyone who makes, or causes to be made, a false statement in a document verified by a statement of truth without and honest belief in its truth.

92. The witness was provided the following Scottish Hospitals inquiry Bundles / documents for reference when they completed their questionnaire statement (Appendix A).

Appendix A

A43255563 – Bundle 1 – Incident Management Team Meeting Minutes (IMT Minutes)
A43299519 - Bundle 4 – NHS Greater Glasgow and Clyde: SBAR Documentation
A43296834 – Bundle 5 – Communications Documents
A43293438 – Bundle 6 – Miscellaneous documents
A43941023 – Bundle 8 – Supplementary documents for the Oral hearing commencing on 12 June 2023

Scottish Hospitals Inquiry Witness Statement of Questions and Responses
Professor Stephanie Dancer

This statement was produced by the process of sending the witness a questionnaire with an introduction followed by a series of questions and spaces for answers. The introduction, questions and answers are produced within the statement.

Personal details and professional qualifications

1. Name, qualifications, chronological professional history, specialism etc please provide an up-to-date CV to assist with answering this question.

A Professor Stephanie J. Dancer BSc, MB.BS, MD, MSc, FRCPath, DTM&H, FRCP(Ed), FESCMID, FISA; I am a consultant medical microbiologist in NHS Lanarkshire and Professor of Microbiology at Edinburgh Napier University. Please see CV as requested.

Previous involvement

2. Did you have any involvement with QEUH/RHC prior to February 2019? If so, please give details.

A I worked as a Consultant Microbiologist at the then Southern General Hospital from 2005 until 2007. The QEUH was built on the original Southern General Hospital site. I had no involvement with either construction or planning of the QEUH, and no formal or contractual arrangements with GG&C after I left in 2007.

3. When and how did you first become aware of the emerging Infection Control issues within QEUH/RHC? Was this from the media, or from people within GGC?

A I became aware of emerging Infection Control issues at QEUH/RHC from talk among Glasgow microbiologists at meetings, etc.

a) Can you advise which year this was (even if only approximately)

A 2018, but possibly earlier.

Your role within QEUH/RHC

4. Please describe how you first became involved in Infection Control in QEUH, including who first approached you.

A Professor Brian Jones messaged me via LinkedIn on Feb 7th 2019 asking me to get in touch with him. I replied on Feb 8th explaining that I was overseas but provided email and mobile phone number. Please see chronology of events summarising my involvement with QEUH **(A48491885 - Report from Professor Stephanie Dancer - Chronology of my involvement with QEUH. Bundle 27 volume 7, page 574)**

5. What was your role to be? What was your job title, and what were your duties? Did you receive a formal written offer of employment or engagement?

A Brian Jones wrote: ‘’GGC IPC under a lot of pressure right now. Teresa Inkster wondered if you would be available for a 2 days a week IPC locum to help during the crisis? If current pressures persist perhaps we could discuss on your return?’’ I replied that I would be happy to help Teresa and my R&D manager agreed to release me for one day a week to do this.

Over the course of the following few days, I received e-mails requesting: CV; Fitness to Practice documentation; PVG clearance; Occupational Health; Trak Care application; Clinical Portal application; honorary contract; payment process; office allocation; and car parking. Most of these were completed but I never received or saw a formal contract.

6. What background information were you given for the need for your employment or engagement, and by whom?

A I was given specific background information on the need for employment by Dr Teresa Inkster, who had requested my help as documented. This included infection control staffing, hierarchy and practices; details of presumed exogenous infections and outbreaks; mechanical ventilation structure and

equipment; plumbing; cleaning and decontamination; air quality; water storage; and laboratory processes. I visited the hospital 2-3 times and received a guided tour to several key areas in the hospital. I was assigned an office in the microbiology laboratory, which I would share with Dr Christine Peters when she returned from long term sick leave.

Infection Control Team

7. Were any of the IC team known to you personally prior to your employment? If so which ones?

A I knew Drs Teresa Inkster and Christine Peters; Drs Brian Jones and Alastair Leonord; possibly others by name only. Also at least two of the Infection Control nurses, especially Sandra, with whom I had worked before. I knew some of the microbiology laboratory staff, including the data manager, John. I knew Tom Walsh by name only.

8. At the team of your appointment the following individuals were involved with Infection Control:

a) Tom Walsh

b) Sandra Devine (nee McNamee)

c) Professor Alastair Leaonard

d) Dr Iain Kennedy

e) Dr Teresa Inkster

f) Dr Christine Peters

g) Professor Brian Jones

For each of these can you describe any interaction you had with him or her during the period of your employment or engagement in February 2019, the reason for the interaction and its outcome?

A I received Linked in Messages/e-mails from, and to, Professor Jones, and emails, phone calls and face-to-face meetings with Dr Inkster.

9. Did you interact with any other IC Team members at that time? If so, please identify him or her and answer question 8 above.

A There was no contact with any other named members of the IC team.

Infection Control Issues

10. What were the main issues from an infection control viewpoint during your time there?

A Clear evidence of hospital-acquired infections arising from the environment – surfaces, air and water, mostly identified in vulnerable adults and children; one specific outbreak among immunosuppressed patients in one ward; and an ongoing problem with Staphylococcus aureus among SCBU neonates.

a) We would like to understand the source of information you used to reach your conclusion. What was the “clear evidence” you refer to? What caused you to reach the conclusion you come to in Answer 11?

A The identification of specific microorganisms provides ‘clear evidence’ of infections arising from the environment. Bacterial organisms such as Cupriavidus spp. originate from water sources and tend to be very rare. Similarly, fungi such as Cryptococcus neoformans is airborne and also rare in UK hospitals. Any isolation of these, and other related organisms, would immediately raise concern over environmental reservoirs. I have nothing further to add to my response to Question 11.

11. In your opinion what was the root cause(s) of these problems?

A The root cause of these problems was due first and foremost to a combination of A. Estates issues, and B. a dysfunctional infection control structure. A. included poor environmental design of the new build; substandard building materials; inadequate maintenance and decontamination of plumbing components, water storage and ventilation systems; and poor cleaning practices (no standard operating procedure for cleaning patient shower

drains, for example); B. became apparent once I was aware of the fractious relationships between individual members of the ICP team.

12. How common or, conversely, how unusual, were these issues? Were any of these issues unique to QEUH?

A Every hospital has environmental issues; the risks of HAI from surfaces, water and air are well known. But the QEUH was relatively new and should not have had a surfeit of these exogenous infections so early after construction. Poor working relationships between members of the IPC team, again, are not unknown, but this came over as a seriously toxic atmosphere, given that one consultant microbiologist (Dr Peters) was so damaged that she had to take sick leave. To a certain extent, I wasn't surprised, because there were key players past and present within the GG&C IPC department who had caused similar problems at other hospitals, causing colleagues to leave the health board.

a) You describe a "seriously toxic atmosphere" at QEUH. Did you reach this conclusion solely on the basis of a few days in the hospital or was it also because of what other people told you? If the latter, when did you learn this information.

A I was aware of interpersonal friction among microbiology consultants in Glasgow beginning years before the emergence of infection control issues at the QEUH. Indeed, it was one of the reasons I left the Southern General Hospital (forerunner of the QEUH) to take up a post in Lanarkshire in 2007.

Termination of role and email to Professor Jones

13. In what manner was your role terminated? Who conveyed this to you, and in what manner? What reasons were you given?

A Brian Jones terminated my role via e-mail before the contract had been signed. Please see the chronology document for the exact wording.

14. We have been provided a copy of your email to Brian Jones (also in your chronology).What events gave rise to it- what was the “shabby treatment” you refer to?

A The shabby treatment refers to the termination of my role before it had even begun, after asking me to help. I had already completed a multitude of official documents in preparation for the new job as well as organised time away from my own health board duties.

15. You go on to say:

“I would have engineered a raft of interventions that would have immediately reduced the HAI risks for everyone. These are evidence- based and cost-effective. I’m surprised that none of your resident experts have already suggested the more obvious amendments.”

Insofar as not covered by Question 10, what were the main HAI risks of which you were aware? Were they usual or unusual?

A Both ventilation and water systems required a risk assessment, complete overhaul and upgraded decontamination and maintenance policies.

a) As with Answer 10, what was the source of the information that enabled you to reach these conclusions?

A After over 40 years working in the NHS, and with at least 38 of these years specialising in clinical microbiology and infection control, one tends to recognise unusual infections among patients and possible links with the environment. I have investigated countless numbers of outbreaks, finding epidemiological links between patients and source and implementing effective control strategies. Faced with events at the QEUH, I would have launched a major investigation much as colleagues on the ground attempted to do so.

16. What are the “more obvious amendments” you would have recommended?

A Improving air quality; assessment of air change; insertion of air filters or other air cleaning strategies; water quality monitoring; water treatment (e.g. neutral

electrolysed water addition to reservoirs); waterless trial for specific areas; enhanced cleaning and decontamination practices introduced, again for specific areas; and finally, engaging with management as an outside spokesperson in order to bring all parties together for the benefit of patients and staff.

17. You say you were surprised that members of the IC team had not already suggested them. Can you suggest a reason why they had not done so?

A I suspect that informed requests had been made by certain individuals but due to the disrespect, distrust and egotism of the IPC committee, none were adopted.

a) You describe the conduct of the IPC committee as “disrespect, distrust and egotism”. How did you learn of this behaviour?

A I learned of this behaviour from two trusted colleagues. Given prior knowledge of some of the IPC members concerned, I felt their testimony was accurate.

18. In your email you explain that “There are serious environmental deficiencies at the QUEH”. What are these deficiencies, to whom did you describe them to and how and when did you become aware of them?

A Dr Inkster and I wrote a treatise to the Scottish Government on the deficiencies following a call for comment on HAI risks from the environment. **(A41745971 - Health and Sports Committee - Health Hazards in the Healthcare Environment - HS/S5/19/HHHE/A2, Bundle 27 vol 7, page 329)**

19. In your email you state “GGC can no longer paper over the cracks in this multi-million pound flagship hospital”. What were these cracks, to whom did you describe them to and how and when did you become aware of them?

A I was referring to the inaction from key members of IPC and management over the ongoing environmental risks to patients. Some individuals were doing

their best to raise awareness and put interventions in place but their concerns were ignored.

a) How did you learn of this 'inaction'? Who told you about the actions of some individuals and when?

A As with the previous response, I learned of this 'inaction' from trusted colleagues working at the QEUH. However, it was clear that remedial action, if initiated, was slow to have an impact. Infections linked to the environment were continuing to occur over months and even years.

20. Did Professor Jones reply to your email? If so, how? What was his response?

A Brian Jones did not respond to my e-mail. To be fair, he was in a difficult position because while he supported my input, close colleagues did not.

Conclusions

21. What was your impression of the culture within the IC Team? How does this affect the delivery of the service?

A I have never come across a more toxic atmosphere among IPC professionals. My motivation for getting involved was to protect the people working hard but also bring the structure together to make the changes required.

22. How would you evaluate the efficacy of the Infection Control team? Are they fulfilling their function? What are the reasons for this?

A A dysfunctional team cannot deliver appropriate care. Even if there were a few individuals trying to do their best, the whole has to work together to achieve results. IPC is difficult at the best of times; it is the Cinderella of medical specialties and never receives adequate resources. How do you cost something that doesn't happen? So an effective IPC team means that the HAI rate in their institution is low.

23. Do you have any other observations regarding the Infection Control Team at

QEUH/RHC?

A Just an immense sadness at what happened. I believe that the original planning, design and construction were likely to blame for future events; then the reluctance to recognise what was happening coupled with ignorance, inaction and sheer laziness by key individuals compounded original construction failings. I wonder whether there was too much cost cutting in the first instance, rather than aiming for a quality build. I am not qualified to comment on this aspect any further.

Declaration

I believe that the facts stated in this witness statement are true and accurate and may now form part of the evidence before the Scottish Hospitals Inquiry and can be published on the Inquiries website. I understand that proceedings for contempt of court may be brought against anyone who makes, or causes to be made, a false statement in a document verified by a statement of truth without an honest belief in its truth.

Stephanie Dancer
16 August 2024

The witness provided the following documents to the Scottish Hospital Inquiry for reference when they completed their questionnaire statement.

Appendix A

A48491885 – Report from Professor Stephanie Dancer - Chronology of my involvement with QEUH Bundle 27 vol 7, page 574

A41745971 - Health and Sports Committee - Health Hazards in the Healthcare Environment - HS/S5/19/HHHE/A2, Bundle 27 vol 7, page 329

Appendix B

CV Professor Stephnie Dancer March 2024

CURRICULUM VITAE

Stephanie J Dancer

BSc, MB.BS, MD, MSc, FRCPath, DTM&H, FRCP(Ed), FESCMID, FISAC

Consultant Microbiologist & Professor of Microbiology

March 2024

Personal details

Name: Stephanie Jane Dancer
Date of birth: [redacted]

Marital status: [redacted]
Religion: [redacted]
Nationality: British

Address: [redacted]
Tel: [redacted]

GMC status: **Full Registration No:** [redacted]
Orcid id: orcid.org/[redacted]

Summary

Stephanie is a medical microbiologist working between NHS Lanarkshire and Edinburgh Napier University. She edited the *Journal of Hospital Infection* for 20 years and now edits for *International Journal of Antimicrobial Agents* and *Infection, Disease & Health*. She trained at St. Bartholomew's Hospital in London followed by postgraduate studies in pathology at Guy's Hospital. She has worked and travelled all over the world, from South East Asia to the Canadian tundra. She spent six years as Infection Control Officer for Argyll before moving to Health Protection Scotland (HPS) as their inaugural microbiologist. She has been a member of national, European and international working groups on antibiotic prescribing; infection control; MRSA; and environmental cleaning, and is a current or recent member of NHS Scotland ASSURE; HPS (decontamination and antimicrobial resistance); UK NICE (infection control & antimicrobial prescribing); UK HTA (screening and diagnostics); DEFRA; and ESCMID committees on conference planning, infection control, MRSA & multi-resistant Gram-negative bacilli. She balances clinical duties with teaching and research on antimicrobial stewardship, hospital hygiene and infection control.

Qualifications

Ordinary Levels

Autumn 1974: Mathematics Grade 1; English Language Grade 1
Summer 1975 Religious Education Grade A; French Grade A; Russian Grade B; English Literature Grade A; Physics Grade B; Chemistry Grade A; Music Grade A; Advanced Mathematics Grade B; Latin Grade A

Advanced Levels **(Oxford Nuffield Board)** **June 1977**

Mathematics, Physics & Chemistry: Grade A*

MB, BS **(Scholarship entrance, University of London)** **June 1983**

Degree in Medicine, Medical College of St. Bartholomew's Hospital, London.

BSc in Medical Physiology (University of London) June 1980

Intercalated one-year science degree Class 2:1.

i) Cardiovascular/Respiration module (St Thomas' Hospital, London) Projects on "The athlete's heart" and "The origin of hyperventilation in response to exercise".

ii) Endocrinology module (Royal Free Hospital, London)
Joint project on "The modification of pituitary ACTH release by morphine in the rat". Seminar presentation: "The function of Prolactin''.

ii) Neurophysiology module (Institute of Neurology and NIMR, London). Projects: "The development of central nervous connections in the foetus" and ''Visual evoked response to light in tadpoles".

MD Thesis (Guy's Hospital, University of London) June 1991

"*The Staphylococcal Scalded Skin Syndrome: Epidemiological and Biochemical Studies*."

MSc Microbiology (Royal London Hospital, University of London) Sept 1992

MSc thesis: "*A Hospital Outbreak of Bacillus*."

FRCPath (Royal College of Pathologists, London) Dec 1992

Written (Part II, Final) examination gained March 1992, London, UK; practical examination gained Dec. 1992, Glasgow, UK. Fellowship awarded October 2000.

DTM & H (London School of Hygiene & Tropical Medicine) April 1993

This four-month course offered intensive teaching in tropical medicine with specific focus on clinical management, epidemiology and diagnostic parasitology.

FRCP(Ed) (Royal College of Physicians of Edinburgh) May 2012

Honorary Fellowship awarded May 25th 2012.

Current position

***Present posts*: 1) Consultant Microbiologist, NHS Lanarkshire, Dec 2018-**

This part time clinical research position is based at Hairmyres Hospital. The post comprises 2 PAs with additional facility for locum cover for out-of-hours work (1 in 5 weekends). Contracted clinical duties cover the clinical microbiology and infection control service for Lanarkshire health board. Since beginning this post, SD has completed or has on-going studies on: molecular epidemiology of MRSA; decontamination of medical equipment; environmental cleaning; cost evaluation of healthcare-associated infection; effect of ventilation on the home microbiome; role of hard surface biofilm in critical care; role of the air in HAI; isolation and molecular

characterisation of VRE and MDR-coliforms; surgical site infection; pre-operative screening for *S.aureus*; disinfectants & multiple outbreak investigations.

2) **Professor of Microbiology, Edinburgh Napier University, March 2016-**

This post provides academic support to the School of Applied Sciences, Department of Microbiology & Drug Discovery (one day/week). This includes teaching and original research. Currently supervising one PhD and PI for NHS ASSURE research fund aimed at controlling infection in Scottish hospitals.

Previous consultant posts

Dec 2007-Dec 2018: Consultant Microbiologist, NHS Lanarkshire

Led the clinical microbiology and infection control service for NHS Lanarkshire, based at Hairmyres Hospital. Helped the laboratory to achieve success in multiple CPA inspections and introduced screening programmes for patients in a range of specialties. Took an active role in the out-of-hours clinical microbiology service for the health board on a 1 in 3/4/5 basis during this post. I taught doctors, biomedical scientists, nurses, pharmacists and others on a regular basis. I was a member of two infection control committees; antimicrobial prescribing committee; sterilisation and decontamination group; clinical governance; and other short term outbreak or incident committees. Engaged in a number of research studies, some of which continue to date.

April 2005-Dec 2007: Consultant Microbiologist
Southern General Hospital, Glasgow

This consultant post had a 1 in 5 out-of-hours commitment. The Institute of Neurology receives patients from all over Scotland and experience was gained in managing acute and chronic neurological infections, including brain abscess, meningitis and shunt infections. I set up and supervised research projects on 'Bacterial Transforming Agents', antibiotic resistance, hospital cleaning and MRSA and supervised MSc projects comparing and contrasting different methods for the rapid detection of MRSA and environmental sampling of hospital surfaces.

Feb. 2002-April 2005: Consultant Microbiologist,
Health Protection Scotland, Glasgow

I was responsible for leading Antimicrobial Resistance Surveillance in Scotland as well as supporting several teams within HPS regarding microbiological advice. I set up Scottish participation in the European Antimicrobial Resistance Surveillance Scheme (EARSS) and helped establish the Scottish Microbiology Forum. Within the first year of my appointment, I organised a national conference on MRSA. I assisted with the implementation of ECOSS and initiated a number of projects on hospital cleaning, MRSA, ESβL-producing coliforms, antimicrobial resistance and rapid molecular testing. Three clinical sessions per week at the Western Infirmary allowed me to maintain basic microbiological and medical skills. I was allocated responsibilities within the cardiothoracic intensive care, high dependency and general wards and contributed towards audit, teaching and supervision of junior staff.

Jan 1996 – Feb 2002: Consultant Microbiologist &
Infection Control Officer for Argyll
Vale of Leven District General Hospital, Dunbartonshire

Service developments included: successful reaccreditation for CPA; organised and produced major laboratory review; procurement of new equipment (Vidas serological analyser, autoclave, IF microscope), new tests (*H. pylori*, *B. burgdorferi*, Varicella zoster IgG, Hepatitis C), new methods (Chlamydia LCR) and improved methods (*E.coli* 0157, MRSA and IUI techniques); enrolment in two national antimicrobial research programmes – quinupristin-dalfopristin & moxifloxacin.
Clinical developments: Set up and advised three Infection Control Committees for both Acute and Primary Care Trusts; member of Drugs & Therapeutics, Laboratory and Support Services Directorate committees; introduced the oral streptogramin, pristinamycin, for patients with MRSA infections; wrote antimicrobial prescribing policies for hospital and community; co-wrote the Infection Control Manuals and updated the Outbreak Control Plan; initiated community Group B streptococcal study; introduced Post-Exposure Prophylaxis strategy for needle-stick and related accidents; maintained on-going campaign for STD services for Argyll; three and six year audits completed on MRSA; set up and supervised hospital Hand Wash Days; responsible for all medical undergraduate teaching following appointment as Sub-Dean for Glasgow University. This included Special Study Modules on microbiology projects.

Previous non-consultant posts

April 1995-Jan 1996: Lecturer in Microbiology
University of Edinburgh

This post included research and teaching all science and medical students. My research project investigated virulence determinants of *Burkholderia pseudomallei*.

May - Aug 1994: Medical Officer, Joint Services Expedition, Blue Mountains, Ellesmere Island, High Arctic, Canada.

The aims of the expedition (sponsored by the Royal Geographical Society) were to combine adventurous training with scientific fieldwork in a hitherto unexplored and uninhabited region of Ellesmere Island. The M.O. was responsible for the health and safety of twelve military and civilian members during the trip. I was offered this post because of my involvement with the Scottish Mountain Rescue services, fitness and ice climbing skills. During this expedition, I undertook a microbiological project with Dr Paul Shears in the Department of Tropical Medical Microbiology, University of Liverpool. We isolated coliforms from Arctic water sources and glaciers using the McArthur "Village" microscope, and an Oxfam-Delagua water testing kit devised by the Robens Institute, University of Surrey. This miniature travelling incubator had never been used under Arctic conditions, as it was developed principally to help provide a suitable water supply for refugee camps in war-torn areas and third world tropics. The aim was to retrieve coliforms from an environment unpressured by the human use of antibiotics. These organisms were brought back to the UK for further work on their antibiotic resistance characteristics.

Sept - Nov 1994: **Visiting Research Associate**, Dept. Tropical Microbiology, University of Liverpool. Head of Department: Prof C. Hart

I characterised isolates brought back from Canada's High Arctic and presented the findings at the UK Path Society conference at the John Radcliffe Hospital, Oxford.

Aug 1993-Nov 1993: **Visiting Lecturer in Microbiology,** Tropical Medicine (Wellcome) Unit, Mahidol University, Thailand. Director: Prof. Nicholas J. White

This post was funded by the Wellcome Trust and afforded an opportunity to manage patients with tropical infectious diseases in Thailand, Vietnam and Northern Territory, Australia. I worked as a microbiologist in Sappasitprasong Hospital, Ubon Ratchatani, North East Thailand, and supervised patients in various research trials centred upon *Burkholderia pseudomallei* infections. Clinical duties also included the management of patients with septicaemic shock. The two main trials were: 'Pharmacokinetics of ceftazidime in acute septicaemic melioidosis'; and 'Effects of Anti-Platelet Activating Factor (PAF) in septicaemic shock'.

I also worked at Bien Nhiet Dhoi Hospital in Ho Chi Minh City, Vietnam, in order to gain clinical experience in the management of malaria, diphtheria and tetanus. I advised microbiology staff on various UK isolation techniques and taught them how to perform MICs. Daily ward rounds allowed valuable insight into the Vietnamese management of infection and public health. Increasing interest in melioidosis took me to the Menzies School of Health Research in Darwin, Australia, where *B. pseudomallei* infections are commonly seen among Aboriginal populations.

Nov 1990-Jan 1993: **Senior Lecturer in Microbiology**
St Bartholomew's Hospital, London.

Four senior registrars shared the supervision of the routine clinical laboratory. St. Bartholomew's Hospital caters for 100-150 medical students per annum and senior registrars planned and ran microbiology teaching throughout the clinical years. Specialist units within the hospital included Intensive Care (ICU), Bodley-Scott haematological malignancies unit, renal unit and a new ward for HIV patients.

July 1990-Oct 1990: **Lecturer in Microbiology**
The Royal London Hospital Medical College.

During this post, I enrolled on the MSc course in Clinical Microbiology and investigated a hospital outbreak of non-gastrointestinal *Bacillus cereus*.

Dec 1987-July 1990: **Research Registrar in Microbiology**
Guy's Hospital Medical College, London SE1
Head of Dept: Professor Cedric A. Mims

This research post was funded by the Special Trustees of Guy's Hospital. My MD thesis was entitled, 'The Staphylococcal Scalded Skin Syndrome: biochemical and epidemiological studies'. The work involved Biochemistry, Histopathology and Immunology departments as well as Clinical Bacteriology and Obstetrics. Experience was gained in optimising staphylococcal culture requirements for toxin production, methods of protein purification, animal bioassay, phage-typing, plasmid extraction,

production and analysis of monoclonal antibodies, SDS-page electrophoresis, High Performance Liquid Chromatography (HPLC), basic immunological techniques such as immunodiffusion, enzyme-inhibition assays, bacteriocin typing, staphylococcal adhesion assays and epidemiological and statistical analyses.

July 1986-Nov 1987: **Registrar in Clinical Bacteriology & Virology**
Guy's Hospital, London Bridge, London SE1

This post involved daily assessment and authorisation of microbiological results. I was taught hospital infection control and contributed towards the management of various hospital outbreaks as a member of the Infection Control Committee. An outbreak of the rare 'Scalded Skin Syndrome' in the neonatal unit launched a major epidemiological investigation and led to the research post described above.

March 1985-June 1986: **Senior House Officer in Pathology**
Guy's Hospital, London Bridge, London SE1

This rotation consisted of four months in Histopathology, Biochemistry, Haematology and Clinical Bacteriology and Virology, with a 1-in-4 on-call rota for emergency treatment of haemophiliacs and anti-coagulated patients and out-of-hours microbiology. Histopathology offered training in macro- and microscopic description of excised tissue with post-mortem examinations. Experience in tissue culture, fluorescent microscopy and serology was gained in Virology and serum antibiotic assay methods in Microbiology.

Sept 1984-Feb 1985: **Senior House Officer in Accident & Emergency**
Bristol Royal Infirmary, City of Bristol, Avon.

Close to the junction of three major motorways, this A&E department sees multiple RTA patients and industrial accidents from engineering and shipyard workers at the city docks. The post involved 8-12 hour shifts on a rotational basis with experience in all aspects of paediatric, obstetric, medical and surgical emergencies. I organised a weekly ECG tutorial group for medical students.

Feb 1984-July 1984: **House Surgeon in General & ENT Surgery**
St. Bartholomew's Hospital, London.

The first three months involved a 1:2 rota in general surgery with special interests in surgical management of breast cancer and Hodgkin's disease. The final three months involved a 1:3 rota in Ear, Nose and Throat surgery. Special interests centred upon the management of head and neck tumours.

Aug 1983-Jan 1984: **House Physician in General Medicine**
Whipps Cross Hospital, London.

The post involved a busy 1:3 medical rota with cross cover. Special interests were metabolic diseases (esp. Diabetes mellitus) and rheumatology.

Offices past and present

March 2023	**Elected Member** of **ESGNI** executive committee (ESCMID)
Dec 2023-	**Board Member,** Groove-binders, Strathclyde University
Jan 2016- present	**Senior Editor**: *Infection, Disease & Health*
May 2014-18	**Clinical Advisor**, MGB-Biopharma & Strathclyde University
October 2013-15	**Senior Editor** and **Board member**, *Healthcare Infection*
February 2012	**Witness**, Vale of Leven Enquiry, Scotland
July 2011-present	**Editor/Board member**, *Journal of Hospital Infection*
May 2011- present	**Section Editor**, *Int J Antimicrob Agents*
Jan 2006-2011	**Editor-in-Chief**, *J Hosp Infect*; annual submissions increased from 500 to 900; Impact Factor increased from **2.2** to **3.393**.
Jan 2006-2011	**Member**, UK Healthcare Infection Society Council.
August 2008-13	**External Examiner**, Highlands & Islands University MSc in Infection Control
1996-present	**Referee** for numerous international journals and grant-giving bodies, e.g. *Wellcome; HTA; NIHR; CSO; MRC*
Nov 2002-06	**Honorary Secretary**, Scottish Microbiology Forum.
June 2001-02	Elected **Chairman**, Medical Staff Association, VoLDG Hospital
June 2000-03	**National Register of Panellists for Microbiology** (Scotland).
July 1999-02	Appointed **Undergraduate Sub-Dean**, Glasgow University.
Sept 1999-2000	**External Examiner** for the Diploma in Infection Control, University of Glasgow.
July 1996-2006	**Assistant Editor**, *Journal of Hospital Infection.* Member of Editorial Board.
May 1991-	Elected **Vice-President** of St. Bartholomew's Hospital Boat Club. First woman to be appointed.
1980 -1982	Elected **Captain**, St. Bartholomew's Hospital Boat Club.
1978 -1979	**Treasurer**, Hall's Committee (QMC, London & St Bartholomew's Hospitals Halls of Residence).

National & International Working Groups

June 2022-24	Member of **ECCMID** scientific planning committee 2022-2024
May 2021-	Member, **Chief Scientist Office** Translational Clinical Studies Committee, Scotland
May 2020-21	Member of **SAGE subgroups** during COVID-19 pandemic
May 2020-21	Member of **DEFRA expert group** during COVID-19 pandemic
Jan 2019-22	Committee member, **NICE UK**: Antimicrobial prescribing.
Dec 2016-18	**Health Protection Scotland AMR committee**
Oct 2013-16	**Committee member,** British Standards Institute
Jan 2013-19	**Health Protection Scotland** Decontamination committee
Jan 2011-15	Member, **National Institute of Clinical Excellence (NICE)** formulating expert guidance on hospital-acquired infection.
Mar 2011-	**ESGNI (European Study Group for Nosocomial Infections)**.
July 2010-16	Member, **HAI Commodities** group, responsible for assessing new technology for infection control in Scotland's hospitals.
Jan 2009-15	Member, **Cochrane Review** on Hospital cleaning.
Apr 2009-11	**Health Facilities Scotland:** Decontamination committee.
June 2008-12	Member, **HTA Board (UK)** (Research applications assessor)
Feb 2007	**NHS Education**: Advisor, national Infection Control training.
Oct 2006-7	**HAI Taskforce**: The role of the housekeeper.
Oct 2005	**National working group** on Antimicrobial prescribing
Jan 2003	**BSAC Scottish subgroup**: Undergraduate teaching for Prudent Antimicrobial Prescribing.
June 2005	**HAI Taskforce**: Monitoring Cleaning Standards. Report published.
Feb 2004	**HAI Taskforce**: Antimicrobial Prescribing in Hospitals.
March 2003	**HAI Taskforce**: Hospital Cleaning - Report/Guidelines published.
2002-2003	**Scottish Infection Standards** (**SISS) subgroup**: Good Practice Guidelines published for 'MRSA'; 'Laboratory Organisation' and 'Antibiotic Prescribing in Hospitals': RCP (Edinburgh), Nov 2003.
March 2002	**HAI National Steering Group**. Several surveillance publications.

Current Grant applications

2024-: '**Examining the groove-binder group of compounds offering potential antimicrobial activity'**, with Strathclyde University (Profs. Colin Suckling & Iain Hunter). Application to CSO; successful.
2022- : Edinburgh Napier University appointed to manage NHS Scotland ASSURE Research Scheme on '**HAI from the Healthcare Environment'** [redacted].

Research grants obtained

2020-22: '**Examining the groove-binder group of compounds offering potential antimicrobial activity'**, with colleagues at Strathclyde University (Prof. Colin Suckling). Application to CSO successful [redacted]. Paper published.

2017-22: London School of Hygiene & Tropical Medicine: '**The Clean Study'**, funded by MRC. Following an intervention involving training and mentoring of cleaning supervisors, this study demonstrated improved environmental hygiene in maternity and newborn units in three Tanzanian hospitals. Papers published.

2017-19: '**Modelling the effect of ventilation on MDROs in community homes'.** With Dept. of Engineering (Leeds University) and Glasgow School of Art. Application successful [redacted]; paper published.

2017: '**Healthcare Environment Control, Optimisation and Infection Risk Assessment'.** EPSRC: Research Grant. With Prof Cath Noakes (Dept of Engineering, Leeds University); project (healthcare toilet microbiome) started 2023 [redacted].

2017: **'Investigation of biofilm components on frequent touch hospital equipment'.** With Professor J-Y Maillard (Cardiff University) & Dr Jon Otter (UCLH). Healthcare Infection Society grant [redacted]. Study published.

2016-: '**Investigating the transmission of *Staphylococcus aureus* in ICU'**. Surface-Air-Sampling (SASS) project in Critical Care, Hairmyres hospital. Funded by a [redacted] project grant from NHSL. Study complete: three publications.

2016-: '**Examining the Groove-binder class for antimicrobial properties'**. Study funded by Chief Scientist Office, Scotland, with Professors Colin Suckling and Iain Hunter, Strathclyde University, Glasgow [redacted]. Study completed.

2016-: '**Assessing the impact of microbubble technology for surface cleaning'**. Project in conjunction with Professor Tim Leighton, University of Southampton. [redacted] awarded for initial microbiology pilot study.

2015-: '**Clinical and decontamination potential of electrolysed water'**.
Several projects examining the effects of electrolysed water as a disinfectant (*C. difficile*; norovirus) and as a wound irrigant (diabetic feet) in NHS Lanarkshire. Funding [redacted]. Funding body: Aqualution Ltd., Scotland.

2015-: '**EPSRC Bridging the Gaps Antimicrobial Resistance - *Tackling Antimicrobial Resistance: An Interdisciplinary Approach***'. Co-applicant with Dr D.

Malik (Loughborough University) for joint application to investigate the role of antimicrobial surfaces in healthcare [redacted]. Study complete: two publications.

2010-13 & 2015-: **AHRC SFC Knowledge Exchange Programme:** '**Visualising the invisible: developing innovative approaches to help NHS staff prevent and control Healthcare Associated Infections'.** [redacted] awarded for a translational arts project to study perception of infection transmission for educational purposes. Lead: Dr Colin MacDuff, Robert Gordon University, Aberdeen; also with St. Andrew's University & Glasgow School of Art. Study complete, one publication.

2014- : '**Cost-benefits of environmental cleaning methods for controlling hospital-acquired infection: the REACH project'.** Developed an environmental cleaning intervention to reduce HAI. Application to NHMRG **successful**; with Professor Nicholas Graves, Australian Centre for Health & Biomedical Innovation, Queensland University of Technology, Australia. Study complete and published.

2012-: **'How Quickly Do Hospital Surfaces Become Contaminated?'** [redacted] from NHS Lanarkshire for study evaluating the microbiological effects of two different cleaning methods. Posters & two papers presented and published.

Health Facilities Scotland (2010): [redacted] for hospital cleaning assessment using ATP bioluminescence. Paper published in *J Hosp Infect* Jan 2011.

NHS Lanarkshire (2010): [redacted] for decontamination study. Paper published.

UNISON (2006): [redacted] received from Unison, to be used with monies from **NHS Scotland** for projects on hospital cleaning, modelling of environmental data against clinical risk of infection and MRSA. Several papers published.

IDI®, Quebec (2004), Canada: Realtime PCR equipment (value: [redacted]); plus additional [redacted] for consumables obtained from **Common Services Agency** to trial the equipment for rapid testing of MRSA in the clinical laboratory. Report complete.

Department of Health (2002), London: [redacted] to study antibiotic resistance among environmental organisms from different wards in a teaching hospital. One paper.

Argyll & Clyde Acute Hospitals Research Fund (2001): [redacted] for projects on Group B streptococci, healthcare environment and oral streptogramins. Three papers.

Argyll & Clyde Acute Hospitals Trust Research Fund (2000): [redacted] to study antibiotic resistance of environmental organisms in Intensive Care. One paper.

Bayer (1998), Berkshire: [redacted] for six-month collection of selected pathogens for in-vitro susceptibility studies against moxifloxacin.

Rhone-Poulenc Rorer (1998), Kent: [redacted] for three year in-vitro susceptibility study of Gram-positive isolates against quinupristin-dalfopristin.

Joint Services Expedition Trust Committee (1994): [redacted] for research consumables for work on the Arctic isolates. One paper published.

Wellcome Trust (1993): [redacted] for three-month research post in Thailand, Vietnam and Darwin, Australia. One paper published.

Proctor & Gamble Ltd (1990): [redacted] for further seven months for Staphylococcal Scalded Skin Syndrome study. Four papers published.

Special Trustees of Guy's Hospital (1988): London: [redacted] for two-year study on the Staphylococcal Scalded Skin Syndrome, leading to MD thesis.

Teaching

Edinburgh Napier University (2016-): Contribute to several modules; currently joint supervisor of a PhD student.

NHS Lanarkshire Trust (2008-18): Teaching doctors, laboratory staff, students, nurses as requested. Gained the highest score possible (100%) from junior doctors for a seminar on antimicrobial resistance. Supervise research projects for junior doctors, BMS and research nurses; several joint publications.

University of Highlands & Islands (2008-2013): External examiner for MSc in Infection Control.

Southern General Hospital (2005-7): Taught Post-graduates, BMS's, students, doctors, nurses, pharmacists and cleaning staff, etc. Supervised MSc projects on MRSA (Glasgow Caledonian University) with publications. Junior doctor audits on antimicrobial prescribing and resistance.

University of London (2004-present): External Examiner for PhD theses: **'Biochemical modelling of structure-function relationships of staphylococcal toxins'**; and '**Epidemiological and molecular studies of Community-associated Methicillin-Resistant *Staphylococcus aureus*'**.

Open University (2002-8): Supervisor for PhD student (Dr A. Robb). '**Investigating the mechanisms of antibiotic resistance in animal and human staphylococci'**. PhD awarded August 2008.

Argyll & Clyde Health Board (1996-02): Taught doctors, laboratory staff, students, nurses and pharmacists, etc. Supervised biomedical scientist for MSc project on methicillin-resistant *Staphylococcus aureus* (Glasgow Caledonian University).

University of Glasgow (1996-2018):

1996-98:	Tutor for third year medical students and Special Studies Modules.
1999:	Directed microbiology workshop for final ENT FRCS candidates.
1999-00:	External examiner, Diploma of Infection Control.
1999-02:	Appointed Undergraduate Sub-Dean, Glasgow University.
1999:	Undergraduate Facilitator for medical students, Glasgow University.
1999:	Supervisor, Special Studies Modules for medical students.
2002-03:	Lectures 'Antibiotic Resistance & Prescribing' (Dental school).
2009-10:	Lectures 'Antibiotics' & 'Antibiotic Resistance' (Medical school).
2013:	Lecture course on antimicrobial prescribing & resistance.

University of Edinburgh (1995-6): Lecturer, tutor and practical demonstrator for science and medical students. Attended the five-day '*Teaching, Learning and Assessment*' course. Year lecture, "Identification of micro-organisms," with associated practicals. 2012-13: External Examiner for 3 PhD theses: ESBL-coliform epidemiology and MDR-*Acinetobacter baumannii* (x2)

School of Tropical Medicine, University of Liverpool (Autumn 1994): Supervised Bacteriology demonstrations for the DTM & H course.

Guy's Hospital (Dec 1987 - June 1990): Construction and supervision of all practical microbiological demonstrations; Year lectures: 'Serology in the diagnosis of infection', 'Control of Hospital Infection' and 'Basic neonatal immunology'.

St. Bartholomew's Hospital (Dec 1990 – Dec 1992): Supervisor for practical demonstrations for Pathology teaching. Seminars in basic microbiology. Lectures on 'Use of Microbiology Laboratory', 'Mycology'; 'Vaccination' & 'Infections in the Immunocompromised'.

Prizes and awards

Dec 2019:	Awarded **ISAC Fellowship** for professional excellence and outstanding service rendered to the profession and the Society.
April 2017:	Awarded **ESCMID Fellowship** for professional excellence and outstanding service rendered to the profession and the Society.
Nov 2014:	**Two discretionary points** awarded, NHS Lanarkshire.
Oct 2012:	**Discretionary point** awarded, NHS Lanarkshire.
May 2012:	Awarded **Honorary Fellowship**, Royal Coll Phys of Edinburgh.
Nov 2009:	**Two discretionary points** awarded, NHS Lanarkshire.
Nov 2007:	**Discretionary point** awarded, NHS Greater Glasgow & Clyde.
Oct 2004:	**Discretionary point** awarded, Health Protection Scotland.
April 2000:	**Discretionary point** awarded, Argyll & Clyde Health Board.
May 1984:	**University of London Honours-Colours** awarded for services to St. Bartholomew's Hospital Rowing Club.
March 1982:	**Finalist**, Orthopaedic & Cardiology Prizes.
Sept 1977:	**Scholarship to study medicine**, Cedars Grammar School.

Continuing Professional Development **(**Royal College of Pathologists)

I joined this scheme in Jan.1996. Total credits for session 1996-2000 were **409** (initial target 208). Credits for 2000-2005 were **687;** for 2005-2010 were **877**; and for 2010-2015 were **1002** (given target 250). The Regional College tutor reviewed credits for 2003 and 2006. For the 5-year period ending on 31/3/2016, I achieved **1001** credits; **483** credits for the 5-year period ending on 31/03/2019, and **534** credits for the 5-year period ending on 3/31/2022.

Publication record

I have over **200 publications** in peer-reviewed journals; books; guidelines, etc. On average, top ten papers have about **670 citations** each (Google Scholar); top 20 (first author for 11) have over **450 citations** each. Author h-index: **52** (Google Scholar).

Publications (in preparation/ submitted)

1. Dancer SJ, Hamill R, Wilson D, McLure H, McDougal C. (2024). '**Management of the diabetic foot using neutral electrolysed water'**. In preparation, *European J Operational Research*.
2. Schuler H, Harnoss JC, Dancer SJ, et al. (2024). '**Particle and microbial load with conventional and laminar airflow ventilation under real operative conditions'.** Awaiting review, *J Hosp Infect.*
3. Aumeran C, Hamilton L, Jamieson L, Lee E, Dancer SJ. (2024). '**Establishing the living microbiome of the healthcare toilet'**. Original study, in preparation.
4. Denkel LA, Voss A, Caselli E, Dancer SJ, Leistner R, Gastmeier P, Widmer, A. (2024) **'The place of probiotic cleaning in European hospitals – a narrative review based on expert discussion'.** Final draft.
5. Kramer A, Dancer SJ, et al**.** (2024). **'Survival of microorganisms, protozoa and viruses on inanimate surfaces considering re-cultivation: Basis for the assessment of the nosocomial infection risk'.** Provisionally accepted.
6. Gon G, Ma S, Aiken A, Dancer SJ, Graham WJ, Nash S, Nov V, Sovathiro M, Sarpong B, Vong S, Tang V, Thompson J, Ir P. (2024) '**Reducing the risk of infection from the healthcare environment: results from a stepped wedge trial in Cambodia'**. Paper submitted.

Publications (in press)

1. Okomo U, Gon G, Darboe S, Sey ICM, Nkereuwem O, Leigh L, Camara N, Makalo L, Keita A, Dancer SJ, Graham W, Aiken AM. (2024). **'Assessing the impact of a cleaning programme on environmental hygiene in labour and neonatal wards: an exploratory study in The Gambia'.** Accepted, *Antimicrob Res Infect Control*.
2. Morawska L, Allen J, Bahnfleth W, Bennett B, Bluyssen PM, Boerstra A, Buonanno G, Cao J, Dancer SJ, et al. (2024). '**Making indoor air quality standards the reality: moving forward'**. Commentary, *Science*.

Publications (2024-1988)

1. Dancer SJ. (2023). **'Hospital Cleaning: Past; Present; and Future.'** Narrative review. *Antimicrob Res Infect Control*.
2. Mitchell B, McDonagh J, Dancer SJ, Ford S, Sim J, Khadar BTSA, Russo P, Maillard J-Y, Rawson H, Browne K, Kiernan M. (2023). '**Risk of organism acquisition from prior room occupants: an updated systematic review'**. *Infection Disease & Health*.
3. Tang JW, Marr L, Dancer SJ, Li Y. (2023). '**Airborne transmission of respiratory viruses'**. *Curr Opinion Pulm Med*.

4. Morawska L et al. (2023). '**COVID-19 and Airborne Transmission: Science Rejected, Lives Lost. Can Society Do Better?**' *Clin Infect Dis*.
5. Hind C, Clifford M, Woolley C, Harmer J, McGee L, Tyson-Hirst I, Tait H, Brooke D, Dancer SJ, Hunter I, Suckling C, Beveridge R, Parkinson J, Sutton M, Scott F. (2023). **'Insights into the spectrum of activity and mechanism of action of MGB-BP-3'.** *J Medicinal Chemistry*.
6. Loh M, Dancer SJ, et al. (2023). '**SARS-CoV-2 sampling in NHS Lanarkshire'**. *J Hosp Infect*.
7. Dancer SJ. (2022). '**How Do Biofilms Affect Surface Cleaning in Hospitals?**' Editorial, *Hygiene*.
8. Dancer SJ. (2022). '**The Inanimate Environment'**. Book chapter, 'Bennett & Brachman's Hospital Infections'.
9. Jimenez J, Marr L, Randall K, Ewing ET, Tufekci Z, Greenhalgh T, Tellier R, Tang JW, Li Y, Morawska L, Mesiano-Crookston J, Fisman D, Hegarty O, Dancer SJ, et al. (2023). '**What Were the Historical Reasons for the Resistance to Recognizing Airborne Transmission during the COVID-19 Pandemic?'** *Indoor Air*.
10. Manoukian S, Stewart S, Dancer SJ, et al. (2022). '**Probabilistic microsimulation to examine the cost-effectiveness of hospital admission screening strategies for carbapenemase producing enterobacteriaceae (CPE) in the United Kingdom'**. *Eur J Health Econ* 23(7):1173-1185.
11. Gon G, Aiken AM, Dancer SJ, et al. (2022). '**A Better Disinfectant for Low-Resourced Hospitals? A Multi-Period Cluster Randomised Trial Comparing Hypochlorous Acid with Sodium Hypochlorite in Nigerian Hospitals: The EWASH Trial'**. *Microorg* 10(5): 910.
12. Inkster T, Peters C, Hood J, Dancer SJ. (2022). '**Safe design and maintenance of Bone Marrow Transplant Units: What to do when there are no guidelines'**. Review, *Clin Micro Infect*.
13. Greenhalgh T, Peng Z, Jimenez JL, Bahnfleth W, Dancer SJ, Bourouiba L; 22 authors of the technical paper in Environmental Science and Technology. (2022). '**Quantifying transmission risk of SARS-CoV-2 in different situations'**. *BMJ* 376: o106.
14. Peng Z, Pineda Rojas A, Kropff E, Bahnfleth W, Buonanno G, Dancer SJ, et al. (2022). '**Practical Indicators for Risk of Airborne Transmission in Shared Indoor Environments and their Application to COVID-19 Outbreaks'**. *Environ Sci Technol* 56(2):1125-1137. Given **Best Paper Award** (*Environmental Science &Technology Best Paper Awards 2022*).
15. Dancer SJ, Inkster T. (2022). '**One size does NOT fit all: why infection prevention is difficult to randomise or control'**. *J Hosp Infect.*
16. Dancer SJ. (2022). '**Airborne SARS-CoV-2'**. *BMJ* 377: o1408.
17. Dancer SJ, Cormack K, Loh M, Coulombe C, Thomas L, Pravinkumar SJ, Kasengele K, King M-F, Keaney J. (2022). '**Healthcare-acquired clusters of COVID-19 across multiple wards in a Scottish health board'**. *J Hosp Infect*.
18. Dancer SJ, Bluyssen PM, Li Y, Tang JW. (2021). '**Do we just open windows? Why the evidence for preventing COVID-19 is lost in translation'**. *BMJ* editorial.
19. Dancer SJ. (2021). '**Reducing the risk of COVID-19 transmission in hospitals: focus on additional infection control strategies**.' Original article, *Surgery (Oxford).*

20. King M-F, Wilson AM, Weir, Lopez Garcia M, Hirwar W, Khan A, Fletcher L, Sleigh PA, Clifton I, Dancer SJ, Wilcox M, Reynolds, Noakes CJ. (2022). '**Modelling fomite mediated SARS-CoV-2 exposure through PPE doffing in a hospital environment'**. *Indoor Air*.
21. Ledwoch K, Dancer SJ, Otter JA, Maillard JY. (2021). '**Dirty QWERTYs: there's no ESC!**' Letter, *J Hosp Infect.*
22. Manoukian S, Stewart S, Graves N, Mason H, Robertson C, Kennedy S, Pan J, Haahr L, Dancer SJ, et al. (2021) '**Evaluating the post-discharge cost of healthcare-associated infection in NHS Scotland**.' *J Hosp Infect* **114**:51-58.
23. Robertson C, Kennedy S, Pan J, Kavanagh K, Haahr L, Adil M, Dancer SJ, et al. (2021) '**Bed-days and costs associated with the inpatient burden of healthcare-associated infection in the UK**.' *J Hosp Infect* **114:**43-50.
24. Stewart S, Robertson C, Kennedy S, Kavanagh K, Haahr L, Manoukian S, Mason H, Dancer S, et al. (2021) '**Personalized infection prevention and control: identifying patients at risk of healthcare-associated infection.**' *J Hosp Infect* **114**:32-42.
25. Stewart S, Robertson C, Pan J, Kennedy S, Haahr L, Manoukian S, Mason H, Kavanagh K, Graves N, Dancer SJ, et al. (2021) '**Impact of healthcare-associated infection on length of stay**.' *J Hosp Infect* **114**:23-31.
26. Stewart S, Robertson C, Pan J, Kennedy S, Dancer S, et al. (2021) '**Epidemiology of healthcare-associated infection reported from a hospital-wide incidence study: considerations for infection prevention and control planning**.' *J Hosp Infect* **114**:10-22.
27. Lerche N, Holtfreter S, Walther B, Semmler T, Dancer SJ, et al. (2021). '***Staphylococcus aureus* nasal colonization among dental health care workers in North Germany (StaphDent study)**'. *Int J Med Micro*.
28. Dancer SJ, Hart A, Jones D, Li Y. (2021). '**What is the risk of acquiring SARS-CoV-2 from use of public toilets?**' *Science Total Environ*.
29. Morawska L, Allen J, Bahnfleth W, Bluyssen PM, Boerstra A, Buonanno G, Cao J, Dancer SJ, et al. (2021). '**A paradigm shift to combat indoor respiratory infection'**. *Science*.
30. Tang JW, Marr LC, Li Y, Dancer SJ. (2021). '**Covid-19 has redefined airborne transmission**'. Editorial, *BMJ* 373: n913.
31. Tang JW, Kwok KO, Loh TP, Lee CK, Heraud J-M, Dancer SJ. (2021). '**Can we do better? A guide to pandemics – some Dos and Don'ts for the next one'**. *J Infect*.
32. Ledwoch K, Dancer SJ, Otter JA, Kerr K, Roposte D, Maillard JY. (2021). '**How dirty is your QWERTY? The risk of clinically relevant pathogen transmission from healthcare facilities' keyboards**.' *J Hosp Infect.*
33. Hiwar W, King M-F, Shuweihdi F, Fletcher LA, Dancer SJ, Noakes CJ. (2021). '**What is the relationship between indoor air quality parameters and airborne microorganisms in hospital environments? A Systematic Review and Meta-Analysis'.** Review, *Indoor Air.*
34. Manoukian S, Stewart S, Graves N, Mason H, Robertson C, Kennedy S, Haahr L, Dancer SJ, et al. (2021) '**ECONI: Evaluating the post-discharge cost of healthcare associated infection in NHS Scotland'**. *J Hosp Infect.*
35. King M-F, Wilson AM, López-García M, Proctor J, Peckham DG, Clifton IJ, Dancer SJ, Noakes CJ. (2021) '**Why is mock care not a good proxy for**

predicting hand contamination during patient care?' In press, *J Hosp Infect*.

36. Dancer SJ, King M-F. (2021). '**Systematic review on use, cost and clinical efficacy of automated decontamination devices'**. Review, *Antimicrob Res Infect Control*.
37. Tang JW, Tellier R, Marr LC, Bluyssen PM, Neilsen PV, Bahnfleth WP, Morawska L, Dancer SJ. (2020). '**Environmental air-sampling vs. person-to-person transmission**.' Letter, *JAMA Netw Open*; 3(12): e2033232. doi:10.1001/jamanetworkopen.2020.33232. Available at: https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2774463
38. Tang JW, Dancer SJ, Bahnfleth WP, et al. (2021). '**Dismantling the myths on the airborne transmission of severe acute respiratory syndrome coronavirus (SARS-CoV-2)**'. *J Hosp Infect.*
39. Gon G, Kabanywanyi AM, Blinkhoff P, Cousens S, Dancer SJ, Graham WJ, Hokororo J, Manzi F, Marchant T, Mkoka D, Morrison E, Mswata S, Oza S, Penn-Kekana L, Sedekia Y, Virgo S, Woodd S, Aiken AM. (2021). '**The Clean pilot study: evaluation of an environmental hygiene intervention bundle in three Tanzanian hospitals'**. *Antimicrob Resist Infect Control* 2021 Jan 7;10(1):8.
40. Dancer SJ. (2020). '**Covid-19 has exposed the gaps in infection prevention and control**.' Editorial, *Infect, Dis & Health*.
41. Tang JW, Tellier R, Dancer SJ. (2020). '**Aerosol transmission – Out with the Old, In With the New'**. Response to *JAMA* commentary, July 2020. https://jamanetwork.com/journals/jama/fullarticle/2768396
42. SJD is one of c.240 signatories on an Open Letter, '**It is Time to Address Airborne Transmission of COVID-19'**. *Clin Infect Dis*. (2020).
43. Miller S, Morawska L, Jimenez JL, Dancer SJ, Marr L, Nazaroff W, Noakes C, et al. (2020). '**Outbreak of SARS-CoV-2 during a choir rehearsal'**. *Indoor Air*.
44. Morawska L, Tang JW, Bahnfleth W, Bluyssen PM, Boerstra A, Buonanno G, Cao J, Dancer SJ, et al. (2020). '**How can airborne transmission of COVID-19 indoors be minimised?**' *Environ Int*.
45. Wilson AM, King M-F, Dancer SJ, Sarah E. Abney SE, López-García M, Noakes CJ, Reynolds KA, Proctor J, Sexton J, Weir MH. (2020). **'COVID-19 and non-traditional mask use: How do various materials compare in reducing the infection risks for mask wearers?'** *J Hosp Infect*.
46. Sharpe T, McGill G, Dancer SJ, King M-F, Fletcher L, Noakes CJ. (2020) '**Influence of ventilation use and occupant behaviour on surface microorganisms in contemporary social housing'**. *Scientific Reports*.
47. Suchomel M, Eggers M, Kramer A, Dancer SJ, Pittet D. (2020) **'Evaluation of WHO recommended hand hygiene formulations'.** *Emerg Infect Dis*.
48. Dancer SJ, Tang JW, Marr LC, Miller S, Morawska L, Jimenez JL. (2020). '**Putting a balance on the aerosolization debate around SARS-CoV-2'.** Letter, *J Hosp Infect*.
49. Gon G, Dancer SJ, Dreibelbis R, Graham WJ, Kilpatrick C. '**Reducing hand recontamination of healthcare workers during COVID-19'.** (2020). Letter, *Infect Control Hosp Epidemiol*.
50. Dancer SJ. (2020) '**Revising Nightingale's Legacy**.' Letter, *J Hosp Infect*.
51. King M-F, Atedoghu K, Hiwar W, López-García M, Dancer SJ, Noakes CJ, Fletcher LA. (2020) '**Fomite-to-fingertip transfer of *Escherichia coli***

during multiple surface contacts with and without hospital gloves'. *Indoor Air*.
52. Harnoss JC, Dancer SJ, Kaden SF, Baguhl R, Kohlmann T, Papke R, Zygmunt M, Assadian O, Pittet D, Kramer A. (2020) **'Improving compliance with hand disinfection by shortening the rub-in time of alcoholic based hand rubs to 15 seconds without decreased efficacy'.** *J Hosp Infect* **104**(4):419-424.
53. Dancer SJ. (2020) '**How much impact do antimicrobial surfaces really have on healthcare-acquired infection?**' *Clin Infect Dis* pii: ciz1078.
54. Khaznadar L, Dancer SJ, Petersmann A, Seifert U, Below H, Papke R, Suchome M, Kohlmann T, Kramer A. (2020) '**Do pneumatic tube transport systems transmit potential pathogens? A hygienic risk assessment in a University hospital'**. *J Hosp Infect* **104**(3):374-380.
55. Oon A, Reading E, Ferguson JK, Dancer SJ, Mitchell BG. (2020) '**Measuring environmental contamination in critical care using dilute hydrogen peroxide (DHP) technology: an observational cross-over study'**. *Infect, Dis & Health* **25**(2):107-112.
56. Adams CE & Dancer SJ. (2020) '**Dynamic Transmission of Staphylococci in Critical Care'**. *Int J Environ Res & Public Health* 17(6). pii: E2109.
57. Lemonidis K, Salih TS, Dancer SJ, Hunter IS, Tucker NP. (2019) '**Emergence of an Australian-like *pstS*-null vancomycin-resistant *Enterococcus faecium* clone in Scotland**'. *Plos One* **14**(6):e0218185. European Nuclear Archive: GenBank BioProject (ID for VRE5 is PRJNA422798).
58. Dancer SJ, Adams C, Smith J, Pichon B, Kearns A, Morrison D. (2019) **'Tracking *Staphylococcus aureus* in ICU using Whole-Genome Sequencing.**' *J Hosp Infect* **103**(1):13-20.
59. Dancer SJ, Kramer A. (2019) '**Four Steps to Clean Hospitals: Look; Plan; Clean; and Dry'**. *J Hosp Infect* **103**(1): e1-e8.
60. Dancer SJ. (2019) '**Visualising the Invisible; why cleaning is important in the control of hospital-acquired infection'.** *Evidence-Based Nursing* 22(4):117.
61. Dancer SJ, Macpherson SG, De Beaux AC. (2018) '**Protracted diagnosis of ACNES: a costly exercise'**. *J Surg Case Reports* (9): rjy230.
62. Manoukian S, Stewart S, McFarland A, Mason H, Robertson C, Graves N, Reilly J, Dancer SJ. (2018) '**How do you cost the length of stay due to hospital-acquired infection? A review of analytical methods**.'*J Hosp Infect* **100**(2): 222-235.
63. Ledwoch K, Dancer SJ, Otter JA, Kerr K, Roposte D, Maillard JY. (2018) '**Beware Biofilm! Dry biofilms containing bacterial pathogens on multiple healthcare surfaces; a multicentre study**.' *J Hosp Infect* **100**(3): e47-e56.
64. De Kraker M, Harbarth S, Dancer SJ. (2018) '**Shining a light on Ultraviolet-C disinfection: no golden promises for infection prevention'**. *Am J Infect Control* **46**(12):1422-1423.
65. Lee XJ, Fulford G, Dancer SJ, et al. (2017) '**Quantifying the relative effect of environmental contamination on surgical ward MRSA incidence: An exploratory analysis'**. *Infect Dis Health* **23**(3): 127-136.
66. Reid M, Whatley V, Spooner E, Nevill A, Cooper M, Ramsden JJ, Dancer S.J. (2018) '**How do photocatalytic antimicrobial coatings affect**

environmental bioburden in hospitals?' *Infect Control Hosp Epidemiol* **39**(4):398-404.
67. Smith J, Adams CE, King M-F, Robertson C, Noakes C, Dancer SJ. (2018) '**Is there a relationship between airborne and surface microbes in the critical care environment?**' *J Hosp Infect* **100**(3):e123-e129.
68. Int Soc Chemother Working Group: '**PVL-producing *Staphylococcus aureus* (MSSA and MRSA)**'. (2018) *Int J Antimicrob Agents* **51**(1):16-25.
69. Muirhead E, Dancer SJ, King M-F, Graham I. '**New technology for door handle design'**. (2018) Letter, *J Hosp Infect* **97**(4):433-434.
70. Parsonage BC, Hagglund P, Keogh L, Mitchell C, Wheelhouse N, Brown R, Dancer SJ. (2017) '**Control of antimicrobial resistance requires ethical consideration'**. Review, *Frontiers in Microbiology* **8**: 2124.
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72. Mitchell BG, Dancer SJ, Graves N, et al. (2017) '**Variation in hospital cleaning practice and process'.** *Infect, Dis & Health* 22(4): 195-202.
73. Mitchell BG, Petrie D, Morton L, Dancer SJ. (2017) **'What's trending in infection control? A scoping and systematic review.'** *Infect Control Hosp Epidemiol* **38**(9): 1098-1102.
74. Ramsden JJ, Reid M, Whatley V, Dancer S.J. (2016) **'Disastrous performance of NanoCote/Aqua-Based antimicrobial paint in a hospital setting'.** *J Biolog Physics Chem* **16**(3): 131-136.
75. Adams CE, Smith J, Robertson C, Watson V, Dancer SJ. (2017) '**Examining the relationship between surface bioburden and frequently touched sites in Intensive Care'.** *J Hosp Infect* **95**(1):76-80.
76. Dancer SJ. (2016) '**Infection control; evidence-based common sense'.** *Infect, Dis & Health* **21(**4): 147-53.
77. Dancer SJ. (2016) '**Antibiotic prescribing: the consequences of getting it wrong'**. *Clinical Focus Primary Care* **10**(2): 62–71.
78. Graham WJ, Morrison E, Dancer S, et al. (2016) '**What are the threats from antimicrobial resistance for maternity units in low- and middle-income countries?'** *Global Health Action* **9**: 10.3402/gha.v9.33381. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5027331/pdf/GHA-9-33381.pdf
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August 2009: Crawford K, Dancer SJ. **'A microbiological evaluation of name badges'.** Nuffield TechFest, Scotland.

Sept 2010: Findlay J, Hamouda A, Dancer SJ, Amyes S. **'Carbapenem resistance emerging in a strain of *Klebsiella pneumoniae* treated with meropenem'.** ICAAC, Boston, USA.

Sept 2010: Robb A, Gemmell CG, Dancer S, Morrison D. '**Characterising *Staphylococcus aureus* from livestock, Companion and wild animals in Scotland and Northern Ireland: a review of current methods**'. ISSSI, Bath, UK.

Oct 2010: Anderson RE, Young V, Stewart M, Robertson C, Dancer SJ. '**Cleanliness audit of clinical equipment: Who cleans what?'**& Mulvey D, Redding P, Robertson C, Dancer SJ. '**Finding a benchmark for monitoring hospital cleanliness'.** Hosp Infect Soc Int. Conference, Liverpool.

May 2011: Smith SJ, Young V, Robertson C, Dancer SJ. '**Cross-transmission audit: Who touches What?'** ECCMID, Milan 2011.

April 2012: Taconnelli E, Dancer SJ, et al. **'Control methods for multi-drug resistant Gram neg bacilli'**. ESCMID group, ECCMID.

July 2012: Kerr F, Dancer SJ, Laughlan G, Dundas S, et al. '**Oral fosfomycin used as a carbapenem sparing strategy**

for management of UTI due to MDR Enterobacteriaceae'. ESCAIDE conference, Edinburgh.

April 2013-14: Bogusz A, Stewart M, Hunter J, Yip B, Reid D, Dancer SJ. **'Effect of detergent-based cleaning at high-risk sites on an acute ward'**. ECCMID, Berlin; Br.Geriatric Soc Annual Meeting & NHS Scotland conference, Glasgow, June 2014.

Sept 2013: Boytha S, Virdi M, Dancer SJ. **'Audit of Endophthalmitis cases, Hairmyres hospital'.** Ophthalmology meeting, Scotland.

Dec 2013: Hunter P, Christison F, McLaren J, McCandless K,McCormick S, Inverarity D, Dancer SJ. **'Use of pivmecillinam for treating urinary tract infection caused by MDR enterobacteriaceae'.** NHSL R&D conference; ECCMID, 2014.

May 2014: Stewart M, Bogusz A, Hunter J, Devanny I, Yip B, Reid D, Robertson C, Dancer SJ. **'Effect of disinfectant-based cleaning at high-risk sites on an acute ward'**. ECCMID 2014 (Barcelona) and NHS Lanarkshire R&D conference (Bothwell).

March 2015: Dancer SJ, Christison F, Eslami A, Perisamy K, et al. '**Is it worth screening elective orthopaedic patients for carriage of *Staphylococcus aureus*?'** NHS Lanarkshire R&D conference.

June 2015: Macdonald A, McDuff C,Loudon D, Wan S, Wares K, Dancer SJ.' **Design and evaluation of a dynamic visualisation tool for use in staff training for the prevention of HAI'.** Champions Challenged conference, Aberdeen.

July 2016: Smith J, Adams C, Robertson C, Watson V, Dancer SJ. '**Examining the relationship between surface bioburden and frequently touched sites in Intensive Care'.** NHS Scotland conference, Glasgow & Scottish Anaesthesia conference.

April 2017: Vickery K, Aljohani K, Costa D, Dancer SJ, Melo D, Lopes LK, Tipple A, Deva A, Gosbell I, Jensen S, Whiteley G, Hu H. '**Multi-drug resistant organisms (MDRO) within biofilms on dry hospital surfaces: is this worldwide?**' SHEA Spring 2017 Conference, Portland, Oregon, USA.

Sept 2017: Vickery K, Aljohani K, Costa D, Dancer SJ, Melo D, Gosbell I, Jensen S, Hu H, Lopes LK, Whiteley GS, Glasbey TO, Lima L, Deva A, Tipple A. '**Hospital surface biofilms promote antibiotic resistant organisms'**. *Eurobiofilms*, Amsterdam, The Netherlands.

Oct 2017: Mitchell BG, Dancer SJ, Morton L. '**What's trending in Infection Control?**', Australian infection control conference.

April 2018: Smith J, Adams CE, King M-F, Robertson C, Noakes C, Dancer SJ.

'**Is there a relationship between airborne and surface microbes in the critical care environment?**' ECCMID, Madrid, Spain.

Nov 2018: Dancer SJ, McNally L, McLaren J, McGill G, Fletcher L, Noakes C, Sharpe T. '**The microbiome of the human home' &** Hiwar W, King M-F, Fletcher L, Dancer SJ & Noakes C. '**The relationship between air and surface microorganisms in hospital wards: a systematic review'.** HIS Conference, Liverpool, UK.

March 2019: Mitchell B, Dancer SJ, et al. '**REACH (hospital cleaning)**' poster. Australian Conference for Infection Control, Best poster award.

April 2019: '**European Study Group for Nosocomial Infections'** (ESGNI) mission poster, ECCMID 2019.

Sept 2019: Three posters at ICPIC, Geneva, Switzerland (D.N.A. – ill).

Sept 2021: Ledwoch K, Dancer SJ, Otter JA, Kerr K, Roposte D, Maillard J-Y. '**Pathogens from dry surface biofilms (DSB) still transfer from hospital keyboards despite the use of sodium hypochlorite 1,000 ppm wipe**.' Poster at IPC, Liverpool.

Sept 2021: Gon G, Dansero L, Aiken A, Dancer S, et al. '**EWASH trial: a cross-over cluster randomised trial comparing electrolysed water with bleach for hospital cleaning in Nigeria'**. Poster, conference, Africa.

Sept 2023: Kramer A, Dancer SJ, et al. '**Factors influencing the survival of pathogens in the hospital: basement for the assessment of the nosocomial infection risk'**. Poster, ICPIC, Geneva, Switzerland.

April 2024: Aumeran C, Hamilton L, Jamieson L, Lee E, Dancer SJ. '**Establishing the living microbiome of the healthcare toilet'**. E-poster + oral presentation, ECCMID, Barcelona, Spain.

Invited speaker (forthcoming conferences):

April 2024: 'How to clean the occupied bed-space', ECCMID, Barcelona, Spain.

June 2024: 'Environmental impact of disinfectants', ESGNI course,

June 2024: 'Pathogen Transmission in the Healthcare Environment', UVC conference, St Andrew's, Scotland.

August 2024: Three lectures: 'The future of healthcare cleaning', 'Examining the toilet microbiome' and 'Establishing clean air standards in healthcare facilities', New Zealand & Australia.

Oct 2024: Lecture, Croatian IPC conference, Zagreb.

Invited International Presentations (1988-2024)

■ = Editing posts ☸ = Published abstract

☸16th Nov 1988: "Staphylococcal Scalded Skin Syndrome''
Int. Hosp Infect Society conference, London.

☸1-19 Nov 1989: "An Outbreak of Pemphigus neonatorum". 1st World Congress, Infections in Obstetrics & Gynaecology, USA.

■2-5th May 1990: Assistant Editor, Congress Bulletin, for 1st International Conference for the Prevention of Infection in Nice, France.

☸11th July 1990: "Studies on the structure of epidermolytic toxin"
Pathological Society of Great Britain, UK.

☸6th Sept.1990: "Epidermolytic toxin-producing *S.aureus* in the Community"
Int. Hosp Infect Society conference, London.

■6th Sept. 1990: Sub-editor for 'Conference Monitor'
Int. Hosp Infect Society conference, London.

■30th Nov. 1994: Editor for A.M.M. Conference, "Clinical Microbiology: Challenges and Opportunities", London.

☸15th May 1996: "Coliforms from the pre-antibiotic era."
Oral presentation at ECCMID, Glasgow.

☸17th Sept.1998**:** "Keeping MRSA out of a District General Hospital"
Int. Hosp Infect Society conference, Edinburgh.

☸1-3rd Dec. 1999: "Oral streptogramins in the management of patients with MRSA infections". FIS Conference, Manchester.

☸28th Nov 2001: 'Linking environmental organisms with antimicrobial consumption', FIS, Manchester.

Sept 4th 2003: 'Standards for Hospital Cleaning'. Dept of Health, London.

☸March 2004: 'Interventions to control MRSA'. International Teleclass.

☸May 2004: 'Floor Wars: Defence against Dark Corners'.
Royal Institute of Public Health, London.

☸June 21st 2004: 'What's under your bed?! Infection Control and ESBLs'.
Organised and spoke at symposium on ESBLs, Glasgow.

☸Dec.1st-3rd 2004: 'The Socioeconomic Cost of MRSA'.
ECC & RICAI conference, Paris, France.

☸Sept 2005: 'Floor Wars: Defence against Dark Corners'. Royal Institute of Public Health, London.

☸Oct 2005: 'Mopping Up MRSA'. ECC, Florence, Italy.

☸Jan 2006: 'Floor Wars: Defence against Dark Corners'.
Infection Control conference, Isle of Man.

☸Oct 2006: 'Getting it wrong for MRSA: consequences of inappropriate therapy'. ECC, Budapest, Hungary.

☸Mar/Apr 2007: 'If the question concerns MRSA, the solution contains detergent'. ECCMID, Germany

☸May 2007: 'Would more cleaning reduce MRSA acquisition in hospitals?' Public Services International, WHO, Geneva.

☸June 2008; 'Floor Wars: Defence against Dark Corners'
Cleaning Research Institute, Washington DC, USA.

☸Dec 2008: 'The role of the environment in infection control'
Lancet Infectious Diseases Conference, London.

June 2009: 'Role of the environment in HAI'

European Infection Control symposium, Switzerland.

❁Oct 2009: 'Hospital cleaning in the control of HAI'
Dept. of Health, Westminster, London.

■Nov 2009: 'How to review an article for an infection journal'.
FIS conference, Birmingham.

Jan 2010: 'Hospital cleaning for controlling HAI', Porton Down, UK.

❁Feb 2010: 'Hospital cleaning in the control of HAI'.
First HAI conference, Belfast, Northern Ireland.

❁March 2010: Presentation 'Temporal effects of a restrictive antibiotic policy on hospital-acquired *C. difficile*, MRSA and ESBLs'.
ECCMID, Vienna, Austria.

❁April 2010: 'Why cleaning is important for healthcare'.
ISSA conference, Amsterdam, The Netherlands.

❁April 2010 'Hospital cleaning in the control of MRSA'
Infection Control Symposium, Copenhagen, Denmark.

❁Sept 2010: Hospital cleaning in the 21st Century'. ICAAC, Boston, USA.

■❁Oct 2010: 'What is best for HAI control: Hand hygiene or cleaning?'
'How to write a paper for JHI'; 'Outbreak of surgical site infection'. International HIS conference, Liverpool.

❁Oct 2010: 'Pants, policies and paranoia'. IC symposium, Norway.

Feb 2011: 'Controlling MRSA in the ITU'.
National conference, Dublin, Republic of Ireland.

■March 2011: 'Should we screen Healthcare Workers for CA-MRSA?'
Seminar, ESCMID, Florence, Italy.

July 2011: 'Hospital Cleaning in the 21st century', two presentations,
1st Infection Control & Prevention Conference, Geneva.

❁Sept 2011: Keynote lectures, Australian Infection control, Hobart.

❁Oct 2011: Lectures: Hospital hygiene & Antimicrobial stewardship.
Singapore University & General Hospitals.

❁Nov 2011: International Teleclass, Healthcare Decontamination.

Nov 2011: ESCMID workshop, MDR-GNRs, Rome, Italy.

❁March 2012: Keynote speaker, Infection control conference,
Finnish Society for Infection Control, Helsinki.

❁May 2012: Keynote speaker, Italian National Microbiology &
Infection Conference, Pisa, Italy.

Sept 2012: National Infection Control Conference, Gothenburg, Sweden.

❁Nov 2012: Keynote speaker, Brazilian Infection Conference, Sao Paulo.

❁Nov 2012: Hosp Infect Soc International conference, Liverpool, UK

❁Feb 2013: International workshop, HAI, WHO, Geneva, Switzerland.

❁Mar 2013: Infection control conference, Edinburgh.

❁April 2013: Meet-the-Expert & two presentations, ECCMID, Berlin.

❁May 2013: Keynote plenary lecture, SHEA, Atlanta, USA.

❁Sept 2013: Two key note lectures & international teleclass:
Australasian College of Prevention & Infection Control
annual conference, Brisbane, Australia.

❁Nov 2013: 'Outbreak of surgical site infections'. World Sterilization conference, Antalya, Turkey.

Jan 2014: West of Scotland Urology study day, Lanarkshire.

March 2014: Holyrood Infection Control Conference, Edinburgh.
'Visualising The Invisible'.

April 2014: Assoc. Clin. Microbiol. conference, Sheffield, UK
May 2014: NICE conference, Birmingham, UK; AMR debate.
May 2014: HOPE conference, Amsterdam, Netherlands. 'Role of cleaning in controlling hospital-acquired infection'.
☸Sept 2014: The '**Graham Ayliffe'** lecture, IPS conference, Glasgow, UK
Sept 2014: Workshop, Hospital cleaning, Bart's NHS Trust, London
Nov. 2014 Irish Decontamination Annual Conference, Dublin, Ireland.
Nov. 2014 Holyrood Vascular Access conference, Glasgow.
Jan 2015: 'Visualising The Invisible', Cardiff University, Wales.
☸April 2015: 'The Year in Infection Control', ECCMID, Denmark.
☸June 2015: 'The ABC of Hospital Cleaning', ICPIC, Geneva.
☸Sept 2015: 'Role of cleaning in the control of HAI', ICAAC, USA.
Oct 2015: Infection control in the 21st Century', Oxford HI Group.
☸Feb 2016: RCP Australia annual conference, Melbourne: 4 lectures on infection control, cleaning and antimicrobial stewardship.
May 2016: Decontamination workshop, Health Protection Scotland
May 2016: Urology conference, RCPSG, Glasgow.
☸Sept 2016: Vision On workshop, Glasgow, Scotland.
☸Dec 2016: NHS Lanarkshire R&D Conference, Bothwell.
Jan 2017: Post-grad seminar, Trinity College, Dublin, Ireland.
☸March 2017: Seminar, London School of Hygiene & Tropical Medicine, UK.
April 2017: ECCMID, Vienna (Chair, Education in Infection Control).
☸May 2017: Keynote: Belgian Infection Society, Brussels, Belgium.
June 2017: 'Don't Panic!' national conference, Sheffield, UK.
Sept 2017: Infection control conference, Trondheim, Norway.
Oct 2017: Infection control Conference, Wolverhampton, UK
Oct 2017: Danish Infection Society, Copenhagen, Denmark.
Oct 2017: Infection control conference, Wolverhampton, UK.
☸Nov 2017: World Sterilisation Congress, Antalya, Turkey.
Feb 2018: Infection Control conference, London.
☸April 2018: ECCMID, Madrid, Spain.
April 2017: Infection Control Conference, Dublin, Ireland.
May 2018: British Society for Microbial Technology, UK.
May 2018: Italian Infection Control conference, Bergamo, Italy.
Oct 2018: Infection control conference, Wolverhampton, UK.
Oct 2018: Scottish Microbiology Association, Stirling, UK
Nov 2018: National Infect Control conference, Copenhagen, Denmark
Nov 2018: Federation of Infection Societies, Liverpool, UK
April 2019: Two presentations at ECCMID, Amsterdam, Netherlands.
Summer 2019: Missed due to illness (Strasbourg; Bologna; & Geneva)
☸Nov 2019: Infection control conference, Ballymena, N. Ireland
Jan 2020: Healthcare environment design workshop, York, UK
Feb 2020: BHTA Study day, England, UK
March 2020: Infection Control conference, London, UK (cancelled)
June 2020: J Hosp Infect conference, London (cancelled)
Nov 2020: Infection Control conference, London, UK (cancelled)
Nov 2020: FIS conference, Edinburgh, UK (withdrew)
Nov 2020: Memorial on-line lecture for Professor Kevin Kerr: 'Smart cleaning: a weapon in the war against antibiotic resistant superbugs', Café Scientifique, University of Bradford.

June 2021:	Presentation on COVID-19 impact in NHSL, USA (on line)
Oct 2021:	Keynote lecture on hospital cleaning, NHS Estates, Birmingham
☸April 2022:	Keynote IP&C & Meet-The-Expert, ECCMID, Lisbon.
May 2022:	Edinburgh conference on COVID-19 impact in Scotland
Sept 2022:	Edinburgh conference on healthcare ventilation
☸Oct 2022:	Keynote presentation on hospital cleaning, Geneva
☸April 2023:	'IPC Principles', ECCMID, Copenhagen
June 2023:	Hospital Probiotic Cleaning meeting, Berlin, Germany
Oct 2023:	'Principles of IP&C', ESCMID course, Vienna, Austria
Nov 2023:	Session Chair: Antiseptic Stewardship & Hard Surface Biofilm, FIS conference, Edinburgh, Scotland

Extra-curriculum activities

Music

May 1975	**Grade VIII Bassoon** (Merit, Associated Board of Music).
June 1976	**Grade VIII Piano** (Merit, Trinity College of Music).
1975 - 1980	Bedfordshire County Youth & Chamber Orchestras
1980 - 1984	St. Bartholomew's Hospital Orchestra (Principal Bassoon).
1994 - present	**The Glasgow Orchestral Society (Principal Bassoon**)
2001- 02	Glasgow Chamber Orchestra, RSAMD.
2005	Professional debut: **BBC Scottish Symphony Orchestra**
May 2007	**Concerto** with Glasgow Orchestral Society
Jan 2009	Guest player with **Bedford Sinfonia;** (also July 2019)
Jan 2010- 2016	Glasgow Wind Orchestra (bassoon)
May 2012- 2018	Arthur Short's **Jazz Band**, Glasgow (alto saxophone)
May-Aug 2016	Stirling Orchestra; runner-up, BBC competition, Prom RAH
June 2017	**Grade V Saxophone** (Distinction, Trinity College of Music)
Nov 2019	**Grade VIII Saxophone** (Distinction, Trinity College of Music)
Summer 2023	Glasgow International Orchestra (Mahler 4; The Planets)
Dec 2024	Alto & soprano saxophone, Black Diamond Havana & Bearsden Jazz bands

Rowing

1982 - 1984:	Head of the River 1982-84, University of London Bumps
1986	Silver Medal W VIII Nat. Champs, UK
1987	Silver Medal W 4X Nat. Champs, UK
1988	Gold Medal W 4+ Nat. Champs, UK
1989	Bronze medal W 2X Nat. Champs, UK
July 1988:	Gold medal, W 4+ (England) **Home Countries Int**, Ireland.
1989-1990:	British National Lightweight Women's rowing squad.
March 1990:	Winner, Tideway Head of River Race (New course record).
Jan 1994:	Gold medal, **Scottish National Indoor Rowing Championships**.
Sept 1994:	Double gold medallist **World Veteran Rowing Championships.** Groningen, Holland **(**WVet A coxed IV & WVet B double sculls).
Sept 1997:	Silver medal, WVet B single scull, **European Masters,** Munich.
June 2000:	Gold medal, WVet single scull, **Scottish Nat. Rowing Champs.**
August 2002:	Scottish Dragon boat, **Commonwealth Games** 2002. Placed 4th.

Jan 2003 WVet C winner, **Scottish Nat. Indoor Rowing Championships.**
March 2005: WVet D VIII pennant, Tideway Head of the River.
Sept 2005: **World Veteran Rowing Championships**: two silver medals.

After a break of 15 years, I returned to rowing during 2020. Wins 2021: Gold medals x2, WVet F quad, Lockdown Regatta, Strathclyde Park; Gold medal, Mixed double sculls, Castle Semple Regatta; Gold medal, WVet 1x, Clyde HOR; Gold medal, WVet D quad, Inverness HOR. 2022: Silver medal, WVet 2x World Masters, France.

Other work experience and travel

This has included farm & factory work and shop roles; Oncology and Obstetric nursing and medical journalism. I have visited many European and Mediterranean countries and have travelled through, or worked, in India, Hong Kong, Vietnam, Thailand, Philippines, Australia, New Zealand, Papua New Guinea and the Canadian Arctic. I have also visited the Microbiology Departments at the National University & Tan Tock Seng Hospitals (Singapore), Royal Hobart Hospital (Tasmania), Woollongong General Hospital, Queensland Central Pathology Laboratories & Royal Darwin Hospital (Australia), Denver General Hospital (U.S.A.), Bien-Nhiet-Dhoi Hospital (HoChiMinh City, Vietnam), Sappasitprasong Hospital (Ubon Ratchatani, Thailand), Port Moresby General & Tari Mission Hospitals (Papua New Guinea). I am a lifeguard for the **Glasgow Humane Society** (in-shore lifeboat) and assist with safety and rescue on the River Clyde.

Future Aims

Delivering a busy clinical job in today's NHS means that research suffers because clinical work always fills the time allotted. For this reason, I accepted an academic post at Edinburgh Napier University, in order to further original research, collaborate with business & industry and support international and national organisations on cleaning, decontamination and other infection control strategies. Networking with colleagues in other countries has generated joint publications and grant applications for future research. An opportunity to crystallize all the clinical, laboratory and academic experience gained over many years has been a welcome addition. As we prepare for a world without antibiotics, research and education on microbial transmission, hygiene and infection control have never been more important. My career is now firmly settled within academia, particularly collaborative research. The role of the environment as a major reservoir of hospital pathogens is fundamental to the understanding of transmission, as well as the novel and preventive strategies that may be required. Creative thinking, initiative and courage will be required for future management of infection in both healthcare and community, in Scotland and beyond.

Referees

1. [redacted]

2. [redacted]

3. [redacted]

4. [redacted]

SCOTTISH HOSPITALS INQUIRY

Witness Statement of

Dr Iain Kennedy

Personal Details

1. My full name is Dr Iain Thomas Robert Kennedy. My qualifications are MBChB, gained at University of Glasgow in 2006. I also hold the following: BSc (MedSci), which I gained at Glasgow in 2004; Fellow, Faculty of Public Health, 2014; Fellow (Physician), Royal College of Physicians and Surgeons of Glasgow; and Diploma in Tropical Medicine and Hygiene, gained in 2021.

Professional background

2. Following gaining my medical degree, I began my foundation training in 2006 at NHS Greater Glasgow and Clyde, working on rotation at Royal Hospital for Sick Children (Yorkhill), Victoria Infirmary and Southern General Hospital.

3. From 2008 to 2010 I worked as an advisor for BUPA Health Dialogue as part of a medical leadership fellowship scheme. This was facilitated by Liam Donaldson, who was Chief Medical Officer (CMO) in England at the time. I was assigned to BUPA and that was principally about supporting Primary Care Trusts in England, working in healthcare commissioning support data assurance, and telephone based health coaching. I also spent approximately 10% of my time working with the WHO Patient Safety Programme, on a framework for tackling antimicrobial resistance.

4. From 2010 to 2014 I was a registrar on the South London, Surrey and Sussex Public Health training programme. This is the training programme necessary for NHS consultant posts in public health. This involved rotational placements, including to the London regional epidemiology unit, the national Centre for Infections at PHE Colindale, and a three month exchange to the National Health Laboratory Service, Johannesburg, South Africa.

5. Since August 2014 I have been a Consultant in Public Health Medicine, working within the Public Health Protection Unit (PHPU), West House, Gartnavel Royal Hospital, Glasgow. PHPU was headed up by Dr Gillian Penrice until April 2023, when she retired. Since April 2023 I have been in the role of Acting Lead Clinician for health protection. PHPU reports to the Director of Public Health. The Director of Public Health is Emilia Crighton, who took over from Linda de Caestecker in February 2022. The PHPU is part of the Public Health Directorate, which sits within the NHS GGC Corporate Division.

Overview

6. In this statement I will address the undernoted themes:

- The role of Public Health
- Involvement in design, build, specification of Queen Elizabeth University Hospital (QEUH) / Royal Hospital for Children (RHC)
- Issues with Built Hospital Environment
- Involvement in Incident Management Teams meetings (IMT)
- Closure and Movement between Wards
- Infection Control
- Use of Prophylactic Medication
- Evidence provided by patients and families to Inquiry
- Personal and Professional Impact

The role of Public Health

7. Public Health has been defined as ‘the science and art of preventing disease, prolonging life, and promoting health through the organised efforts of society’. Public Health is often described as having three domains. These are Health Improvement, e.g., stopping smoking, health behaviour change, and health education & literacy; Health Services Public Health, which includes screening,

health needs assessment, and, design and evaluation of healthcare delivery; and thirdly Health Protection, which covers the control of communicable diseases, environmental hazards and emergency planning and response. My work is in the Health Protection domain.

8. Each board has a Public Health Directorate, who will have a health protection team within their structure. The Public Health (Scotland) Act places duties on territorial boards for the protection of the health of the population. In NHS GGC, PHPU have responsibility for leading on these duties on behalf of the DPH and the Board. The remit of territorial board health protection teams is detailed in a 2007 CMO letter.

9. Public Health Scotland (PHS) is a separate Special Health Board, formed during the pandemic. One of the organisations that came together to form PHS was Health Protection Scotland. PHS leads on national public health issues, including leading on cross-board incidents, and providing support to territorial board health protection teams on request. PHPU and PHS work closely together. This is a quite different structure from the setup across the other four nations, where local health protection teams are directed by the national Public Health body; in Scotland, we are all embedded in the local NHS structures, and report to the DPH.

10. PHPU is responsible for the local public health response to specified communicable diseases, and environmental hazards, as well as port health, and use of statutory powers under the Public Health Act. In doing so we work closely with many stakeholders, most notably local authority Environmental Health departments. Part of our remit is to provide specialist advice and guidance to staff working in the community; hospitals; local councils and other local organisations and agree how best to deliver health protection at local level. We will investigate and manage a full range of health protection incidents, including outbreaks of disease, and carry out surveillance, co-ordination, support, and the monitoring of certain key national programmes. PHPU is principally a community facing specialty, and although we provide

advice and guidance to hospital health care staff, in a healthcare setting the Infection Prevention and Control Team would be responsible for leading the response to the vast majority of infection outbreaks and incidents.

11. The role of a Public Health consultant in a health protection team is two-fold. We provide strategic leadership and decision making to, and take responsibility for, the health protection reactive service. This includes Public Health response to notifiable diseases, community outbreaks and public health incidents, and provision of advice and guidance to enquiries from other professionals and the public on matters in the scope of public health practice.

12. We also all have a portfolio of proactive work. For example my portfolio includes immunisations, emerging pathogens, port health and CJD. I also provide the link at consultant level between the department and the Infection Control teams. In practice that means I represent the Public Health team on the Board Infection Control Committee and the Acute Infection Control Committee

13. I have been asked by the Inquiry my views on infections and infection incidents at QEUH. My views are included in this statement in relation to the events I was involved with.

14. I have been asked by the Inquiry about my contribution to SBARS and HAISCRIBES. I contributed to the SBAR to reopen ward 6A in Autumn 2019 **(A38694845 - SBAR dated 10 October 2019 - Ward 6A - Situation update - gram negative bacteria - Bundle of Documents for the Oral Hearing Commencing 12 June 2023 - Bundle 4 - NHS Greater Glasgow and Clyde: Situation, Background, Assessment, Recommendation (SBAR) Documentation, document 46)**. I do not recall contributing to other SBARS. I have never contributed to an HAISCRIBE. HAISCRIBES are not in scope of Public Health practice.

Involvement in design, build, specification of Queen Elizabeth University Hospital (QEUH) / Royal Hospital for Children (RHC)

15. I had no role in the design, build, commissioning, or maintenance of the QEUH/RHC. I have not acted nor provided any services as an expert witness or on a consultancy basis in relation to QEUH/RHC or other hospital building projects.

16. My awareness of decisions regards the specification of the water and ventilation systems is limited to what was stated in infection control committee meetings or incident management team meetings.

17. I have been asked by the Inquiry the extent of my awareness of results of testing of the water and ventilation systems as part of the commissioning of the hospital. I was not aware of any of these results at the time. I became aware of the water results only when reviewing the draft Health Facilities Scotland (HFS) technical report. I was surprised at these results, as one of the outlets was positive for *E. coli.* I would have expected that to have been reported through infection control structures at the time, but I do not recall hearing about that result before reading the HFS report.

18. I have been asked by the Inquiry to describe my knowledge of the DMA Canyon reports of 2015 and 2018 **(A33870103 - Report prepared by DMA Water Treatment Ltd titled "L8 Risk Assessment (Pre-Occupancy) NHS Greater Glasgow and Clyde South Glasgow University Hospital" dated 1 May 2015 relating to site assessment concluding on 29 April 2015 - Bundle of Documents for the Oral Hearing Commencing 12 June 2023 - Bundle 6, Miscellaneous documents, document 29; A33870243 - Report by DMA Canyon Ltd titled "L8 Risk Assessment NHS GGC QEUH and RHC following site surveys in September 2017, October 2017, gap analysis in January 2018 and review date September 2018 - Bundle of Documents for the Oral Hearing Commencing 12 June 2023 - Bundle 6,**

Miscellaneous documents, document 30). My first recollection of becoming aware of the reports was a conversation with Dr Inkster following a meeting of the Water Technical Group, when Dr Inkster told me she had been asked to look into an external report on the water system that had not been actioned. I understand this to be the 2015 DMA Canyon Report. Dr Inkster told me that she believed she was not the person who should have responsibility for investigating this, and that she felt there was an expectation that her report should place all the responsibility for not actioning the report on Ian Powrie. Otherwise, all my knowledge of the DMA Canyon reports would be their inclusion in external reports such as the HFS technical report, or when mentioned at BICC.

19. There are three principal Infection Control Committees in NHS GGC. There is the Board Infection Control Committee (BICC), which is chaired by the HAI Executive Lead. Reporting into that committee are two other committees, the Acute Infection Control Committee (AICC) which covers the acute hospitals, and the Partnership Infection Control Support Group, which is for community NHS facilities, the health and social care partnerships and mental health. They both report to BICC. Public Health is represented on all three committees. Personally, I am a member of both BICC and AICC.

20. The new building was a standing item on the agenda at the Infection Control Committee meetings, and discussions were often led by the lead Infection Control Doctor at the time, Professor Craig Williams.

21. I joined the membership of BICC in October 2014. I can recall at that time there were several questions being raised about rooms with specialist ventilation in the new build, including where patients with high consequence infectious disease would be placed, and if the designated rooms for multi-drug resistant tuberculosis met requirements. The rooms for adult and paediatric bone marrow transplant (BMT) were also discussed.

22. I have been asked by the Inquiry about the decision to decant the adult BMT ward back to the Beatson. The detail on this decision is included in the minutes of the July 2015 meeting of BICC **(A32222054 – Minutes of the NHS Greater Glasgow and Clyde Board Infection Control Committee held on 27 July 2015 - Hearing Commencing 19 August 2024 - Bundle 27, Miscellaneous Documents - Volume 3, document 16)**, however I was not at this meeting and not party to the discussions on this decision.

23. I recall Professor Williams stating on several occasions at BICC that the new paediatric haematology/oncology ward (RHC ward 2A) was built to the same specification as the old Schiehallion ward. Professor Williams also said this was because there was no national specification for this type of unit, the previous building technical note having been withdrawn and not replaced. I recall Mary Ann Kane making a similar statement at an IMT, in terms of type and number of specialist ventilation rooms and use of HEPA filters being same between the old and new wards. She said that this had been confirmed by her team physically inspecting the old ward.

24. I recall a comment being made at one of the meetings that some rooms should have HEPA filtrations and that the filters had been delivered but not yet installed. I have no knowledge of the outcome of that, but was aware that Professor Williams, Dr Christine Peters, and Guy Jenkins (Director of Service) would be taking that matter further.

25. I have been asked by the Inquiry to comment on the “institutional knowledge” of ventilation systems. NHS GGC have a Patient Placement SOP, which is regularly updated. It contains detail of all rooms with specialist ventilation, and the types of patients who are suitable or not suitable for being cared for in those rooms.

Issues with Built Hospital Environment

26. I have been asked by the Inquiry if I had any involvement in the wards at QEUH or RHC, primarily within the Schiehallion Unit, Wards 2A and 2B. From 2014 to the September 2017 my involvement would have been purely as a member of the Infection Control Committee structure.

27. However, in September 2017 the Director of Public Health, Linda De Caestecker, contacted me and advised me that concerns were being raised from employees at NHS GGC over patient safety issues and the built environment at QEUH/RHC. A meeting was arranged between senior management and the microbiologists to discuss the concerns they had raised in their SBAR. (Situation, Background, Assessment, Recommendations). Professor de Caestecker suggested that either I or my colleague Gillian Penrice attend; however, we were later informed, via Prof. De Caesteker's PA, that there was no requirement for Public Health at the meeting

28. On 26th September 2017, I met with Tom Walsh, then Infection Control Manager (ICM) and Sandra Devine (nee McNamee), at the time Associate Nurse Director for Infection Control to discuss joint working between Public Health and Infection Control. The SBAR by the three microbiologists came up in conversation.

29. My recollection of the conversation is based on a follow-up email that I sent to Tom and Sandra about outputs of that meeting. In that email I noted that there were a number of issues, concentrated on BMT service, and extending to other managerial and infection control issues which lay well outside public health's area of responsibility. However, these issues could knock onto other areas that were at least partly within our purview, such as infectious disease of high consequence, such as Viral Haemorrhagic Fevers (VHF), Middle East Respiratory Syndrome (MERS), emerging infections or significant outbreaks of flu, including a pandemic. In those circumstances it would be important for Public Health to be involved.

30. From my recollection the SBAR covered several different areas. These included the type, location and specification of specialist ventilation rooms, cleaning of environment and equipment, communication with microbiologist, and roles and responsibilities within the infection control teams.

31. The meeting between the microbiologists and senior management went ahead on 4th October 2017. I am aware of this meeting as minutes were circulated to BICC. An action plan was drawn up, and it was reported through Board governance procedures. The lead ICD, Teresa Inkster had responsibility for this action plan, which was brought back routinely to the Board of Infection Control Committee (BICC).

32. One area raised in the SBAR was the use of Positively Pressurised Ventilated Lobby (PPVL) rooms. Negative pressure rooms are at a lower pressure than the corridor, so prevent airborne particles from escaping the room, so are ideal for highly infectious patients. Positive pressure rooms are effectively the opposite, and push air out of the room into the corridor, thereby preventing airborne particles from entering the room. They are therefore suitable for patients requiring protective isolation. The idea of a PPVL room is that you have a lobby / antechamber that is at positive pressure to both the room and the corridor. This creates a barrier, preventing transit of airborne particles in either direction. Therefore, PPVL rooms can be used for both protective isolation and source isolation.

33. PPVL rooms are considered acceptable for isolation of infectious patients. They are included in SHTM, with reference to the English building notes. I understand that the Regional Infectious Disease Unit in Edinburgh uses PPVL rooms. When Prof Williams was Lead ICD, he reported to BICC that the rooms were confirmed as having been suitable for MDR-TB patients, and I was comfortable for their use for short periods for patients with viral haemorrhagic fever. However, there are different views on how suitable the PPVL rooms are. In particular there was later discussion as to whether they

were suitable for MDR-TB patients. An SBAR was written by a Dr Inkster who recommended we have negative pressure rooms, due to this uncertainty. Subsequently some of the PPVL rooms were modified to negative pressure rooms.

34. At the October 2017 BICC meeting Dr Jennifer Armstrong advised that there were concerns over line infections, including a patient death, in RHC. Dr Armstrong asked if Andrew Seaton, infectious disease consultant, and I would review the cases. Dr Seaton indicated that this was not an appropriate task for us to undertake. I agreed that something I could support with would be to review the action plan for Ward 2A, to provide “another pair of eyes”, to potentially suggest any other interventions. Having read the documents, I arranged to meet Lead Infection Control Nurse (ICN) and do a walk round of the wards, to better understand the action plan.

35. On 6th November 2017, I met with Susie Dodd who was the lead ICN for paediatrics at the time and we discussed various action plans that had been drawn up, before I then had a walk round Wards 2A and 2B with Susie and Emma Somerville, who was the Senior Charge Nurse of those wards. This was the first time that I had visited the wards.

36. Later that month I attended the next meeting of the Board of Infection Control Committee (BICC), where Jen Rodgers, Chief Nurse for Paediatrics, gave a presentation on work ongoing within QEUH/RHC **(A32221779 - Draft Minutes - BICC Meeting - 27 November 2017 - Hearing Commencing 19 August 2024 - Bundle 13 - Additional Minutes Bundle (AICC/BICC etc), document 48)**. She asked me for feedback on my walk round of the wards, and I highlighted the only point I had noted, not covered in her presentation, was the presence of an examination couch within the ward prep room on Ward 2A. I was told that when the 2B day ward shut, staff would sometimes see patients within the prep room. I reported my view that this was not an appropriate space. Jen agreed and told me it would be rectified. I had no

further involvement with Wards 2A/2B until the start of the Incident Management Team (IMT) process in March 2018.

37. I have been asked questions regarding ventilation on Ward 4C. I do not recall being involved in any issues regards Ward 4C, so cannot assist the Inquiry on this point.

38. I have been asked a series of questions for my views relating to ventilation on ward 2A, and ventilation systems in general. While Public Health may give advice on appropriate placement of patients with certain infections, including use of negative pressure rooms, we do so based on published guidance. Specialist ventilation systems are outwith the regular remit and scope of practice of Public Health, and I would not expect the Public Health team to be informed of concerns regards ventilation on a hospital site. My understanding of any issues with the ventilation system, not otherwise described in this statement, will be that captured in minutes of IMTs or Infection Controls Committees.

Involvement in Incident Management Teams meetings (IMT)

39. The IMT process is separate to Infection Control Committee structure. The IMT itself is independent from the normal management structures within the hospital; it is multidisciplinary and multiagency. The IMT has the remit to minimise further spread of infection through co-ordination and decision making on investigation, implementation of control measures, and communication regards the outbreak or incident. All members of the IMT have equal status and have responsibility for consensus decision making. Where consensus cannot be reached, the responsibility for decision making lies with the IMT Chair.

The roles of Public Health and HPS

30 Public Health are generally responsible for management of outbreaks and incidents that occur in the community. For hospital incidents and outbreak Public Health's role is supportive, with Infection Control being responsible for leading the response. The Public Health team can provide various levels of support depending on what is needed, due to our experience in incident response and outbreak management, epidemiology, response for specific diseases, or liaising with external agencies to support the IMT chair if required.

31 In NHS GGC, we have a process that if Infection Control have scored an incident as HIIAT amber or red, or are closing a ward to admissions, they will email the Public Health team. With most notifications there is no support from Public Health required. Support from Public Health will be triggered if the notification requests our involvement, if the Infection Control Doctor contacts the Public Health consultant directly – as they may do in more complex situations – or if on review of the information in the email notification the Public Health team believe our involvement would be beneficial.

32 National agencies, such as Public Health Scotland and ARHAI Scotland (previously Health Protection Scotland (HPS)) are there to provide additional support and expertise to local teams when requested, or to lead incident response in specific circumstances, such as cross-board outbreaks or cases of confirmed High Consequence Infectious Disease.

33 When Public Health hold an IMT we always notify PHS, although we may not necessarily request that they attend, depending on the specific situation. It is bringing another expert to the table, who will have experience of incident management in general, and knowledge and experience of specific topics. So, we would expect a different PHS staff member to attend for a gastrointestinal infection versus a respiratory infection for instance, depending on their

expertise. PHS can also help mobilise additional support for larger or more complex incidents and support cross-board communication.

34 Public Health incident management follows guidance in the Scottish national publication “Management of Public Health Incidents by NHS-led Incident Management Teams” (MPHI), and our local Incident Management Plan is principally based on that document, with additions from other national and international guidance and best practice. Under those plans, the Health Board Public Health team has the responsibility for notifying Scottish Government and requesting Scottish Government observers to attend IMTs when these are considered necessary.

35 Healthcare outbreaks and incidents were previously covered by an annex to MPHI, however the guidance document for them is now Chapter 3 of the National Infection Prevention Control Manual (NIPCM) **(A35957621 - National Infection Prevention Control Manual (including appendices showing draft HIIATs etc) - Bundle of Documents for the Oral Hearing Commencing 12 June 2023 - Bundle 6 - Miscellaneous documents, document 44)**. One of the principal differences between HAI and community outbreaks is the reporting chain to national bodies. HAI incidents use the HIIAT and outbreak reporting tools to ARHAI, who then communicate with Scottish Government – there is no direct communication from the Board to Government. Chapter 3 is also not comprehensive, and in my opinion there remains a need to refer to MPHI in healthcare incidents.

36 During the incident response at RHC in 2018-2019, I didn’t feel that HPS/ARHAI representatives worked with the IMT in the way I would have expected, given my experience of working with national agencies in community outbreaks. As described above, I would expect them to be full members of the IMT, taking part in all aspects of the IMT work, including the consensus building. My impression was that they saw themselves more as external observers, there to critique. I did not find the HPS/ARHAI

representatives to be fully engaged or supportive, at times distancing themselves from IMT decision making.

37 The performance of the IMTs was adequate, though not high performing. There were some specific issues that affected that performance. There were too many people in attendance, sometimes 20 to 25, with only a proportion of those actively participating. The meetings themselves went on too long. Some meetings lasted up to four hours, where usually 60 to 90 minutes, even for complex incidents is sufficient. One of the reasons for this was trying to do the investigation during the meeting, rather than taking the time out from the meeting or the use of sub-groups, who then report back into the IMT. Another issue would be the timings of the meetings versus the timings of receiving lab results. Sometimes the results would be “hot off the press” and Dr Inkster would often have handwritten lab results, which were being read out at the IMT, with those in attendance not having a chance to see them beforehand. This made it difficult to follow how the outbreak was progressing. There were also challenges on some days of identifying a suitable room for the IMT meetings to be held in. Individually, these challenges were minor; however, in combination they do impact on the efficiency of the IMT process. The solutions to these issues are generally covered by incident management best practice. As an organisation we have reflected on these issues, and have incorporated updates into the GGC area-wide Incident Management Plan, and that plan has been adopted for use by the Infection Control team. As we went through 2019 the IMTs became less effective. There were more challenges, but there was less clarity on purpose, and less consensus about what the end point of the incident would be.

IMTs Spring/Summer 2018

38 I first became aware of the infection incident associated with RHC wards 2A/2B on 5th March 2018. I attended the weekly national teleconference between HPS and health board Public Health teams. It was noted there by HPS colleagues that a red HIIAT had been submitted by NHS GGC. I do not

believe this assessment had been sent to Public Health, which would be our standard protocol. I contacted the Infection Control team and received a copy from both Sandra Devine and Susie Dodd. I was also sent details of the next IMT, which was scheduled for 6th March. I asked if Public Health support was required, and Susie replied, saying that Public Health did not need to attend the IMT.

39 The first IMT relating to this incident I attended was on 16 March 2018 **(A36690477 - Incident Management Meeting, dated 16 March 2018, relating to Water Contamination in Ward 2A - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 17)**. Public Health were now being copied into the IMT papers. I reviewed the minutes of the previous IMT and saw that the Medical Director and several other senior managers had attended **(A36690457 - 12.03.2018 4. IMT Minutes Water Incident Ward 2A RHC - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 16)**. Although there had not been a specific request for Public Health support, my view was that the presence of senior management was an indicator that the incident had increased in severity or complexity, and that Public Health support may be warranted, so chose to attend. I was on my way to the IMT when I received a phone call from the Prof de Caestecker saying that Dr Armstrong had now requested Public Health support, and I confirmed I was already on my way. When I arrived at the hospital, I met Dr Armstrong and Dr Inkster in the corridor outside the meeting room we would be using. Dr Inkster expressed surprise at my attendance.

40 Prior to my attendance at the IMT, and other than described earlier in my statement, I was not aware of concerns about infections from the water.

41 At this meeting Dr Inkster discussed the identification of three new hospital acquired bacteriaemia cases of Stenotrophomonas, in addition to the

Cupriavidus case that had initiated the IMT process. The hypothesis was that direct contamination of water taps was the problem. This hypothesis was reasonable, however, given that water testing had shown positive results from other ward areas, that hypothesis required to be revisited, and Dr Inkster was seeking support from HPS and HFS. I suggested that given there were two organisms it was important not to assume they were necessarily a single incident, as there may have been different sources.

42 Four patients with bacteraemia, with two different organisms, is not in and of itself unusual in a large hospital. The key factors being that these were both gram-negative organisms, previously associated with the water supply, in patients clusters in time, place and person, that make initiation of detailed investigation and outbreak management structures the correct response.

43 As noted in the minutes, I was assigned an action to request mains water testing from Scottish Water. The purpose of this sampling was to rule out the possibility of the mains supply being the source of the bacteria. This is an example of the support Public Health can bring to hospital outbreaks, as Public Health have an ongoing relationship with counterparts in external agencies, such as Scottish Water.

44 I contacted Scottish Water, by emailing James Simmonette, Team Manager, Public Health Science (West), Scottish Water, on 16th March 2018. Sampling took place on the weekend of 17th/18th March 2018 at four properties close to the hospital boundary. Duplicate samples were taken at each location, one set of samples tested at the Scottish Water laboratory, and the other set at the Glasgow Royal Infirmary water lab. The reason for the duplicate samples is that the testing available at the Scottish Water lab is limited to those that are required under water regulations, and would not include speciation of gram negative organisms. The results from the samples tested at the Scottish Water lab were satisfactory. A gram negative (Delftia) was detected on two of the duplicate samples, but at very low counts, and within acceptable limits. These results were reported to the IMT at the meeting on 21st March 2018

(A36690549 - 21.03.2018 8. IMT Minutes Water Incident Ward 2A RHC - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 19).

45 In addition to this, Scottish Water publish a rolling 12-month report detailing any water quality failures in each supply zone. There were no failures in either of the two supply zones in the published data. This, along with the results of additional mains testing carried out by Scottish Water gave high confidence that any water contamination problem was not caused by the incoming mains water.

46 Hospital infections linked to water can happen, but the complexity of this outbreak was very unusual, due to the identification of different organisms identified and the positive water sampling results from other parts of the hospital. The source of the contamination was unknown. If it had been something like a contaminated tap, you would expect the infection to be confined to one area, but this was not the case, and this raised the possibility there was a systemic issue with the water within the hospital. This was the first time that I was aware of such concerns.

47 Also at this meeting various several short-term control measures for patients were discussed. Some of these, related to restrictions on the use of water outlets on the ward, had already been implemented. Twice daily cleaning of the rooms with Actichlor, a chlorine-based disinfectant, was instituted. In addition to this, point of use filters were to be fitted on every tap on the effected wards; if there were insufficient filters then Ward 2A should be given priority. This was a formal consensus decision by IMT members. I agreed with this decision, and I also agreed with the decision to prioritise ward 2A, as this is where the most vulnerable patients would be placed.

48 At the IMT on 19th March, the formal consensus decision was that once the filters have been fitted to the taps and a negative result was obtained then the

control measures could be lifted **(A36690507 - 19.03.2018 6. IMT Minutes Water Incident Ward 2A RHC - Bundle of documents for the Oral hearing commencing 12 June 2023- Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 18)**. I agreed with this decision, as the other short term measures, were challenging for patients and staff, and had their own risks, and the filters were a simpler solution which would allow a return to the use of the tap water. The use filters are themselves only a medium term measure, with longer term solutions, such as the introduction of chlorine dioxide dosing required.

49 On 21 March 2018 there followed a further IMT, which I attended, where it was highlighted that there had been no new cases of infections since the implementation of the control measures. Dr Inkster informed the meeting that the National Support Framework algorithm had been invoked, meaning that HPS would lead and co-ordinate all National support activity **(A36690549 - 21.03.2018 8. IMT Minutes Water Incident Ward 2A RHC - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 19; A40562750 - National Support Framework 2017 – NHS NSS HPS – Version 1.1 - June 2018 - Hearing Commencing 19 August 2024 - Bundle 27 - Volume 1 - Miscellaneous Documents, page 68)**. The Framework invoked by the Scottish Government HCAI/AMR Policy Unit or by an NHS Board to optimise patient safety during or following any healthcare incident or outbreak. This can be used to assist IMTs when dealing with more complex, serious incidents when additional formal support may be needed.

50 Though after the first few steps the algorithm is the same regardless of how it is invoked, my impression is that there is a different tone whether it is invoked by the board or by Government, with the later implying failure by the board to act effectively, and therefore the intervention is more directive, than supportive.

51 My recollection is that the Framework was announced by the Cabinet Secretary for Health as having been invoked by Scottish Government. However, I recall at a later date, perhaps at a BICC meeting, Dr Armstrong commenting on the announcement, as she had requested the invocation of the framework, but that it had been requested by the Board was not mentioned in the Government statement.

52 From that date the role of HPS within the IMT changed in that they had more oversight responsibility, though I do not believe the specific steps in the Framework were completed. Given that Dr Inkster had already requested support form HPS and HFS, the practical difference to IMT is not clear.

53 Also at this IMT, the chair noted that the assistance of HPS and Public Health with the epidemiology of Cupriavidus and Stenotrophomonas cases had been requested. This is part of the investigation of any outbreak; we will look at the epidemiology, as well as the environmental and microbiological investigations. All three aspects of investigation need to be considered, in combination with the clinical picture, as drawing conclusions from one aspect alone can be misleading.

54 At the IMT minutes Dr Inkster discussed the epidemiology and highlighted that since the opening of the RHC site there have been three cases of Cupriavidus reported. Dr Inkster informed the IMT that it is a rare pathogen which is linked to dialysis lines and water. The view of the chair was that there was a strong link between the patient cases and the positive results from the water outlets. I agree with this statement based on information available at the time – it is a reasonable view to take, as they have identified a patient with the organism and identified a water outlet with the organism in proximity in the ward area, so it is a likely source.

55 At the meeting there was further discussion on water control measures, the use of filters and dosing of the water system. I informed the group that Scottish Water had offered the assistance of their inspection and regulation

team if required – referred to as the Byelaws team. While there was expertise within the IMT, and from external expertise engaged by Dr Inkster, I thought bringing in the expertise of our national water company would have been helpful, and this was my experience from a previous hospital water incident. They would be able to visit the site, and work with the NHS GGC team on reviewing the water system, and suggesting any remediation they thought necessary. Mary Ann Kane, representing Facilities considered that we did not need support from Scottish Water at that time and this was accepted by the group.

56 I can understand the argument that some people may take a view that they would not add to the acute response to the cases of infections, but they ould certainly add to the considerations on longer term control of the water system. Therefore, at the first meeting of the Water Technical Group, I again suggested bringing in Scottish Water for their experience. Facilities representatives expressed the same view as had been expressed at the IMT. Colleagues from Health Facilities Scotland also disagreed with my suggestion, stating that Scottish Water did not have experience of large complex water systems such as in the QEUH/RHC campus. Because of these objections Scottish Water were not asked to support the response. I believe this was a missed opportunity.

57 At the IMT there followed extensive discussions about the efficacy of water filters. That is, very fine mechanical filters that are attached to the tap outlet that would stop any bacteria in the water passing through. The IMT continued to support the use of the filters. The question then became whether to trust the manufacturers' assurances as to the efficacy of the filters, or to carry out local testing before allowing use of the water from these taps. Some IMT members wanted a trial period, with daily water testing before bringing taps back into use. My view was, they had been subject to extensive testing the manufacturer, and were used in other hospitals, so we should trust that they would be effective. In the end the IMT reached a compromise position. There would be ongoing sampling, but the service would not need to wait for results

before using the taps with filters fitted, and Facilities would change the filters every 25 days, rather than every 30 days, which was the manufacturer's recommendation. I was content that this decision, which would allow removal of the water use restrictions, and provide confidence that the filters were effective, was proportionate.

58 I understand that after the meeting Dr Inkster contacted Peter Hoffman, Public Health England and Dr Susanne Lee, Public Health Microbiologist, an international water expert, who both supported the decision to use water filters. I was not involved in those discussions. I believe having the agreement of two independent experts was helpful.

59 The next IMT was on 23 March 2018 **(A36690544 - 23.03.2018 9. IMT Minutes Water Incident Ward 2A RHC - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 20)**. At that IMT I presented the epidemiology work I had completed. This was 'descriptive epidemiology' – that is looking at links between cases in terms of time, place and person, and any shared exposures. I will define descriptive epidemiology more fully later in this statement. As there was only one case of Cupriavidus there was really no scope for this type of investigation, as there were no other recent cases to compare to. I was also able to establish the patient with Stenotrophomonas in Paediatric Intensive Care Unit (PICU) was not linked to the three Stenotrophomonas cases in Ward 2A.

60 I was able to provide report of detailed results of my epidemiological investigation into the three cases of Stenotrophomonas, and a further case with faecal colonisation, who had strong links to Ward 2A. All four were inpatients in 2A in two different time periods- mid-February and again in early March, so they had multiple opportunities to interact with each other. Two of these cases had been nursed one after the other in Room 9. Subsequently, the colonised patient and one of the cases were nursed sequentially in Room 12, which is the room where water from the shower had tested positive for

Stenotrophomonas. The third case had been in Room 11 throughout. We therefore had four patients, with the same organism, linked in time, place and person, and the same organism found in a shared environment. On the basis of this information, the most likely source was the shower outlet, and there had then been either direct transmission between the patients, or cross transmission from a health care worker, or a piece of equipment.

61 Later, additional information, the typing results, cast doubt on this explanation. Typing is where additional microbiological testing is used to determine if isolates of the same species are closely related or identical. The Stenotrophomonas isolates were all typed as ‘unique’. Which means not only were they all different form each other but were different from any other isolate in the typing database. This indicates that the cases possibly aren’t linked, which contrasts with the epidemiology. However, the view expressed by water experts, first I believe by Suzanne Lee, was that if there was biofilm in the pipework, you could have multiple different strains present, and therefore based on the number of samples we had, you could not rule out that they came from the same source. There has been further work done more recently in terms of whole genome sequencing (WGS). It is possible to have organisms which do not type together, but WGS shows are related, or have a common ancestor. I would think that if there were multiple strains in the biofilm, they may well demonstrate a common ancestry. My understanding though is the WGS results demonstrates they are very different, so unlikely to be from the same source. This is a good example of the point made earlier in my statement, of the importance of looking at the epidemiology, microbiology and environmental samples as a whole, and no tin isolation.

62 Also at this IMT, Dr Inkster requested that HPS look at the ECOSS system to check if historical patient cases within Ward 2A and Ward 4B could be related to water issues. I have been asked by the Inquiry if I am aware of this work having been completed by HPS. HPS have produced a number of reports related the issues at QEUH/RHC, though I am unsure if this specific task was ever completed. As the months moved on this was raised several times at

IMTs and nothing had been produced by HPS. I had started the task of doing something similar, producing a report using ECOSS data, which I submitted to the IMT. I describe this report in more detail later in my statement. I did discuss the issue with Dr Inkster outside the IMT setting and apologised for the length of time it had taken to produce my written report. She told me not to worry about it and appeared to be more concerned over the length of time it was taken for HPS to complete the task. She felt that HPS were waiting on me to produce the report so they could then copy it or use data from it.

63 I recall Annette Rankin reporting that HPS were asked to do a 'root and branch' review of Wards 2A and 2B, parallel to similar work being undertaken by HFS. This was at the IMT on 5th June 2018. Annette stated that HPS would not begin their epidemiological study until they had conducted the review of Wards 2A and 2B.

64 This 'root and branch' review was being undertaken by Annette Rankin from HPS and would involve a comparison with Ward 2A and the old Schiehallion ward, Yorkhill Hospital. This comparison was chosen as it dealt with mostly the same patient group undergoing similar treatments in environments that should be similar in specification. It would look at the physical environment, domestic and nursing service/hours, change in patient numbers and examination of chilled beams, along with published outbreaks and speaking to staff.

65 Following this review HPS would compile a data comparison where they would extract data of all bacteraemia from 2012 and compare it with the rest of Scotland. It was also suggested by the IMT that Annette should contact Public Health England to see if there have been any similar outbreaks within England and if there are any similar set up of BMT standalone wards within a paediatric hospital anywhere in England.

66 I recall discussion in the IMT where questions were raised over the choice of comparator, as HPS would be comparing quite old hospital wards to a brand-

new hospital ward, a different built environment. There was also the issue of the volume and acuity of patients seen in the Glasgow unit compared to those seen in Edinburgh and Aberdeen. The Glasgow unit staff would be dealing with patients who are more at risk of infections and complications than the groups in those two hospitals. So, when comparing across these hospitals one would expect to see a higher infection rate in the Glasgow cohort than you would in the Aberdeen cohort. My own thoughts were that comparisons should be made to other tertiary centres, such as Great Ormond Street, making the request to contact PHE very important.

67 My understanding is that HPS did not produce an epidemiology report at that time. I am aware of a 2019 report they did produce, which included a comparison of my epi report, a separate report produced by the microbiology team, and HPS own work. The HPS conclusion was that all three pieces of work produced extremely similar results, so they triangulated the epidemiology, which was reassuring.

68 At the IMT meeting on 27 March 2018, we discussed the water situation **(A41890244 - 27.11.2019 IMT minutes Gram Negative Ward 1A PICU - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 90)**. According to the minutes, some water tests were positive for gram-negative pathogens, and there were some high fungal counts, some greater than 100, found in a number of locations in the QEUH and RHC sites.

69 I have been asked by the Inquiry if this was significant and to provide an understanding of what was going on at that time. As these were pre-filter samples, and we knew the filters were effective, this did not represent a direct risk to patients. However, it confirmed that there remained an issue with the water supply and the longer-term solutions needed to be progressed.

70 It was during this IMT meeting that Dr Inkster informed the group that the IMT would be stood down following the meeting. Dr Inkster explained that her

decision was based on all the acute issues having been addressed, an enhanced incident management response was no longer necessary. A separate group, what would become the Water Technical Group, would instead take forward the longer-term actions. This new group would look at the remit of filter placement, instruction on new taps, chlorine dioxide dosing and drain cleaning. In my opinion this was the correct time to move away from an acute response. A debrief, to be led by HPS, was being set up, which is good practice. As the IMT was not planning meeting again, there should have been a review by the IMT Chair that all outstanding actions had been completed, and an outbreak report prepared. I do not know if those steps were completed.

IMTs Autumn 2018

71 I attended an IMT on 14 September 2018 **(A37990970 - 14.09.2018 IMT minutes Ward 2A - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 33)**, at which we discussed the issue with the drains within Wards 2A and Ward 2B, and other parts of RHC, and contingencies for patient care if there was a need to move patients out of Wards 2A. My understanding was that some 'black grime' had been seen regurgitating out of some of the sink drains, and swab tests of the drains had grown a number of different gram negative bacteria. This could potentially present a risk if these bacteria were aerosolised. It had been recommended that some preventative work would be conducted on the drains in terms of replacing components and deep cleaning of Wards 2A and 2B.

72 The Phase One contingency plan put forward involved potentially using the Clinical Decision Unit (CDU) if a patient were to attend either ward to be seen or admitted. I raised a concern that given issues had been identified with some drains outwith Wards 2A/2B, and the initial water issues investigated earlier in the year had been more widespread, there was no guarantee that CDU was free from the drains issue. Therefore, rather than using any bed

space in CDU, specific cubicles should be identified for use of the haematology/oncology patients, and those cubicles should receive the same drain cleaning control measures as 2A/B. My understanding that this action was completed, and the designation of specific CDU beds was included in the patient pathway.

73 In the September IMTs, the IMT agreed to recommend a complete decant of Wards 2A/2B. This would allow more significant works to be undertaken on the wards that would prevent any recurrence of the issues experienced with the water and drains. The IMT had a full discussion of several options, as detailed in the minutes. The conclusion was to recommend decanting the paediatric BMT patients into the adult BMT ward, and the rest of the patients into another ward in QEUH. It was agreed this recommendation would be presented to the executive team.

74 Immediately following the IMT meeting I, along with other senior members of the IMT, attended a further meeting with the executive team, which was chaired by Jane Grant, in which we discussed how the recommendation of the decant could be operationalised. As mentioned earlier in this statement, IMTs are decision making bodies. They also need to be aware of the legitimate bounds of that decision making authority. There are circumstances where the size of the decision, or the knock on effects of a decision mean the IMT should limit itself to recommendations, request decision making from a higher authority. Decanting these wards was complex, impacting on paediatric and adult hospitals, and a national service. Therefore, the decision needed to be made at an executive/board level.

75 From memory the chief executive, the chief operating officer and the sector director were all there. It was a good meeting in terms of the atmosphere in the room. It was a serious situation and there was an appropriate level of concern. The meeting did not make decision whether to follow the IMT recommendation to decant had not been made. The final decision was made by the board, over the weekend.

76 I was not involved in the decision making itself, and I am not aware of anyone else from Public Health being involved, nor do I have any first-hand knowledge of that decision making, or the reporting of the decision back to the IMT on 18th September 2018 **(A36629310 - 18.09.2018 IMT minutes Ward 2A - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 40)**.

77 The reason I was not in attendance at the IMT on 18th September, was because I was attending an all-day public health reform event as a staff side representative. At that event I was spoken to by two HPS staff about the incident at RHC.

78 Laura Imrie, from the ARHAI team, who I believe was Annette Rankin's manager, asked me what the current hypotheses were for the incident, and how the epidemiology work was going. I was surprised by these questions as I would have expected Laura to have been fully briefed by Annette, so could not understand why I was being asked.

79 Later, Dr Colin Ramsay, a Public Health consultant at HPS, asked to speak to me confidentially, about the incident. First I asked Dr Ramsay's involvement and he informed me he was part of an internal HPS committee that had been setup to support Annette. He said that the IMT should make sure it has also looked at ventilation, which I thought was unusual, as we were dealing with issues related to water systems. Dr Ramsay said it was important to demonstrate that we have considered every avenue, and that HPS was going to be positioning itself defensively.

80 I spoke with Dr Inkster that evening by telephone and fed back to her, as IMT Chair, these conversations. I believe the indicated issues with the flow of information between HPS and the IMT.

81 In terms of the time frame from the decision to decant being made, the preparatory work that was necessary and then the decant, it was done in just over two weeks, which was incredibly fast. The risk assessment and action plan for the decant were regularly updated and shared with the IMT.

82 I have been asked whether I agreed with the decision to move the children to wards 6A and 4B. I did agree with that recommendation. 6A had already been remediated when the hospital first opened, so was suitable for BMT patients. The next most viable alternative was decant to the Beaton. However, the lack of PICU and other paediatric services on that site would create an unacceptable level of clinical risk. The decant into QEUH did increase the distance from the haematology-oncology service and other paediatric services, however, they would still remain on the same sit. Given the initial expectation that the decent would be for less than 6 months, then this would be acceptable, though challenging.

83 I was not involved in any communications to staff, or to patients and families. That task would be shared between the hospital management and the clinical staff. They would be supported by the press office, as there would be public communications too.

84 Also at the IMT of 28 September I gave a brief presentation on my epidemiology findings **(A36629328 - 28.09.2018 IMT minutes Ward 2A - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 44)**. There was also discussion about when the HPS report would be ready. I recall Prof Gibson asking how what I reported compared to the presentation that Dr Peters had given at the recent routine haematology-oncology antimicrobial use meeting. I replied that I could not comment as I had not seen Dr Peter's report.

85 At the IMT meeting on 05 October 2018 the discussions were still on the issues of drains, particularly their contents following drainpipe works on Ward

2A/2B/2C **(A36629290 - 05.10.2018 IMT minutes Ward - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 45)**. During these works numerous items including syringes, small toys, and plastic material had been discovered. Dr Inkster stated that this would need to be addressed ahead of planned remedial works otherwise issues would continue to recur. A recommendation was made that both Dr Inkster and I would create a joint communication for all staff and raise public awareness surrounding this. I contacted Lorraine Dick, Senior Communications officer in regards the matter and there were several emails exchanged, from both myself and Dr Inkster, chasing the issue. A meeting for the three of us to meet and discuss was set for 14th December. However, I do not believe that meeting every happened. My recollection was that decision had been made in the Communications team, that due to the multiple complex communications ongoing around this incident, that this specific communication would not be progressed. I am not aware of the issue ever being revisited. It seemed to me that concerns on reputation management were overriding IMT decisions.

86 I completed the first part of my written report, which had the data for the RHC, and submitted to Dr Inkster on 17th September 2018, and then the whole report was sent to Dr Inkster on 29th September 2018. An updated version was also produced and sent to Dr Inkster on 2 October 2018 **(A42362089 - Report by Dr Iain Kennedy - Descriptive analysis of five year trends in bacteraemia rates for selected gram negative organisms dated 1 October 2018 - Bundle of Documents for the Oral Hearing Commencing 12 June 2023 - Bundle 6 - Miscellaneous documents, document 27**).

87 Dr Inkster sent an email on 10th October, asking for comments on the epidemiology reports available, prior to working to combine them into a single report. On 11th October Dr Christine Peters replied with a series of comments. Dr Inkster had answered many of the points, but had left those directly related to the method I used in my report. Dr Peters challenged the reliability of some of my work, although she made no comment on the actual results. In doing

so, it felt more like an attempt to dismiss the report, rather than engage constructively with it, and I felt very negative about this.

88 For example, one of Dr Peter's comments was a question I had posed in the report about laboratory methods. Dr Peters described this as "not valid" and requested it be deleted. It is a very valid question, that is part of standard outbreak investigation. That the answer to the question was that lab methods had not changed, does not alter the validity of the question.

89 I therefore did not respond to the email immediately. When subsequently Dr Inkster indicated the plan to arrange a meeting to discuss, I felt best to wait for that discussion, rather than correspond by email. I did take the points on board and included responses to them in the July 2019 update to the report **(A38662683 - Report by Iain Kennedy "Descriptive analysis of trends in bacteraemia rates for selected gram negative organisms" dated July 2019 - Hearing Commencing 12 June 2023 - Bundle 6 - Miscellaneous documents, document 28)**. I took advice from Dr Michael Lockhart on the reliability of the ECOSS data. Dr Lockhart confirmed that there was very high confidence in the ECOSS data for blood culture results.

90 The epidemiology reports were discussed at the IMT meeting on 20 September 2018 **(A36629320 - 20.09.2018 IMT minutes Ward 2A - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 42)**. The consensus then was that they be finalised, submitted for comparison and a meeting be arranged with some of the IMT members, Dr Inkster, and Michael Lockhart HPS consultant microbiologist, so that we could go through them in detail. Due to Dr Inkster's and Dr Lockhart's other commitments, we were unable to arrange a meeting.

91 I attended an IMT meeting on 30 November 2018 **(A42909010 - 30.11.2018 IMT minutes Ward 2A - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team**

Meeting Minutes (IMT Minutes), document 54). Dr Inkster advised the group that the HPS epidemiology report was still outstanding; however, since patients had been decanted from wards there was a marked reduction in bacteraemia, which fit with the hypothesis. Dr Inkster expressed that as a result of this any future meetings to discuss the report may not be required. The decrease in bacteraemia following the decant does support the hypothesis, and the chosen control measures, though it does not prove it. Often, in outbreaks you can gather significant evidence that supports a hypothesis, but you can rarely prove the hypothesis was correct.

92 I understood that finalising the epidemiology reports was unlikely to make much difference to the control measures in the short term. However, I was disappointed in this decision, as I believe they would add to the understanding of everything that had gone on; that is there were still unanswered questions on how we got to that situation, and how would we avoid it in the future. It was also important from an incident management principles point of view that you need to take epidemiology, microbiology, environmental and the clinical picture as a whole. You should not rely on just one of them and say we do not need the epidemiology anymore, as that is not keeping with best practice.

93 Dr Inkster also explained that Annette Rankin's report would be delayed until the ventilation report had been completed. I am not sure which ventilation report is referred to here; and I do not know who commissioned it.

94 In general, I believe that the IMT was still functioning at this time, though given the outstanding reports that were awaited, there were some loose ends that should have been pursued, rather than dropped.

Cryptococcus

95 I first attended an IMT about Cryptococcus on 20th December 2018 **(A36605178 - 20.12.2018 IMT Cryptococcus - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 55)**. The

meeting had been called to discuss two cases of Cryptococcus neoformans found in blood cultures from haematology patients. Dr Inkster explained that this organism was rare and not typically hospital acquired. Sporadic community cases were known to occur and Cryptococcal meningitis has been seen in HIV patients. I was aware of Cryptococcus because of its link to HIV but had never come across it in an outbreak incident. I am aware that it can be found in soil and bird droppings, particularly pigeons.

96 As a result of their infection a paediatric patient died on [redacted] 2018. Both patients had positive blood cultures, and the patients had been diagnosed over a [redacted] within two separate wards (Ward 6A and Ward 4C). Dr Inkster had contacted PHE Mycology laboratory in Bristol who stated that we could expect to see community acquired cases but that they had no hospital acquired cases notified to them. Given the information provided by Dr Inkster, my initial thoughts were that the presence of two cases in such a short time potentially significant and required investigation, but I was keeping an open mind, as at this stage there was insufficient evidence to conclude that the two cases were linked, and both were infected in QEUH.

97 Dr Inkster said that she had conducted an initial epidemiology report looking back at how many cases there had been of this organism, which had revealed four cases in blood cultures in the last two years. Three of those were attributed to community acquired cases and the fourth also appeared to be community acquired but required a case note review. I advised the meeting that ECOSS data showed 13 cases in the last 10 years with a cluster associated to the Brownlee Centre and therefore likely to be people living with HIV.

98 I agreed to undertake a more detailed review of epidemiology. The initial report was very brief – just headline figures that could be accessed in the time available before the IMT. A more detailed review would be required to understand the historical cases and identify if any of them might be linked to the current incident or associated with the two recently confirmed cases.

99 In regards the outbreak of Cryptococcus, I have been asked by the Inquiry if the distinction between Hospital Acquired Infections (HAI) and Healthcare Associated Infections (HCAI) plays any part in my role as Public Health consultant. They are generally not a helpful categorisation for most of the incidents Public Health teams deal with, as they are hospital focused, and Public Health focus on community incidents. These are standard definitions which apply nationally as to whether something is hospital acquired or not, which usually is based on how long a patient has been in the hospital before they are diagnosed. If a patient is diagnosed within the first 48 hours of admission then the infection will be community associated, and if more than 48 hours, in general it will be categorised as HAI. However, that is not necessarily straightforward, or appropriate, as many infections have a much longer incubation period, and therefore a longer inpatient stay would be required before assigning as HAI. HCAI is an in-between category, where a patient may not meet the definition of HAI but have had healthcare interaction recently – such as having been discharged within the last 30 days, or recent intervention, such as bloods being taken, or another invasive investigation. This includes anyone with an indwelling line, like many haematology-oncology patients.

100 The definitions of HAI and HCAI are most useful in disease surveillance. In incident management their application needs to be more careful considered, as they are somewhat arbitrary distinctions, and if cases are classified as HAI, then logically any investigation and hypothesis is narrowed to focus only on the hospital as a possible source.

101 I have been asked by the Inquiry if this distinction was appreciated by others involved in the process. I cannot speak to others understanding, but I would say that the distinction between HAI and HCAI is not necessarily intuitive, especially if applied arbitrarily, and it is not necessarily useful. Implications on hypothesis generation if the definitions are applied too strictly was probably not considered by everyone.

102 During the meeting I queried whether, if they were hospital acquired, it was QEUH they were acquired in. One of the patients had been transferred from a hospital in England, so is likely to have had a continuous hospital stay for quite some time. The hospital in England was in a region with a higher incidence of cryptococcal infection. Even though they had been an inpatient in QEUH for three weeks, the long latent period of fungal infections means it may alternatively be an HAI to the English hospital.

103 The other patient was someone who appeared to be getting better, their immune system was recovering, but they then had become unwell. I was aware from community public health of a condition called Immune Reconstitution Syndrome (IRIS). This is where a patient may have an overwhelming response to an infection which has been latent or asymptomatic as their immune system recovers. An example of which would be if a patient has both Tuberculosis (TB) and untreated HIV, who may have few TB symptoms, due to being immunosuppressed. If you start with their HIV drugs, their immune system will recover and they will be extremely ill as it attacks the TB, so the best approach is to start the TB treatment first, wait a couple of weeks, and then start the HIV treatment.

104 I suggested to the group that given the clinical history of this patient, this could be something similar, particularly with a fungus, which could have been sitting dormant in the body. Dr Inkster did not think this was the case as the organism had not been detected in the patient previously, and as they had underlying conditions there was lots of testing going on all the time. After this there was no further discussion of alternative sources that I recall.

105 However, my own thoughts were that we could not say with certainty that either of these cases were both acquired in the QEUH. At this point, to my mind, there was insufficient evidence that either of the patients had caught their infections in QEUH to declare this as an HAI outbreak. That is not to say that the hypothesis put by Dr Inkster was incorrect, but rather there were other

plausible avenues that could have been explored. Assigning both cases as HAI to QEUH at the outset closed the possibility of broader considerations.

106 In outbreak investigation there is a term ‘pseudo-outbreak’. This is not a pejorative term, but a technical one. It refers to two mirror situations – where there is false clustering of true cases; or true clustering of non-cases. Pseudo-outbreaks may still be worth investigating, as they can still generate learning, or be an indicator of other issues where preventative measures may be implemented.

107 I have been asked by the Inquiry if the discovery of Cryptococcus would necessarily have resulted in Microbiology contacting Public Health, and the answer is no. Cryptococcus is not a notifiable disease, and there is no Public Health action, and we would therefore not expect to be contacted by Microbiology.

108 During the meeting we discussed risk management and control measures. As it was suspected that it may be linked to pigeons’ excrement, I had spoken to a contact of mine who was a senior veterinary officer at the Animal and Plant Health Agency, regarding any information around Cryptococcus in birds, and cases of transmission from pigeons to humans. He did not have any knowledge of this issue. I emailed another veterinary consultant Dominic Miller, who works for HPS, to see if he had dealt with cases in the past and similarly, he had not encountered it. There is very little surveillance of disease in wild pigeons as they are usually not much of a risk to humans, and so there was no useful information on Cryptococcus in pigeons in Scotland.

109 At the meeting, the early hypothesis for the Cryptococcus seemed to be that it may be a result of birds roosting within the ventilation plant room. The IMT were presented with evidence that there had been pigeons roosting in the floor plant room, and Dr Inkster suggested that Cryptococcus in the pigeon droppings could be aerosolised during maintenance or cleaning. This was a plausible hypothesis, but at that time I did not think there was enough

evidence to have sufficient certainty, as we were just starting our investigations.

110 Prior to the IMT there had been no previous issues or concerns raised about pigeons in plant room, but I do recall an inquiry about pigeons roosting above a door, which was dealt with by Stan Murray of the Environmental Public Health team. I contacted him later for support in producing an information and advice sheet for occupational health, as they were getting a lot of queries from staff about the impact of pigeon droppings on health.

111 Given the mention of duty of candour at this IMT meeting, I have been asked by the Inquiry my understanding of duty of candour and how it interplays within my role as a Public Health consultant. There is no special or different role for a Public Health consultant compared to any other health professional, and Public Health do not have any specific or additional involvement in duty of candour.

112 Duty of candour can be used to refer to professional duty of communication – our responsibilities to keep patients informed of matters relevant to their health and care. This would include informing them if they have an infection, what actions are needed because of the infection in terms of treatment or preventing spread. In Public Health led incidents, we would also inform the patient if we were investigating other cases and what the purpose of that investigation is.

113 Separate to that there is the statutory duty of candour, where because of some action or inaction by the health service, there has been some harm caused and we have responsibility to investigate and inform patients within strict timetables. This is an organisational, rather than individual, responsibility. If I was concerned that something had happened my service that might trigger the statutory duty of candour, I would be reporting it to my director, and taking advice from senior clinical governance colleagues. The

minutes demonstrate a similar view, with Dr Inkster seeking advice from Dr Armstrong on duty of candour

114 Historically, communication in outbreaks was only proactive if there was a specific action we wanted people to take, or a potential risk we wanted them to be aware of. Modern best practice in outbreak communications is very different. Evidence based best practice guidance is available from WHO, US CDC and European CDC. Important principals include openness, transparency, communicating early, and not being scared to say there are things we don't know. In revisions of the NHS GGC area-wide Incident Management Plan over the last four years, I have expanded the communications chapter to included information and guidance on these principles, and an outbreak communications workshop was included as part of our three-yearly outbreak exercise in Autumn 2023. Though the old fashioned, paternalistic attitude is still sometimes seen, in general the professional communities involved in incident and outbreak response are becoming better at pro-active outbreak communication.

115 I have been asked by the Inquiry if I am aware of the procedures in relation to facilitating disclosure of concerns regards wrongdoing or failure in a service. My first step would be to discuss with my line manager, director, or IMT chair as appropriate. The Incident Management Plan includes a step-wise escalation process for concerns about IMTs. In terms of knowledge NHS policies and procedures, I am aware they exist and would be able to access them through HR website. These policies are included as part of corporate induction, so all staff should be aware of them. Someone working in Public Health would not have any greater knowledge of the procedures than other staff members, unless they had specific whistleblowing responsibilities in their job role.

116 I have been asked by the Inquiry if I am aware of specific changes to whistleblowing policy at QEUH. I am not aware of changes specific to that hospital. However, there are national 'Once for Scotland' changes that have

been brought in, including new whistleblowing champions, and the introduction of a national whistleblowing hotline. These changes were publicised through staff communications.

117 I have been asked by the Inquiry if I had concerns regards workplace culture in relation to communication and duty of candour. Regards the workplace culture in my own department, I have no concerns.

118 I have been asked for my understanding of communications between management and clinical staff at QEUH. My only knowledge will be that recorded at IMTs or Infection Control Committees. I was not party to other communications between management and clinical staff in QEUH. This would be normal, and Public Health would not be involved or aware of any communications that were not processed through the IMT structure. There would be no expectation that all communications would be seen by Public Health.

119 I have been asked by the Inquiry if certain items (number of HAI, decisions on changes to clinical management, decisions on adaptation or refitting buildings), were always notified to Public Health, and if these notifications would relate in communications. This would be out of scope of the remit of Public Health, and I would not expect these items to be notified to us, and we would not have responsibility for communications related to issues related to hospital incidents and outbreaks led by Infection Control teams.

120 Similarly, in relation to communications which I was allocated a role in preparing by the IMT, this would be in respect to helping draft the wording, or reviewing the wording once a draft was prepared. I would have no role in the approval or authorisation of the communications, and very limited role in dissemination (for example, if they needed to go to the on call Public Health team, or to Local authority Environmental Health colleagues). Communications I would have supported would always have been written - for

example staff briefings or media statements. Details of the content are therefore recorded in those statements.

121 In general, IMT protocol is that all communications relating to the incident should be agreed with the IMT Chair. There may need to be other approvals - for example for Public Health incidents in the community, I would always confirm the wording of a press statement with my Director – but the IMT Chair needs to be involved in that process. Indeed, it is a fundamental breech of IMT protocol for information to be shared without agreement of the IMT Chair. There may be occasions where after the IMT has made a decision on communications, someone external to the IMT raised questions, concerns or suggests alternatives – these queries should come back to the IMT Chair for discussion, and not just made out with the IMT structure.

122 At the IMT on 16th January 2019 **(A36690590 - 16.01.2019 IMT Cryptococcus - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 58)**, Dr Inkster provided results of air sampling from the wards and plant room areas. No Cryptococcus neoformans had been detected. Dr Inkster explained that *C. neoformans* is notoriously difficult to culture, so that was not an unexpected result. However, she explained that another Cryptococcus species, *C. albidus*, had been detected in both the ward and the plant rooms. Dr Inkster explained that this was a different strain from the one isolated from the two patient cases, it was less pathogenic but still a risk to haemato-oncology patients.

123 I informed the group that this species was seen far less often than the *Cryptococcus neoformans*, and local lab data showed it had been reported only once, and that report appeared spurious, as it was later updated to an unrelated, but similar sounding organism.

124 Dr Inkster described the *C. albidus* as a proxy for *C. neoformans*, and therefore given it was found in both the wards and the plant areas, a useful

indicator that there is Cryptococcus coming through the ventilation system. Based on the information available at that time and explanation given by Dr Inkster, it strengthened the hypothesis that there was something coming through the ventilation system from the plant room.

125 Although these results strengthened that hypothesis, it was not definitive, and other hypotheses were also still being investigated, which were looking at how infections from pigeon faeces could enter the building. The question then was what control measures we were going to put in place to address this. The IMT recommended that the plant rooms be cleared, cleaned, and resealed, and other actions to be taken in terms of controlling pigeons on-site. This responsibility would fall to Estates and Facilities. There were other control measures recommended, which included the siting of HEPA filter units and the provision of prophylaxis to patients, I asked at the IMT about the provision of prophylaxis, and was informed that options were limited, and it was only being given in line with European guidelines.

126 I have been asked by the Inquiry whether I had any concerns about the risk of infection from ventilation prior to that point. Specialist ventilation is out with the normal scope of Public Health practice, and would defer to what was led at IMT by Infection Control or Facilities.

127 An action allocated to me from this IMT meeting was to seek feedback from HPS and obtain a national picture relating to Cryptococcus cases amongst humans. I believe I did get a response from HPS however I do not recall that there was anything significant in their reply. We would assess what was being investigated locally against nationally epidemiology to understand whether other areas had seen similar things.

128 A further IMT meeting followed on 17 January 2019 **(A36690588 - 17.01.2019 IMT Cryptococcus Part 1 AM - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 59; A36690599 - 17.01.2019**

IMT Cryptococcus Part 2 PM - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 60), to discuss the Cryptococcus incident, which I attended. At that meeting I provided a written report on historical cases of Cryptococcus from January 2009 to December 2018. This report was compiled by me and one of the Health Protection Nurse specialists, and provided more detail than the update I gave at the IMT meeting on 20 December 2018 **(A36605178 - 20.12.2018 IMT Cryptococcus - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 55)**. We had reviewed the ECOSS data and electronic patient records of all thirteen cases individually and the key conclusion reached was that none of the historical cases were linked to this incident.

129 This is an important part of outbreak investigation, termed ‘case finding’. To support generation and testing of hypotheses, and decisions on control measures, IMTs need as much information about relevant cases as possible. If there are a large number of unknown relevant cases, then key information may be missing. Similarity, if patients with the infection, who are not part of the outbreak, are included then irrelevant information may be presented to the IMT. In both these scenarios, data could present a misleading picture which could result in the IMT not making the correct decisions in controlling the outbreak. Therefore, having good case definitions and good case finding are important aspects of incident management. The report provided by Public Health gave high confidence that the appropriate cases had been identified.

130 I have been asked by the Inquiry who received this report. This report was presented to the IMT. I do not know who else saw this report. It would not have gone to the Board, and I do not believe it went to an infection control committee. Dr Armstrong would have received a copy, as she was a member of the IMT.

131 On 21 January 2019 **(A36690569 - 21.01.2019 IMT Cryptococcus - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1**

- Incident Management Team Meeting Minutes (IMT Minutes), document 62), there was another IMT meeting to discuss updates on the Cryptococcus incident. Dr Inkster informed the group that there had been two cases of Mucormycosis within the Critical Care Unit (CCU), QEUH. Both results had been found from respiratory samples. Following the meeting of the IMT it was identified that a leaking dialysis point was likely the cause of the fungal infection. This room had been sealed and Estates were working to rectify this.

132 Several IMT meetings followed as a result of the Cryptococcus incident, throughout January and February 2019. This resulted in further control measures being introduced and the movement of vulnerable patients across wards. On 22 January 2019 the Cabinet Secretary, Jeane Freeman MSP visited QEUH, and it was after this visit she commissioned an external review of the design, commissioning, and maintenance of QEUH, which would be made public.

133 I had no concerns at this stage as to what was being communicated to the staff at IMTs. Additionally, at this stage from what was reported at the IMT there were no issues with communication with the families of the two patients. However, there were concerns reported by Professor Gibson regards communications for families on social media, especially those whose children were not currently inpatients. As far as the role of Public Health, which is support to the IMT, I was not concerned that there was information I should have had but did not. Given the role of Public Health in HAI incidents, I would not expect to be aware of the detail of operational issues in the hospital that were not required for IMT decision making.

134 I have been asked by the Inquiry about actions on communications for staff from the IMTs on 25th January and 28th January 2019. I believe these relate to the same communication. A briefing of staff was prepared by Dr Inkster and Rona Wall, head of Occupational Health. I along with Dr David Stewart and members of the comms team were asked to review. I provided comments on the text. Ally McLaws, then Director of Communications confirmed that day

that it would be a direct briefing to hospital staff, rather than circulated via the all staff Core Brief.

135 Following the IMT on the 28th January **(A36690584 - 28.01.2019 IMT Cryptococcus - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 66)**, I forwarded this email correspondence to Mark Dell, who was now taking forward the preparation of the document. I prompted him on 30th January for the need for an update at the IMT that day. It was recorded as an action at that IMT that the brief would be sent out by the press office. I do not know if that action was ever completed.

136 At the IMT on 4th of February 2019 **(A36690558 - 04.02.2019 IMT Cryptococcus - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 68)** I mentioned a factual information sheet that Public Health were preparing. This had arisen as local authority Environmental Health Officer colleagues had received questions from the public about health risks from pigeons and were looking for support. Public Health prepared an information sheet for them to assist them. My recollection is this was based on advice given to previous enquiries received by Public Health.

Review of 2017 cases

137 On 5th March 2019, I was forwarded an email from Jennifer Armstrong via the Director of Public Health asking if I would support response to an issue raised by Dr Inkster and Professor Gibson about whether cases of potential gram-negative bacteria from 2017 had been appropriately identified and dealt with. They had approached Dr Alan Mathers, Chief of Medicine for Women and Children's, as they were concerned about the pattern of incidence of bacteraemia. They wanted to establish if the children had received

appropriate clinical care, and if there had there been issues with procedures and line management within the microbiology laboratory.

138 I subsequently met with Alan Mathers and Sandra Devine. Dr Mathers provided more detail of the background and his conversation with Dr Inkster and Prof Gibson. Dr Mathers was waiting for Professor Gibson to get back to him about reviewing the cases to make sure the children had received appropriate care. I agreed to update the epidemiology report that I had produced at the end of 2018, to include results since the report was completed, and to separate the haematology-oncology patients. Once the report had been finalised the clinical team were going to look at the results, following which myself, Alan, Sandra, and Professor Brian Jones, Head of Service Microbiology, would meet to discuss the results and consider the questions raised about laboratory practice.

139 I submitted that updated report at the end of July 2019, both to Dr Mathers and others investigating the questions raised by Dr Inkster and Prof Gibson, but also to Dr Inkster as chair of the IMT for onward sharing with the IMT. It was not shared at that time **(A38662683 - Report by Iain Kennedy "Descriptive analysis of trends in bacteraemia rates for selected gram negative organisms" dated July 2019 - Hearing Commencing 12 June 2023 - Bundle 6 - Miscellaneous documents, document 28)**. My report was eventually shared and discussed at IMT meeting in August 2019, however I was not present at that meeting. It was later in the year that the review of 2017 cases was reported in the press and in Parliament, after it had been passed to the Daily Record and the Scottish Labour Party. At that time, it was a shock that this patient level information was suddenly in the public domain.

IMTs Summer 2019

140 At the IMT on 25th June 2019 **(A36591622 - 25.06.2019 IMT Gram Negative Blood Ward 6A - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 73)**, Dr Inkster informed the meeting that there had

been six gram negative bacteraemia positive patients in the last three months. Of the six cases two of them were Hospital Acquired Infections (HAI) and the other four were Healthcare Associated Infection (HCAI). She also advised the group that there had been two cases of Mycobacterium chelonae (M. chelonae) in the last 12 months. The last case was from a blood culture taken on [redacted] May 2018 and the most recent case was from a sample taken on [redacted] May 2019. This case was classed as an HCAI as patient was not an inpatient at time of sample.

141 It was reported at the IMT that in the last decade there had been four cases of M. chelonae reported within the adult population within NHS GGC. All four were haematology patients with links to Beatson and were spread out through numerous years. There had been no paediatric cases reported within NHS GGC in the last 10 years, and now two paediatric cases being reported within 12 months. There was limited epidemiology for this rare mycobacterium and Annette Rankin, HPS, was asked to get a list of all positive M. chelonae cases within Scottish health boards, to allow us to compare figures. I agreed to take an action from the IMT to contact Scottish Water to see if we could obtain water samples from water being sent to QEUH and test in our own labs, which can look for mycobacterium. I arranged this testing with James Simmonette, Scottish Water, by email. It was scheduled to take place on 28th June 2019. As I was about to go on leave, I asked James to liaise directly with the infection control team about the samples.

142 At this time I was beginning to have concerns about the functioning of the IMT. These went beyond the minor issues of efficiency I have mentioned earlier in my statement regards the 2018 IMTs. The IMT was losing focus and direction, and the interactions between IMT members was becoming strained.

Infection Control

143 It was around this time that my working relationship with Dr Inkster began to deteriorate. This followed on from my producing a briefing note for Dr

Armstrong, on the general of mycobacteria in water supplies. The briefing was for Dr Armstrong's use, to support her in discussions with others, such as Board members, and was not intended to be widely shared or published. I was directly commissioned to produce it by Dr Armstrong at a meeting of BICC. I circulated a draft of the briefing to senior IPC team members prior to sending to Dr Armstrong. Dr Inkster replied, she was unhappy about it and was quite critical of the document. Her criticisms were mostly mis-directed, as Dr Inkster misunderstood the purpose of the document. It was not an attempt to summarise the current cases or related factors as Dr Inkster assumed, but more general information. I was, though, still able to incorporate some of Dr Inkster's comments and literature she referenced. Dr Inkster also expressed that she strongly believed I should not have produced the document, asking why she had not been asked to do it. Why I had been asked rather than Dr Inkster would be a question of Dr Armstrong, however the request had come at a BICC meeting Dr Inkster had not attended.

144 Another feature of the breakdown of our working relationship was we would no longer have our informal debriefs after IMTs. These were informal meetings, sometimes in the canteen, sometime just in the corridor. They may have been one-to-one or with other members of the IPC team. We would just chat about the IMT and sometimes other matters. They were a form of peer support. These simply stopped around this time.

145 Disagreement on the progress of the IMT was another area which contributed to the deterioration and was also a demonstration of that deterioration. There were far fewer infections in 2019. I did not think we should be jumping to the same hypothesis or the same control measures, same reactions, and never really finding the underlying cause of the issue. I do not think Dr Inkster and I were aligned with each other on what the direction should be, and I am sure she was aware of this divergence of viewpoints. My contributions would be mis-characterised or dismissed as saying there was no problem or that the cases identified did not need investigation, which is untrue. On one occasion

in the IMT Dr Inkster said I needed to “keep an open mind”, and I felt that I was the only person who was.

146 A good relationship between the Lead ICD and Public Health is important, not just for the smooth operation of the IMT, but across all the areas where we might have shared interests or joint working. I was sufficiently concerned that I raised the issue with Prof de Caestecker. She offered to call to Dr Inkster and set up a mediation between us. I declined that offer, believing that we could still resolve things directly. I contacted Dr Inkster a couple of times by email, to try and set up a time for us to talk, but Dr Inkster was never available.

Meeting 20 August 2019

147 On 20 August 2019 I attended a meeting that had been arranged and chaired by Professor Linda De Caestecker, Director of Public Health NHS GGC, to discuss behavioural issues at a recent IMT meeting on 14 August 2019 **(A36591626 - 14.08.2019 IMT Gram Negative Blood Ward 6A - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 77)**. The issues raised included the nature of communication, inappropriate language, confrontational behaviour, and feelings of blame being attributed.

148 Due to a diary error, I had missed most of the IMT meeting on 14th August and only caught the last 10 minutes of it. I can recall walking into the room and feeling the tension within, things did not feel right. When the meeting finished Jen Rodgers and Tom Steel (Estates) spoke to me about how the meeting had gone. They told me that they had found it a bit problematic with some inappropriate behaviour and language by those in attendance, that their expertise was being ignored or disrespected, and they were keen to escalate things.

149 There were broader issues with the relationship between Infection Control and Estates and Facilities that have been brought out in previous external reviews

and some of these issues were obvious in the IMT. For example, during the Cryptococcus incident there was a decision made to get advice from Peter Hoffmann, Public Health England. Dr Inkster arranged for Dr Peters to have that conversation. No one told Estates about the call despite it being about facilities and ventilation, and they felt they should have been involved in that conversation. Then there was tension over who had the conversation and when would the information be shared with Estates.

150 I advised Jen and Tom that as part of Public Health procedures we also had processes for reviewing performance of IMTs. As part of that someone else could take the lead. However, I did not want Public Health to take the lead, IMT do that, and I did not think it was appropriate for us to come into this type of incident. I got the impression that this meeting had been a trigger point for others to say that things needed to change.

151 I decided to raise the issue with Professor De Caestecker who told me that she had heard similar from multiple people who had attended the IMT on that day, either directly or reported to her by Dr Armstrong as the HAI Executive Lead. It was becoming apparent that with these issues the IMT was not performing. As part of the processes and procedures every NHS board has an Executive Officer who is responsible for managing performance of IMTs, within NHS GGC it is the Director of Public Health.

152 The meeting on 20 August 2019 was attended by members of the IMT and other members of senior management. Some had regularly attended IMT meetings, but some had not. At the meeting a number of issues with the IMT functioning were raised, and considerations on improving the performance. We discussed whether it would be helpful to have new leadership within the Incident Management Team and a decision to have a change of Chair was one of the key outputs from that meeting. I recall it was suggested that I might take on chairing the incident. I argued against that position. I felt it should be someone more senior, and if someone from Public Health chaired the IMT, it may wrongly give the impression that Public Health had taken on

responsibility of the management of the incident. I suggested that one of the Deputy Medical Directors would be more appropriate. I recall the draft minutes stated that there would be a conversation with Dr Inkster regards her demitting as chair. The final version of the minutes stated that she would demit.

153 Dr Inkster was off sick and was unable to attend the meeting to discuss IMT performance. Dr Emilia Crighton was asked to take over the Chair of the IMT. I do not know who asked Emilia, or what discussions had occurred in the executive team regards agreeing who should take on responsibility as Chair. There was then confusion at the next IMT on the Friday of that week, and it was unclear whether this was a temporary measure due to Dr Inkster's absence or if Dr Crighton was now formally Chair of IMT.

154 There is not a formal process of appointing the initial Chair of an IMT. For Public Health led IMTs, quite often you take on chairing the IMT simply because you are the duty person the day the incident starts. Alternatively, you may have that type of infection in your pro-active portfolio, so responsibility for leading the IMT may be passed to you. Changing the chair of an IMT is not unusual, and in fact the guidance encourages rotating the chair, especially if it is complex or long running. This is to keep the team fresh and to avoid fatigue. It is also not unusual for someone who had previously been IMT Chair to rotate back into the role – demitting office as Chair is not a barrier to being IMT Chair again.

155 For example, I recall a water incident at the Royal Alexandra Hospital in Paisley in 2006 involving an external water contamination issue where we had to switch off the mains water for five days. We had daily IMTs and went through four chairs in a week, because we rotated it. Whilst this is an extreme example, it does demonstrate the principle.

156 Personally, I think changing the chair was the right decision, but it could have been handled better. I have been asked by the Inquiry why the Chair had not

been rotated previously. I believe that some of the other Infection Control Doctors found the incident too complex. I also think the external scrutiny and media coverage may also have put anyone off taking the post. However, I also think in part it is because Dr Inkster did not want to relinquish the role. I recall having a conversation with Dr Inkster about it once, in 2018. Dr Inkster indicated that she was feeling significant pressure, including from HPS. I said I would have offered to Chair the IMT, except I was about to start three weeks of leave. I am aware, from correspondence included in one of the bundles previously published by the Inquiry, that Dr Inkster takes the view that rotating the IMT Chair is specifically a Public Health thing, and not applicable in Infection Control led IMTs. I disagree with this as the principles of outbreak control are the same regardless of who is leading.

157 It was unfortunate that Dr Inkster was not able to attend the meeting on 20th August. She was invited to it and invited to other meetings with the new IMT Chair but did not attend them. I think this may have given an impression of excluding her when she was not excluded.

158 I am asked if I ever attended an IMT where I felt intimidated or afraid to speak out. I would not say so. I would say that sometimes I felt frustrated that my contributions were not being given due attention, but I never felt that I was not able to make those contributions. As I have previously said, sometimes there were just too many people in the room, with only a small proportion, perhaps three or four, actively contributing. Whether some people did not feel it was their place to speak, or felt they couldn’t raise issues, I do not know.

159 My own view on chairing the IMT, from principles of incident management and personal experience, is that chairing an IMT, leading an incident, is an onerous process. Within Public Health our guidance is that when you have a protracted incident you have a second member from whatever speciality the Chair is from, so that the role of running the Incident Management Team and providing the specialist advice does not fall on one person. Whether then the interactions of the IMT between individuals can be productive is a different

question but the decision by Dr Inkster of having another microbiologist in the room is a positive. The responsibility for fostering that collective input will fall to the IMT Chair, ensuring everyone is involved and allowed to contribute; however, there is a responsibility placed on IMT members and expected behaviours that people need to fulfil.

Late 2019 IMTs

160 On 06 September 2019 I attended an IMT meeting where the group discussed points raised on SBAR from microbiologists, detailing issues relating to the fabric of Ward 6A. A number of the points raised related to the use of chilled beam technology **(A36591637 - 06.09.2019 IMT Gram Negative Blood Ward 6A - Hearing Commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes) (External Version), document 79)**. There was discussion and different views on some items that are documented in the minutes.

161 My knowledge and understanding of chilled beams is based on what was discussed at the IMTs and related meetings. My understanding is that chilled beam technology has benefits for environmental comfort and energy efficiency, I also understand that where they are in use, the number of air changes per hour (ach) is reduced from 6 ach to 3 ach. I recall discussion on Chilled Beams when it was mentioned at the Water Technical Group. Dr Inkster stated their use had been approved by IPC for one particular outpatient setting within the new build hospital, but their use had been applied across the whole hospital without being signed off by IPC.

162 At the 6th September IMT meeting there was a discussion on the hypothesis and Dr Crighton asked if we were still working on the assumption that the chilled beams were the source. Tom Steele (Estates) reported that he believed the water drops from the ceiling to be condensation and the leak to have been eradicated as a potential source. However, a new patient case had evolved after these measures were put in place a timeline for the new patient

case and the work conducted by Estates would be created. It was agreed that myself, working with Estates and Jen Rodgers would review this timeline for the IMT. My recollection is that the timeline did not show an association between issues with the chilled beams and patient cases.

163 On 13 September 2019, I attended an IMT meeting where I presented the epidemiology data that had been circulated in August 2019 **(A36591627 - 13.09.2019 IMT Gram Negative Blood Ward 6A - Hearing Commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes) (External Version), document 80)**. This was the first time that I had presented this data directly to the IMT. During this presentation I was assisted with commentary by Professor Brian Jones, National Microbiologist for Haematology and Professor Alistair Leanord, Consultant Microbiologist and Director of microbiology reference laboratories. Neither participated in the preparation of the report, nor had seen it when it had been circulated to the IMT in August. They were there as observers and to comment on what I was presenting from their experiences as senior microbiologists. By this time Dr Inkster had resigned as lead ICD, which was why Alastair Leanord was there. Brian Jones was there because of his expertise in infections with patients with blood cancers; he had been the National Microbiologist for Haematology.

164 The first data introduced was an epi curve of gram-negative bacteraemia (GNB) from blood cultures in paediatric haematology/oncology patients from July 2013 to July 2019, taken from the previously circulated epi report. The chart demonstrated numbers pre- and post- move to the new hospital. The graph was split into non environmental/environmental gram-negative organisms. The epi curve outlined peak positive blood cultures during the water incident in March 2018 and an increase during the drainage incident of May 2018 within Ward 2A, RHC. Since moving to Ward 6A the patterns of environmental gram-negative organisms were the same compared to the counts when the ward was at the old Yorkhill hospital. The second graph was provided by Jen Rogers and displayed ongoing surveillance data outlining the central line associated bloodstream infections (CLABSI) per 1,000 central line

days. This was compared to Great Ormond Street Hospital and Cincinnati Children's Hospital rates, which showed comparable rates. The graph demonstrated a downward trend over the last few years of CLABSI rates.

165 Senior Microbiologists Prof Brian Jones and Prof Alistair Leonard both agreed that in their opinion, from a microbiology point of view, Ward 6A, QEUH was safe at this present time and IMT members accepted this position. I believe they had reached this conclusion based on the data presented, their broader knowledge of infection rates within NHS GGC and their wealth of experience within microbiology.

166 I have been asked by the Inquiry for my view on current infection rates. I have not directly interrogated or reviewed the data since 2019. However, on the basis of the reporting through the infection control committees, I believe there are no issues with the infection rates currently.

167 On 20 September 2019, I joined a teleconference hosted by Dr Emilia Crighton, which followed on from the IMT meeting on 18 September 2019, to discuss the recommendation made at the IMT to lift the restrictions on Ward 6A (**A37992136 - IMT Water Incident Minutes - Ward 6A - Teleconference - 20 September 2019 - Position paper produced by NHS GGC dated 14 December 2022 and supporting documents Bundle, document 92)**. The teleconference participants included IMT members and other consultants. For this meeting Jen Rodgers, Chief Nurse, Paediatrics, and I had put together a PowerPoint presentation, which outlined the current data set around infection rates linked to Ward 6A. This was circulated to those attending the teleconference. The presentation was previously presented data; however, I had made amendments to display the data, rather than just numbers. Following discussions the group sought further additions to the presentation, which would include the different types of infections within the haematology oncology population 2013/14 to present date, and actual numbers of each infection by year. It was agreed that both Jen Rodgers and I would finalise the

presentation and submit to Emilia Crighton for approval before circulation and ahead of the next IMT meeting on 08 October 2019.

168 On 08 October 2019, I attended an IMT meeting where an update on the IMT process regarding water, drains and the increase in Gram negative bacteraemia rates was given **(A36591643 - 08.10.2019 IMT Gram Negative Blood Ward 6A - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 83)**. This was to inform Professor Craig White, Divisional Clinical Lead in Healthcare Quality, and Improvement Directorate, who had been appointed by the cabinet minister for Health and Sports and provide him with an understanding of what was going on. Professor White would also function as a single point of contact for families in relation to the infection control measures going on within the hospital and any enhanced safety measures implemented by the board.

169 During this meeting Lesley Shepherd, Professional Nurse Advisor, Scottish Government, told the group that from her observations clinicians seemed to have a lack of confidence in the clinical environment, despite Infection Control measures put in place. There were new cases being reported and she felt there was a dichotomy in the microbiology opinion. I had the impression from the ward team that they were genuinely concerned about the infections, even though the infection rate was back to what we might anticipate for some of these rarer infections. It was reported at that time that the clinical team were being told different opinions by some microbiologists compared to what the IMT were reporting, and this would impact on their confidence.

170 I was challenged by one member of the clinical team that I “didn’t believe them” when they said children had these infections. This was an unfair and inaccurate characterisation. At no time did I dispute that children were getting infections. What I had challenged was the statement that some of these infections had never been seen in their patients before. The infections we were discussing had been seen in Schiehallion patients prior to the move to

the new hospital. While this was rare, with some of the bacteria only having been detected once or twice, this had been previously detected. On reflection I could have done more to bring the clinical team along with me in how I described things and worked to a common understanding, rather than just expecting the data to speak for itself.

IMT 05 November 2019 – Use of Prophylactic Medication

171 I have been asked a series of questions by the Inquiry on the prescribing of prophylaxis, including what was prescribed, the indication for prophylaxis, if I had any involvement in the decision making in the ongoing use of prophylaxis what was communicated around prophylaxis, and if any information around prophylaxis was withheld. My involvement around prophylaxis was very limited, principally related to discussions at the IMT, and therefore I am unable to assist the Inquiry in answering these questions. There were two actions related to prophylaxis I took to support the IMT around this time.

172 On 05 November 2019, I attended an IMT meeting where there was a discussion by the group on the use of prophylaxis medication **(A36591709 - 05.11.2019 IMT Gram Negative Blood Ward 6A - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 86**. I took an action to liaise with Public Health Pharmacy around the requirements for use of a Patient Group Direction (PGD) for Taurolock. Taurolock is a substance that goes into the indewelling line and has antimicrobial properties. There was suggestion that Taurolock could be used instead of oral prophylaxis. A PGD is a document that provides a legal framework to allow registered health professionals to supply and/or administer specified medicines to a pre-defined group of patients without them having to be individually named, as an alternative to a prescription. PGDs are probably most commonly used in vaccine clinics. A PGD would make the use of Taurolock much simpler. I did discuss this with pharmacy. Legally only a registered health care professional can administer under a PGD. As the lines

would be being accessed by healthcare support workers and phlebotomists, I was advised a PGD would not be suitable, and I fed that back to the IMT.

173 Secondly, at the IMT on 6th September there was agreement to include support from the infectious diseases team to facilitate decision making on prophylaxis **(A36591637 - 06.09.2019 IMT Gram Negative Blood Ward 6A - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 79**. I assisted Dr Conor Docherty, paediatric infectious diseases consultant in this by providing him with the relevant documents from the IMT, and meeting with him to discuss them and answer any questions prior to his chairing the prophylaxis group meeting, so he was up to speed, as he had not been a member of the IMT. I did not participate in the subsequent meetings between ID, microbiology and the clinical team.

My epidemiology reports of October 2018 and July 2019: Descriptive Analysis of Trends in Bacteraemia Rates for Selected Gram Negative Organisms

174 I have been asked by the Inquiry to provide further detail on the preparation of the two above named reports I submitted to the IMT, and my opinion on related matters associated with comments made in the Case Notes Review, and Mr Sid Mookerjee's Quantitative Report commissioned by the Inquiry.

(A42362089 - Report by Dr Iain Kennedy - Descriptive analysis of five year trends in bacteraemia rates for selected gram negative organisms dated 1 October 2018 - Bundle of Documents for the Oral Hearing Commencing 12 June 2023 - Bundle 6 - Miscellaneous documents, document 27)

(A38662683 - Report by Iain Kennedy "Descriptive analysis of trends in bacteraemia rates for selected gram negative organisms" dated July 2019 - Hearing Commencing 12 June 2023 - Bundle 6 - Miscellaneous documents, document 28)

175 “Descriptive epidemiology” and “analytical epidemiology” are the labels for two categories of tasks that are used in outbreak investigations. Descriptive epidemiology should always be done in any outbreak investigation. Analytical epidemiology is only done occasionally. Although epidemiology can be useful for all steps in an outbreak investigation, descriptive epidemiology is most closely associated with hypothesis generation, and analytical epidemiology with hypothesis testing.

176 Descriptive epidemiology is also sometimes called “data orientation”. It is usually summarised as describing identified cases by time, place and person. It will include description of demographic and exposure information. For example, commonly it will include breaking down the number of cases by age and sex. Other factors that might be included, depending on the nature of the outbreak, occupation, school attendance, travel history, or a food diary. The ‘place’ component may also be complimented by mapping the location of cases or significant exposure sources. The time component can include charts showing changes over time. This may include an ‘epi curve’ which is a histogram with time on the x-axis, and case count on the y-axis. Descriptive epidemiology may also include the calculation of simple rates.

177 Analytical epidemiology refers to the use of formal statistical methods, such as significance tests, or the use of observational studies. In outbreak investigation, these would most often be cohort study, a case-control study or a case-case study.

178 Detailed information on the commissioning and timeline of these reports is included earlier in my statement. In summary, I offered to produce the first report at an IMT as the HPS report appeared to be delayed. That report was sent to Dr Inkster on 17th September 2018, and an updated version sent to her on 2nd October 2018. I do not believe it was ever shared with IMT. The updated 2019 report was started following meeting with Dr Mathers in March 2019, and completed in July 2019, when it was circulated to Dr Mathers and Dr Inkster, as chair of the IMT. At the meeting of the IMT on 1st August 2019, I

requested it was circulated to all IMT members **(A37991876 - 01.08.2019 IMT Gram Negative Blood Ward 6A - Hearing Commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes) (External Version), document 75)**. It was circulated to IMT members on 5th August 2019 **(A37991958 - 05.08.2019 IMT Gram Negative Blood Ward 6A - Hearing Commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes) (External Version), document 76)**. It was then discussed at the IMT meeting on 14th August **(A36591626 - 14.08.2019 IMT Gram Negative Blood Ward 6A - Hearing Commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes) (External Version), document 77)**. Some of the output of the report was also used in the meetings to discuss reopening of ward 6A.

179 I was not set a specific Terms of Reference by the IMT and I prepared the reports alone. The aim of the reports was to describe trends in gram negative bacteraemia. This would support, together with other parts of the outbreak investigation, the objectives of guiding future investigations and control measures, deciding when the incident could be closed, and providing background information for future surveillance.

180 In preparing the method, I reviewed documentation on bacteraemia surveillance systems from HPS, Public Health England, and the US CDC. All results from the ECOSS system that met the search criteria were downloaded. The results were manually deduplicated. The deduplication action was undertaken twice, and results cross-checked to minimise errors in deduplication. The data set was then further refined to provide two different counts – one where any second positive result within 14 days was discounted (the ‘patient count’) and one where a second positive result for the same organism within 14 days was discounted (the ‘organism count’). I did consider which count would be most representative, but concluded it was best to include both, so the IMT had the most information.

181 Monthly rates were then calculated using bed days as the denominator. The denominators were from the available data produced by the NHS GGC business intelligence team, and at that time available on the staff intranet. Bed days are a good denominator, and often the only one available at hospital or ward level.

182 The reason bed days are a good denominator is because it takes account of "person-time at risk". This means that it does not just count the frequency of the occurrence of a potential exposure, but also captures the length of time someone experiences that potential exposure. It is intuitive that an exposure of a few hours is of less risk than an exposure that lasts several days or weeks. This is why count of admissions alone is not a suitable denominator, as it treats a day case as having the same risk as a long inpatient stay. I did, in the updated report, include a combined denominator of total activity in the haematology-oncology service. This is because so much of the activity of the service happens on an outpatient or day case basis. However, that still includes bed days because a simple count of number of admissions would not accurately represent the activity of the service.

183 An alternative to bed days would be line days. That is the number of days that a central venous access line has been in place. This is particularly useful when investigating line infections. However pragmatically this data would be much harder to collate than the bed day data, and so it was not possible to include the work I was doing. Additionally, for the first report, when I was looking at hospital level data it would not have been appropriate, as the majority of patients not in the haematology-oncology service, do not have lines inserted.

184 To ensure relevance to the IMT, my search strategy aimed to include cases that would likely meet the case definition of the IMT. Therefore, Dr Inkster provided me with a list of the organisms that had been found in either patient samples from the patients included as cases by the IMT, or which had been found in the water or drain samples. To increase the sensitivity of the search, I

searched using the genus only. Genus is the first part of the two part name of an organism. By doing this, although it increases the chance of capturing results that are not relevant, it significantly reduces the risk of missing a relevant result. That is, it helps maximise the count of possible cases.

185 I have been asked by the Inquiry if I experienced difficulties in data collection for my report. I had direct access to the ECOSS system, and, as noted earlier, I am happy at the completeness of blood culture data in ECOSS, so did not experience the issues described by the Case Note Review and Oversight Board.

186 I am asked to comment in particular on availability of typing data. I did not use typing data so the reported issues on challenges in getting typing data did not affect me. If I had needed it, I would have expected typing information to be recorded in the local laboratory information system, as part of the record of that sample. If that was not the case, I would be surprised. I am not aware of the outcome of the recommendation to develop a comprehensive searchable database.

187 I have been asked about the recommendation to carry out a formal analytical study of the trends. This was a recommendation to the IMT and not an expectation of further work that the Public Health team or I would be expected to carry out.

188 However, when I came to update the report, I did seek support from our departmental statistician on suitability of analytical techniques. We discussed the use of time series analysis. This is a type of analysis that takes account of the fact that data that is time-ordered can have an internal structure that needs to be accounted. One example would be seasonality. The data is split into segments based on “breakpoints” – that is clear distinctions between one time period and another. These breakpoints should be decided in advance of the analysis (“a priori”) and have a clear rationale for their choice. Not doing this introduces a high risk of bias into the study. We did not have sufficient

such breakpoints in the RHC data, so the use of formal time-series analysis would not have been suitable.

189 In the updated report I also mention “denominator artefact”. An artefact refers to a misleading, confusing or incorrect output that is due to technique, definitions or other factors, other than the real change in that parameter. A denominator artefact may occur, for example when there is a change in how the denominator is measured, but this change isn’t accounted for. In the case of my report, a particular issue was although there had been similar changes in bed days for RHC as a whole and haematology-oncology services, these may occur at different times. Being able to separate out the haematology-oncology service in the second report aides in reducing any potential artefact.

190 On the basis of the work I undertook, I would conclude that there were more bloodstream infections in the second half of 2017 and in 2018 until the decant to 6A, than would be expected. There was an increase in both common organisms, and rarer organisms. There was also at this time more polymicrobial results than usual.

191 The Inquiry’s Terms of Reference include a key question on whether there is a link between patient infections and unidentified features of water or ventilation. My understanding of “infection link” posed in this key question is whether defects in the building systems result in an increased risk of infection to patients, through an increased risk of exposure to pathogenic organisms. My reports do not address that question directly, not least because they contain no environmental data. They could be used, in conjunction with other evidence to describe the situation over time, and support investigations into the possibility of an infection link.

192 I note that in the July 2019 report I conclude the *E. cloacae* rate was still higher than earlier years. I have not reviewed the rates of *E. cloacae* since then, however my understanding is that it is routinely monitored by IPC Team, and I am not aware of any current concerns about the incidence.

193 In the July 2019 report I conclude that the improvements in incidence and absent polymicrobial episodes are due to the many control measures put in place – both structural and to practice, education and surveillance. The principle hypothesis of the IMT had been that the source of infection was the water system, and control measures related to water and line care were implemented. Given the subsequent improvement, it is therefore logical to conclude these control measures were successful. However, when using a package of control measures, it is generally not possible to determine the impact of any individual measure. I could potentially speculate alternative hypotheses for the improvement, but I don't believe they would be evidenced based or credible.

194 I have been asked to comment on some of the conclusions of the Case Note Review (CNR). I have read the CNR Overview Report but have not seen any other output from the CNR **(A33448007 - Queen Elizabeth University Hospital and Royal Hospital for Children: Case Note Review Overview Report dated March 2021 - Bundle of Documents for the Oral Hearing Commencing 12 June 2023 - Bundle 6 - Miscellaneous documents, document 38)**. I was not involved in the NHS GGC response to the CNR.

195 CNR includes a statement that the control measures would not have been put in place if GGC did not consider that there was a link with the environment. In essence – yes, and this was the hypothesis of the IMT, and mentioned above is supported by the impact of control measures. However, it is important not to conclude that because control measures were used that confirms an environmental source. In incident response we often apply the "precautionary principle". This principle can be stated that when there is uncertainty around a risk, action to mitigate that risk is taken, even when there is an absence of evidence of the existence or strength of that risk.

196 The Inquiry have asked my view on the conclusion that the "vast majority" of cases they reviewed were classified as possible or probable. It is important to

look beyond that headline. 28% of patients reviewed fell into the “probable” category” and 31% into the “most likely” to be associated with the hospital environment. The detailed narrative of the CNR report contains many caveats, and comments on the nuance of the determination of which category each patient is assigned.

197 Having not seen the specific patient level work of the CNR, I cannot judge the accuracy the CNR estimates. I would make two relevant comments. The first is that the CNR Overview Report does not contain sufficient detail to be certain how any individual case was classified. Though the factors are listed, the criteria for how this impacted the final decision on category are not, and the CNR note that this was a subjective process.

198 Secondly, in terms of use of the terms possible and probable. When we use these terms for case definitions in Public Health response, we often consider a ‘possible’ case as being one where features are compatible, but where other diagnoses are as likely, or more likely. Therefore, I would not combine ‘possible’ and ‘probable’ categories, as the chance of being linked would be quite different in those two groups.

199 I have also been asked my views on the question of the usefulness in typing results, when those results show organisms that do not have a typing match. I have mentioned this briefly earlier in my statement. I agree with the principle stated by others, that in a scenario where there may be multiple strains in an environment, that a lack of typing match does not rule out a connection. However, it does make the probability of connectedness less likely. Similarly, the opposite is true. Matched typing does not by itself prove connectedness, but greatly increases the probability that the two samples are connected.

200 Additionally, when different strains come from the same source, I would anticipate a measure of relatedness between them. It is more likely that the strains have come from the same common ancestor, rather than two completely unrelated strains being introduced to the same environment by

chance. This is where whole genome sequencing (WGS) can be useful. WGS can let you see how closely related organisms are.

201 I have been asked detailed question on WGS by the Inquiry, however they would be out with my knowledge and scope of practice.

202 I have also been asked by the Inquiry if any formal analytical work was done. There was none carried during my involvement, though I understand that both NHS GGC and the Inquiry have commissioned such work subsequently.

Mr Sid Mookerjee's Report

203 The Inquiry have asked me to comment on the report they commissioned from Mr Sid Mookerjee, as it contained direct criticism of my reports.

204 In paragraph 17.1, Mr Mookerjee comments on the time period covered by the reports. The reports were based on most up to date data at time of preparation.

205 In paragraph 17.2, and again in 18.2, Mr Mookerjee questions the deduplication process, suggesting that my method would underestimate the number of cases. Mr Mookerjee has misread the report here – genus was used for extraction, not for deduplication, where organism was used. This would have the opposite effect to that suggested by Mr Mookerjee, by increasing the number of possible infection episodes prior to deduplication. The introduction of a separate "case count" recognises that these are individual patients, not simply counts of positive samples, and is in keeping with the CDC guidance.

206 In Paragraph 17.3, Mr Mookerjee notes my report states "date of result was counted as day 1", rather than sample date. Mr Mookerjee states an assumption that this was done to differentiate between community acquired and hospital acquired infections. This was not the purpose of that designation, which was actually for the counting of the 14-day period for exclusion of

repeat results for the same patient, as described in the immediately preceding paragraphs.

207 In paragraphs 17.4 and 17.5, Mr Mookerjee comments on the source and suitability of denominator data – NHS GGC acute service information team were the source of the data. Mr Mookerjee's assumption that the data must be incorrect as the nationally published data does not distinguish between paediatric and adult is false. RHC specific bed day data was used in production of my report. As the assumption in paragraphs 17.4 and 17.5 is false, Mr Mookerjee's conclusion does not hold.

208 In paragraph 18.1, Mr Mookerjee suggests I have adopted his concept of "admissions". I have not. As described earlier in this statement, a count of admissions does not provide a suitable denominator, as it does not include person-time at risk. The inclusion of a second combined denominator of bed days + day cases + outpatients does not indicate agreement with Mr Mookerjee that count of admissions alone is a suitable denominator but provides some allowance for hospital delivered care that did not result in a countable bed day.

209 In paragraph 18.3, Mr Mookerjee repeats his criticism of denominator choice, based on his incorrect assumption of availability of denominator data I have responded to above. Additionally in this paragraph Mr Mookerjee picks up on the term "selected gram negatives", and incorrectly assumes that there was additional "curation step". As described earlier in my statement, and as described in the report, "selected" refers to the list provided by Dr Inkster and was not further edited by myself.

210 In paragraph 18.4, Mr Mookerjee comments on the lack of definition of "activity". The definition of "activity" I used is on page one of my 2019 report. Mr Mookerjee also comments that the labelling of the chart is confusing. The body of both reports are only about paediatric patients, and to assume that

because a chart does not explicitly state this, the chart must also contain adult data, is illogical and ignores the context of the reports.

211 In paragraph 18.5, Mr Mookerjee makes a complex criticism, with several false assumptions but in short, Mr Mookerjee has demonstrated a lack of understanding of descriptive epidemiology. A deliberate choice was made in this chart to display the two data items separately, this was on the advice of a Public Health statistician. Mr Mookerjee is incorrect to suggest that if activity impacts on incidence, that relationship must be consistent. The suggestion of use of correlation “tools” is concerning as tools implies packages that can be applied without forethought. I will therefore assume that “statistical test” is what is meant here. It would be inappropriate to use correlation here, as it would fail to meet necessary assumptions. Additionally, this is specifically not an analytical report. This failure to understand the purpose of the report suggests a lack of understanding or experience of this type of descriptive epidemiology, and its use in outbreak management.

212 Paragraph 18.6 Mr Mookerjee repeats criticisms on denominator data I have responded to earlier in this statement. Mr Mookerjee’s assertion that admission count data is the most appropriate activity measure is false.

213 In paragraph 18.7, Mr Mookerjee comments that comparison with other centres would be useful. I agree with this point, however it is outside the scope of the reports I prepared.

214 In light of these points, I would again suggest Mr Mookerjee’s conclusion on my work is not relevant.

215 I have been asked by the Inquiry to provide a further explanation on the use of statistical process control (SPC) charts for monitoring infections. These charts are different from the epi curves described earlier. SPC charts originate in industry as a means of determining if variation in a parameter warrants further investigation. They are frequently used in hospital infection surveillance.

There are different ways of doing them with different statistical methods that you can include, but in general, a baseline data set is used to calculate a mean and a standard deviation for that parameter. Then a “control limit” is set, usually three standard deviations from the mean, and often a “warning limit” (two standard deviations) is also set. Prospective data is then plotted on the chart.

216 Parameters, such as number of infections in a given time period, will naturally vary over time. The SPC is there to assist in identifying if that variation is more than just chance. If the data plot crosses the warning limit, then that would be an indication to review that parameter, and if the plot crosses the control limit, it is highly unlikely to be just due to chance. If it is a rate of infection higher than the normal expected background rate for that population then that would meet the definition of an outbreak.

217 A higher than expected rate of infection is one definition of an outbreak. The standard definition of an outbreak are two cases linked by time, place, or person. A single exceptional organism where it is either new to the population or previously eliminated from the population, or has a significant Public Health impact, would also be considered an outbreak. A single case of Ebola, smallpox, polio, and extremely drug-resistant tuberculosis would all meet that definition. All three of these outbreak definitions would be responded to using our outbreak control/incident management procedures.

218 However, as it will only show something might be happening, the reason for the variation needs to be explored. With any surveillance system, there needs to be consideration of the data source, and the methodology. The variation above the control line may demonstrate that there is a problem, such as an outbreak. However, there may be other reasons for the variation, and it could be easy to over-interpret the data. For example, if any increase over the control limit is assumed to be an outbreak, and control measures are implemented based only on the SPC chart, then control measures that are either unnecessary, or not effective might be instituted, which themselves

might cause avoidable harm. That is why it is important not to take the increase at face value without further investigation.

219 The reason that we use variation from the baseline rate of infections, rather than from zero, is that not all healthcare associated infections are preventable. In fact, the idea of getting to zero infections is problematic because it sets an unrealistic goal. There are many types of action that can reduce risk of infection, such as isolation, engineering controls, vaccines, hand hygiene, and personal protective equipment. However, none of these is 100% effective. By layering these actions risk can be reduced further but this cannot stop every infection. Certain patients are at more risk of infection than others due to underlying conditions or treatment, and therefore additional layers of control measures are used – examples of this would include the strict isolation of patients undergoing bone marrow transplant, or the offer of certain vaccines to patients who are immunosuppressed which are not offered to the whole population.

220 There will always be unpreventable infections and you can expect over a prolonged period, within a particular patient group, or particular patient setting with standard control precautions in place, to see some infections. Those numbers are often quite low, depending on the setting and the type of infection, and you can get quite big jumps which are statistical flukes. In the circumstances where baseline numbers are very small, SPC charts may be inappropriate.

221 I have also been asked by the Inquiry if it is appropriate to combine multiple infections, for example all gam-negative bacteria, into a single SPC. In general, my opinion is that it is not appropriate to combine such large groups into single SPC charts. This is because in doing so it may mask significant movements in infections which usually have very small numbers, and the reasons for variation may be different for different infections. This is different to the inclusion of multiple infections in the epi curves described earlier, because is based on the case definition and direction of the outbreak

investigation discussed at the IMT. That is, speaking in general terms, there has already been a determination that they are part of an investigation, rather than a trigger to start an investigation.

222 Above and beyond what happened within QEUH, I think we need to consider how we develop, consult, and approve infection control guidance at national level. It is not the most transparent process, and it has become even less so thanks to changes in the structure of the national bodies. One of the issues that came up through the investigation at RHC, is how you should investigate and handle a situation where you have multiple outbreaks over clusters of different organisms all within the same area? Do you assume they all have the same cause, and are combined rates useful or not?

223 My view is that in 2018 it was useful to do this, as we had patient cases and environmental samples in the same area. But it does not necessarily make sense to use those totals as triggers when you don't have any evidence that anything's going on because you might not be monitoring anything useful. You might miss things, or you might find clusters that are not real. You need to have an analysis process so you can conclude as to whether there are links or not. You lose that if you are just using SPC charts.

Other events

224 I have been asked about my involvement in other events related to water and ventilation. The only event I was involved with not covered by the rest of this statement was the NICU in 2016. I provided some limited support to the IMT, which would be detailed in the IMT minutes.

Evidence provided by patients and families to Inquiry

225 I have been asked by the Inquiry if I followed the evidence provided by patients and families in September. I followed some of the hearings and listened to the patients and families describe, movingly, the events and the

impact of those events. I would not wish to comment on the lived experiences of others.

Personal and Professional Impact

226 I have been asked by the Inquiry if I had any concerns at any point about the hospital environment and it being a risk to patient safety and care. Through the process of the IMT investigation and response, there were aspects of the built environment, construction and the commissioning that were antecedence to the issues that we were having to deal with, but they were being dealt with when they were identified.

227 I have been asked by the Inquiry if I am aware of changes being implemented following recommendations from the independent review and oversight board. I am aware that the Board has had a robust process in place to make the changes recommended by external reports and have done so to the satisfaction of the Oversight Board. In relation to changes within Public Health, I have described earlier in this statement the review and updating of our outbreak and incident management procedures.

228 Other changes in NHS GGC that have been beneficial include the creation of the Infection Control in the Built Environment Group (ICBEG), which now provides a more senior group to bring together Infection Control and Estates. The additional funding provided to upscale public health teams due to the pandemic has allowed us to recruit an epidemiologist and data analyst into my team. I understand there has been recruitment to similar roles in the IPC team. These additional health intelligence colleagues are a great asset in response to outbreaks and incidents, as well as improving our routine surveillance systems.

229 I have been asked by the Inquiry if there has been an impact on myself professionally or personally during this period. From a workload perspective, I would think over that two-year period, there was a time where I was just full-

time on this incident, which is significant, given the public health role is supportive, rather than a leading one for hospital infection. I went straight into the pandemic response, and from there to mpox and then the next outbreak or epidemic. There has been little, if any, time to truly decompress and recharge.

DECLARATION

230 I believe that the facts stated in this witness statement are true. I understand that this statement may form part of the evidence before the Inquiry and be published on the Inquiry's website.

Appendix A

- **A38694845** - SBAR dated 10 October 2019 - Ward 6A - Situation update - gram negative bacteria - Bundle of Documents for the Oral Hearing Commencing 12 June 2023 - Bundle 4 - NHS Greater Glasgow and Clyde: Situation, Background, Assessment, Recommendation (SBAR) Documentation, document 46

- **A33870103** - Report prepared by DMA Water Treatment Ltd titled "L8 Risk Assessment (Pre-Occupancy) NHS Greater Glasgow and Clyde South Glasgow University Hospital" dated 1 May 2015 relating to site assessment concluding on 29 April 2015 - Bundle of Documents for the Oral Hearing Commencing 12 June 2023 - Bundle 6, Miscellaneous documents, document 29; A33870243 - Report by DMA Canyon Ltd titled "L8 Risk Assessment NHS GGC QEUH and RHC following site surveys in September 2017, October 2017, gap analysis in January 2018 and review date September 2018 - Bundle of Documents for the Oral Hearing Commencing 12 June 2023 - Bundle 6,document 30

- **A32222054** – Minutes of the NHS Greater Glasgow and Clyde Board Infection Control Committee held on 27 July 2015 - Hearing Commencing 19 August 2024 - Bundle 27, Miscellaneous Documents - Volume 3, document 16

- **A32221779** - Draft Minutes - BICC Meeting - 27 November 2017 - Hearing Commencing 19 August 2024 - Bundle 13 - Additional Minutes Bundle (AICC/BICC etc), document 48

- **A35957621** - National Infection Prevention Control Manual (including appendices showing draft HIIATs etc) - Bundle of Documents for the Oral Hearing Commencing 12 June 2023 - Bundle 6 - Miscellaneous documents, document 44

- **A36690477** - Incident Management Meeting, dated 16 March 2018, relating to Water Contamination in Ward 2A - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 17

- **A36690457** - 12.03.2018 4. IMT Minutes Water Incident Ward 2A RHC - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 16

- **A36690549 -** 21.03.2018 8. IMT Minutes Water Incident Ward 2A RHC - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 19

- **A36690507 -** 19.03.2018 6. IMT Minutes Water Incident Ward 2A RHC - Bundle of documents for the Oral hearing commencing 12 June 2023- Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 18

- **A40562750 -** National Support Framework 2017 – NHS NSS HPS – Version 1.1 - June 2018 - Hearing Commencing 19 August 2024 - Bundle 27 - Volume 1 - Miscellaneous Documents, page 68

- **A36690544** - 23.03.2018 9. IMT Minutes Water Incident Ward 2A RHC - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 20

- **A41890244** - 27.11.2019 IMT minutes Gram Negative Ward 1A PICU - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 90

- **A37990970** - 14.09.2018 IMT minutes Ward 2A - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 33

- **A36629310** - 18.09.2018 IMT minutes Ward 2A - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 40

- **A36629328** - 28.09.2018 IMT minutes Ward 2A - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 44

- **A36629290** - 05.10.2018 IMT minutes Ward - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 45

- **A42362089** - Report by Dr Iain Kennedy - Descriptive analysis of five year trends in bacteraemia rates for selected gram negative organisms dated 1 October 2018 - Bundle of Documents for the Oral Hearing Commencing 12 June 2023 - Bundle 6 - Miscellaneous documents, document 27

- **A38662683** - Report by Iain Kennedy “Descriptive analysis of trends in bacteraemia rates for selected gram negative organisms” dated July 2019 - Hearing Commencing 12 June 2023 - Bundle 6 - Miscellaneous documents, document 28

- **A36629320** - 20.09.2018 IMT minutes Ward 2A - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 42

- **A42909010** - 30.11.2018 IMT minutes Ward 2A - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 54

- **A36605178** - 20.12.2018 IMT Cryptococcus - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 55

- **A36690590** - 16.01.2019 IMT Cryptococcus - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 58

- **A36690588** - 17.01.2019 IMT Cryptococcus Part 1 AM - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 59

- **A36690599** - 17.01.2019 IMT Cryptococcus Part 2 PM - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 60

- **A36605178** - 20.12.2018 IMT Cryptococcus - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 55
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- **A36690569** - 21.01.2019 IMT Cryptococcus - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 Incident Management Team Meeting Minutes (IMT Minutes), document 62

- **A36690584** - 28.01.2019 IMT Cryptococcus - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 66

- **A36690558** - 04.02.2019 IMT Cryptococcus - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 68

- **A38662683** - Report by Iain Kennedy “Descriptive analysis of trends in bacteraemia rates for selected gram negative organisms” dated July 2019 - Hearing Commencing 12 June 2023 - Bundle 6 - Miscellaneous documents, document 28

- **A36591622** - 25.06.2019 IMT Gram Negative Blood Ward 6A - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 73

- **A36591626** - 14.08.2019 IMT Gram Negative Blood Ward 6A - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 77

- **A36591637 -** 06.09.2019 IMT Gram Negative Blood Ward 6A - Hearing Commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes) (External Version), document 79

- **A36591627** - 13.09.2019 IMT Gram Negative Blood Ward 6A - Hearing Commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes) (External Version), document 80

- **A37992136** - IMT Water Incident Minutes - Ward 6A - Teleconference - 20 September 2019 - Position paper produced by NHS GGC dated 14 December 2022 and supporting documents Bundle, document 92

- **A36591643** - 08.10.2019 IMT Gram Negative Blood Ward 6A - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 83

- **A36591709** - 05.11.2019 IMT Gram Negative Blood Ward 6A - Bundle of documents for the Oral hearing commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes), document 86

- **A42362089** - Report by Dr Iain Kennedy - Descriptive analysis of five year trends in bacteraemia rates for selected gram negative organisms dated 1 October 2018 - Bundle of Documents for the Oral Hearing Commencing 12 June 2023 - Bundle 6 - Miscellaneous documents, document 27

- **A38662683** - Report by Iain Kennedy “Descriptive analysis of trends in bacteraemia rates for selected gram negative organisms” dated July 2019 - Hearing Commencing 12 June 2023 - Bundle 6 - Miscellaneous documents, document 28

- **A37991876** - 01.08.2019 IMT Gram Negative Blood Ward 6A - Hearing Commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes) (External Version), document 75

- **A37991958** - 05.08.2019 IMT Gram Negative Blood Ward 6A - Hearing Commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes) (External Version), document 76

- **A36591626** - 14.08.2019 IMT Gram Negative Blood Ward 6A - Hearing Commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes) (External Version), document 77

- **A33448007** - Queen Elizabeth University Hospital and Royal Hospital for Children: Case Note Review Overview Report dated March 2021 - Bundle of Documents for the Oral Hearing Commencing 12 June 2023 - Bundle 6 - Miscellaneous documents, document 38

Scottish Hospitals Inquiry
Witness Statement of Questions and Responses
Peter Hoffman

This statement was produced by the process of sending the witness a questionnaire with an introduction followed by a series of questions and spaces for answers. The introduction, questions and answers are produced within the statement.

Professional History

1. Please list your professional qualifications, with dates

A B.Sc. (IIii) Microbiology, University of Bristol 1976
Honorary Diploma in Hospital Infection Control (HonDipHIC), University of London 1999

2. Please give your chronological professional history.

a) roles held where and when- please also provide an up-to-date CV.

A From 1977, a scientist in the Public Health Laboratory Service (1977-2003), Health Protection Agency (2003-2013), Public Health England (2013-2021) and the UK Health Security Agency (2021) in the department dealing with healthcare associated infections. Essentially the same role progressing through those successive organisations, becoming a Consultant Clinical Scientist. Retired in October 2021.

3. What specialist interest / expertise / qualifications in any area of Infection control do you hold? E.g., hospital ventilation, water Legionella control and infection control related to the built environment, and epidemiology and outbreak management.

A A broad interest and expertise in the ways that microbes causing infection could transfer in healthcare and analogous settings and preventing or limiting that transfer. This included decontamination (cleaning, disinfection & sterilization) of

reusable medical instruments and other relevant items such as infant incubators and healthcare fabrics; decontamination of the healthcare environment; aspects of hospital design, ventilation in operating theatres, procedure rooms, isolation facilities, specialist burns units and elsewhere; hand decontamination; the use of personal protective equipment in the context of infection prevention. This interest and expertise extended to contexts outside the medical field such as infection prevention in tattooing and body piercing. My bachelor's degree in microbiology provided me with a broad context that facilitated build-up of expertise by experience in infection prevention. My honorary diploma in hospital infection control was awarded as a "grandparent" diploma for my part formulating and delivering that qualification for the University of London.

Summary of Involvement

4. Please describe in brief terms any formal instructions/ appointments with the ICPT at QEUH, both pre and post opening (July 2015) other than in respect of Cryptococcus.

a) Which issues were you consulted with, and when?

A I had no such formal instruction or appointment. I have no recollection of consultations, but this does not exclude such consultations having occurred.

Cryptococcus in General

5. What is your own experience of Cryptococcus? How many times had you personally come into contact with Cryptococcus in a healthcare setting prior to your involvement with QEUH?

A Assisting with the issue of Cryptococcus at the QEUH is the only time I have had specific involvement with Cryptococcus in any context.

6. What is your personal view on the link between Cryptococcus and the built environment in general?

A My personal view is that it is a fungus of an uncertain range of environmental origins that transmits from outside the clinical environment to inside, where there may be susceptible patients, via an airborne route. This could be prevented by specialist ventilation systems that supply air via air filters of a grade that remove fungal spores passing through them, that air being supplied to rooms in substantial excess of air mechanically removed from those rooms. The effect of this is that the excess of supplied air leaks out through the inevitable gaps that will exist in a room's fabric. The outward passage of air through those gaps prevents the inward passage of unfiltered air from surrounding spaces. Thus the only air for susceptible patients to breathe is that which has passed through adequate filtration.

Cryptococcus in QEUH

7. When did you first become aware of issues with Cryptococcus in QEUH? Who contacted you about them?

A I do not recall when I was first contacted about this issue. It would probably been via a phone call from Dr John Hood, a Consultant Microbiologist in Glasgow. A questionnaire sent to me from a parallel investigation by Police Scotland makes reference to phone conversation(s) with Drs Teresa Inkster and/or Christine Peters, both Consultant Microbiologists in Glasgow. In the original questionnaire sent to me by the Inquiry, the preamble stated ""…..we know that at one point he agreed with Inkster re aerolisation through air ducts form plant room" "indicating possible prior discussion. Both of these suggest prior discussion(s) to that with Dr Hood. These may have taken place, but I have no recollection of them.

8. What do you understand to be the issues with Cryptococcus at QEUH?

A That patients had developed Cryptococcus infection associated with being inpatients at QEUH. I have no recollection of being informed of the number of

patients involved until being a member of the Sub-group.

9. Did you give the IPCT any advice regarding Cryptococcus prior to the setting up of the Sub-group? If so please give details.

A My recollection is that I advised exploration of pigeon dropping accumulations found in the plantroom as a source of Cryptococcus that then ingressed into the ventilation system. I cannot recall specifically who I gave that advice to.

10. How did you become involved with the Cryptococcus Sub-Group meetings ? Who requested your involvement?

A My recollection is that I was asked to attend meetings by Dr Hood. I understood my involvement to be that of a specialist technical advisor within areas of my expertise rather than a full member of the sub-group.

Composition of the Sub Group

11. What do you understand to be the way the sub-group was set up?

A I have no information on this.

12. Which of the sub-group members were previously known to you?

A Dr Hood and probably minor interactions with Annette Rankin in her role with Health Protection Scotland e.g. on same working groups.

13. What were the group's Terms of Reference?

A I do not know the group's terms of reference.

Functioning of the Sub-Group

14. How did the group function as a whole? Were people able to speak openly?

A My impression was that it appeared to function well. It appeared to me that people were able to speak openly.

15. Did everyone contribute? Or were there some members who contributed more than others?

A It appeared to me that members of the group would contribute as and when their particular expertise became relevant. Dr Hood was the main contributor.

16. If there were disagreements, were opposing views respected?

A Yes

17. Was there external reporting? If so, to which agencies (SG, HPS, GGC Board)

A I do not know.

18. Do you consider you were given adequate resources and investigative materials to function effectively? If not, please elaborate.

A I did not require resources or investigative materials.

The Hypotheses.

19. During the life of the subgroup several hypotheses were put forward. How were they arrived at? Were any put forward by you personally?

A My recollection is they were all formulated by Dr Hood and that the structure of the report being based on exploration of a series of hypotheses came about after the group had already been meeting for a while. Elements that I had discussed in earlier meetings may have contributed to formulation of some aspects of some of the hypotheses, though I have no specific recollection of details of this, but basing the structure of the report on a series of hypotheses was Dr Hood's idea.

For each hypothesis please give your own opinion on its likelihood (or otherwise) and any other comments you might have.

20. Hypothesis 1- Plantroom Air

A In the Summary of Findings section in the group's report, this concerns

contaminated plantroom air entering the air distribution ductwork whilst the air handing unit (AHU) was shut down for maintenance, final filter removed for replacement and the AHU open to allow plantroom air in. I do not find the absence of C. neoformans on air sampling in the plantroom particularly evidential. The nature and level of air contamination in any environment may vary over time. What I do find evidential is that when AHUs were deactivated, as would occur during a filter change, air was observed to flow strongly up through the ductwork from the clinical area into the AHU, then into the plantroom. This indicates that whatever the contamination in the plantroom air, it would not transfer into patient areas when the AHU was out of service and the final filter removed for replacement. My experience from observing airflows around poorly sealed rising service voids in hospitals is that this effect (I know it as a stack or chimney effect) is a constant phenomenon. Additionally, the reported observation that “AHUs in Plant rooms related to case patient rooms/wards were not opened when the case patients were in these rooms/wards” makes this hypothesis even less feasible. In the main body of the report this also includes Cryptococcus ingress to the supply air when the ventilation is running as normal cryptococcal spores (if present) entering the Plant Room air (on for example, Plant rooms on Level 12 QEUH) and then gaining access to the Air Handling Units (AHU’s) ventilating the rooms/wards where the case - patients were”, also detailed in “Sixthly” in the section of the main report. This would have involved plantroom air bypassing filtration. Air filters are supplied as preconstructed units in a rigid frame which slide into mountings within the AHU, typically as an array 2 unit across and 2 units high. There can sometimes be unsealed gaps between the outer surface of the mounting and the AHU such that air can pass though these gaps. It will do so preferentially as there is a far lower resistance to the passage of air though gaps as opposed to passing through a restrictive filter meshwork. There can also be gaps between the filter units in the array i.e. they do not abut each other firmly. Air can similarly pass through those gaps without filtration. This was put to the Estates members of the group and they reported back that the filters in the relevant AHUs had been inspected and no gaps around or between the installed filters had been detected. There is also a possibility was that the AHUs had been constructed in a way that made them unsuitable for

microbiological contamination control of the air they supplied. The core element of an AHU is a fan that pulls air in to the AHU and then pushes it into the branched system of ductwork which supplies air to a number of outlets. All parts of the AHU before the fan will be under negative pressure – air is being pulled in by the fan i.e. air will pass inwards through any holes or gaps in the AHU's integrity. Similarly after the fan, both AHU and ductwork will be under positive pressure – air is being pushed along these section by the fan i.e. any holes or gaps will leak outwards. AHUs will often have 2 sets of filters. A fairly coarse filter as an early component of the AHU ("the primary filter") and a fine filter as a later component ("the final filter"). For healthcare applications where microbiological control of the supplied air is required, it is important that the final filter is positioned after the fan. This means that any holes or gaps in the AHU or ductwork after the final filter will leak outwards; there will be a loss of clean air but no ingress of unfiltered air. If the fan is positioned in the AHU after the final filter, there will be a section of the AHU after the final filter and before the fan which is under negative pressure. Unfiltered air and contaminants within it will be drawn inwards into the airflow after the final filter through any holes or gaps. I have come across high levels of fungal contamination in operating theatre air where this fault has been present and there have been significant gaps/holes in the AHU integrity. The Estates members of the group were informed about this and they reported that they had inspected the relevant AHUs and they were constructed correctly with the final filters after the fan. For these reasons I could not envisage how contaminated plantroom air that entered the AHUs could have escaped filtration. The efficacy of the filters is also relevant. Some of the AHUs were said to have high efficiency particulate air (HEPA) filters as their final filters. These are very fine filters, with their most penetrating particle size being generally around 0.2 microns; fungal spores are about 20 times larger. They are generally clamped into their mounting with non-drying gel seals, reliably sealing them such that air cannot bypass the filter. The recommended procedure is that after fitting, each HEPA filter assembly is challenged with airborne particles and lack of their passage through the installed filters is required to be demonstrated. Sub-HEPA filters, such as the F7 grade filters said to be used as final filters in the remaining AHUs, filter to lower quality assurance. These are graded on

percentage passage of a standard mixed particle size dust rather than specific sized particles. Their fit in situ is less secure than HEPAs and they are not tested for resisting the passage of particles after fitting. The majority of operating theatres have air supplied via F7 filters. I know from long experience of sampling air in operating theatres that fungal contamination of operating theatre air is occasional and sparse unless there is a fault such as those described above. Significant fungal contamination in the outdoor air, the air that these AHUs take in, is the norm.]

21. Hypothesis 2 Outside Air source

A This is detailed in the Summary of the report as “Wards 4C and 6A had F7 standard air filters but did not have HEPA filters therefore would allow through a percentage of C. neoformans spores if present in the outside air”. Whether the presence of what were reported to be modest accumulations of pigeon droppings affected the microbiological quality of the plantroom air remain in question. What I do not see as being in question is that the air in the plantrooms is derived from outdoor air and so would substantially reflect the microbiological quality of the outdoor air. I consider that my response to Hypothesis 1 applies equally to Hypothesis 2.

22. Hypothesis 3 Lack of protective Isolation

A This is given in the main body of the report as “The possibility that unfiltered air from the Plant rooms could, via mechanical or electrical risers and or service voids, get into the rooms/wards where the ‘at risk’ patients were and an explanation of the varying degrees of the ‘lack of control’ of air movements around the entrances and exits of 6A, 4C and even 4B.” One of the problems in addressing this is the lack of a definition of “protective isolation”. There is one table (“Table 3: Airborne protective facilities”) giving some guidance on how to achieve what might be termed “protective isolation” in the current Scottish healthcare ventilation guidance (SHTM 03-01) but this was issued in 2022. I have searched on that term in the previous SHTM 03-01 published in 2014 and found no matches. My definition of “protective isolation” would be a ventilation system that ensures that 100% of every breath a patient takes has passed

through a filter that ensures removal of all fungal spores. This would be achieved by passing the supply air through a HEPA or EPA (recent reclassification of the 3 previous lowest HEPA grades) filter in an AHU designed for specialist healthcare application (see my comments on Hypothesis 1) and ensuring the rate of air supply in the room(s) supplied substantially exceeds the extract rate. The excess supply air passes outwards through all the inevitable gaps in the room (e.g. poorly sealed covers on risers & voids, the door undercut, gaps around pipe or cable entry points etc.). If air is passing outwards, it means that unfiltered air in surrounding areas cannot pass back into the room through those gaps. Thus all the air present has that which has passed through the filter system in the supply mechanism. There can be no opening windows. I think this partially coincides with the definition quoted above from the main body of the report. My recollection is that the form of protective isolation I detailed above was only present in ward 4B patient rooms in the QEUH areas the investigation addressed. If a patient were assessed as being susceptible to infection by inhalation of airborne fungi, they would be protected whilst in a room ventilated to this strategy. I am not qualified to make that assessment of patient susceptibility.

23. Hypothesis 4 Cylinder Room

A This is summarised as “Unfiltered (outside air) circulating in the cylinder room (medical gas store) near PICU entered the patient room ….” with the qualification “when the case-patient was in this room it was a Positive Pressure Ventilated Lobby Room (PPVL)”. The ventilation strategy of a PPVL isolation room is that a high volume of air is mechanically supplied to the lobby of an isolation suite comprising a lobby, a patient bedroom and an ensuite (i.e. integral) shower/toilet room. The air supplied to the lobby then flows in two directions – part of it flows out into the corridor, part of it flows into the patient bedroom. This intended to create a barrier to air from the corridor entering the patient bedroom. The air from the lobby is intended to flow in a circular manner around the patient bedroom, collecting airborne contamination as it does so before being drawn into the shower/toilet room from which air is extracted. This strategy is meant to provide both source and protective isolation. I have reservations about the ways

in which this concept functions. “Protective isolation” as discussed under Hypothesis 3 involves the provision of highly filtered air as the only air existing in the patient room. The lobby was “not ventilated with HEPA filtered air” but assuming this was F7 filtered air, that is likely to have a high degree of removal of fungal spores. That air then flows into the patient room, itself with nil or minimal ventilation before being drawn into the shower/toilet room. The patient bedroom is described as “neutral pressure”, but in this case that does not mean zero pressure but neither intentionally positive nor intentionally negative pressure; it will inevitably and randomly be one or the other. This means that, if negative, air will be drawn into the room from surrounding areas such as through pipe and cable entry points, poorly sealed service voids and any bed door (a door directly into the patient room from the corridor). Such air could carry contamination that may be a risk to highly immunocompromised patients – see comments on Hypothesis 3.

Note: There seems to be confusion in the draft of the report I was passed as final which says “The PPVL room is essentially trying to achieve the best of both worlds i.e., the room is ventilated itself, but the lobby is under negative pressure to both the patient room and the ward corridor, with air being pulled in and extracted from the room and the ward corridor itself”. This is not the PPVL (positive pressure ventilated lobby) room outlined in the Scottish guidance “In-patient accommodation - supplement 1 - Isolation facilities in acute settings (SHPN 4 sup 1)”, in particular in paragraph 4.4 “The entry lobby is to be at +10 Pascals with respect to the corridor” and “Table 1: Isolation Suite – Ventilation Parameters”.

I am unaware of any particular ventilation strategy for the PICU as a whole. If this is the case, contaminated air could enter the PICU from multiple routes which include, but be addition to, that which could enter via the cylinder room. Thus if the PICU PPVL patient room were under negative pressure, air entering the PICU via the cylinder room could be a source of outside air contamination. However, it is probably that this would be a minor component of air in the patient room, most of it coming from that mechanically supplied to the lobby then

flowing into the patient room. It is unlikely that air specifically from the cylinder room would be the only source of unfiltered air in the PICU main space, with air leaking in to the PICU from a variety of sources, examples given above.

24. Hypothesis 5 - Helipad

A This is “That the down draft from Helipad was aerosolising cryptococcal spores from pigeon guano dust into the air intakes and thence the AHUs providing ventilation into the patient areas.” Part of the approach to this was via a computational fluid dynamics (CFD) analysis of airflows during helicopter activity. I have no expertise in CFD but see it as a precise mathematical modelling that can be based on input data that are approximate and sporadic (i.e. the known unknowns can be approximations and the unknown unknowns are omitted]. Having said that, my views in the draft report are given as “Peter Hoffman stated it is unlikely to have been a build-up of aerosolisable material e.g., pigeon faeces as it would be regularly scoured by the helicopter”. With regular helicopter take- offs and landings, either soiling materials would be firmly adherent to surfaces and so no mobilizable by the vigorous air movements or they would be removed on each take-off/landing with no chance to build up.

25. Hypothesis 6 -Specimen transport POD

A This is “AKA the ‘pneumatic tube system’. This system is used to move specimens from wards to labs (and back the other way) via compressed air drawn from either the Plant room (PR 31 – not a PR on Level 12) or the ward area. These PODs then discharge the air into the ceiling void above Ward Treatment Rooms (on return to them).” I am quoted in the report as “PH [Peter Hoffman] view: ‘Felt that a small amount of unfiltered air coming into a Prep/Treatment room would have little effect on the air quality in a patient room.’ ‘He thought that this was an insignificant source if the C. neoformans was getting to patients by the air.’ ”. I consider that to reflect my view accurately.

26. Hypothesis 7 Dormancy reactivation

A This is “Dormacy/Latency/ Re-activation, and therefore often an unknown time of Exposure (and therefore an unknown Incubation Period) This Hypothesis

suggests that both patients could have been exposed to C. neoformans prior to their QUEH/RHC hospital admission …… Hypothesis Number 7 is therefore possible, in both patients, that they acquired the Cryptococcus neoformans prior to their admission to the QUEH/RHC, but: highly likely to be impossible to prove." This is not an area in which I have any expertise. I cannot comment on its likelihood.

27. Were any other hypotheses considered? If so what were they and why were they discounted?

A I have no recollection of other hypotheses being considered.

Dr John Hood's – Refer to Draft Cryptococcus Report

Dr Hood authored a report, although this was not adopted by the sub-group as a whole.

28. Insofar as not already dealt with by your answers to the Hypotheses section above, what is your opinion on Dr Hood's report. To what extent do you agree/ disagree with his conclusions?

A I consider the report to be a fair evaluation of a relevant range of possibilities. I consider that the report often contains excessive, marginally relevant detail that could obscure and distract from more coherent logic pathways. I would not refer to the likelihood assigned to individual hypotheses as "conclusions" but more as assessments of possibilities. That definitive conclusions were missing is perhaps a realistic reflection of abilities to establish what precisely occurred in each case of patient acquisition of Cryptococcus.

29. In general, what were the opinions of the other group members on the John Hood report? Did anyone else agree with it?

A I was unaware of disagreements from other group members with the report when I was involved with it.

30. Did you submit any written comments to the report? If so, please provide a copy.

A I retired on the 22nd October 2021. I did not submit written comments on the report.

31. To your knowledge was the report adopted by the Greater Glasgow and Clyde Health Board as a whole, or did it remain the opinion of Dr John Hood alone?

A I have no knowledge of this.

Link to the Environment

32. (Again, insofar as not answered in Hypotheses section) what is your own opinion on the link between Cryptococcus and the ventilation system in Do you consider that it is more likely than not that the Cryptococcus came from the ventilation system? If so why or why not?

A I addressed this as fully as I am able in the Hypotheses section above.

Additional Cryptococcus Cases

33. The Inquiry's investigations have revealed another 4 cases of Cryptococcus within QEUH. Were you aware of this? If so, how did you come by this information?

A I was unaware of this.

34. Can you comment on this? Does it change to any extent your answers to the Hypotheses section or Link to environment section above?

A I have no comment on this. It does not change my answers to the Hypotheses section or Link to the environment section to any extent.

Aftermath - Events After the Group Disbanded

35. What is your understanding of what GGC did with Dr Hood's report? Are you aware any practical measures taken as a result of it?

A I have no knowledge of what GGC did with Dr Hood's report, nor of any practical measures taken as a result of it.

36. If so what is your opinion of them?

A See my answer to question 35.

37. Is there anything further that you want to add that you feel could be of assistance to the Inquiry?

A I was asked to provide a witness statement to the Inquiry on 12th June 2024 and given access to a bundle comprising two documents: 1) A collection of minutes of the Cryptococcus sub-group and 2) a short string of emails from October 2021. No cryptococcus report was provided, so I worked from one dated 5th April 2022 sent to me by Sandra Devine, DIPC GGC on the 21st August 2023 as "… a final redacted (patient case reviews removed) copy of the report from the Cryptococcus Incident Management Team Expert Advisory Sub-Group". I assumed that was the report I should be using. It was only when my witness statement was formatted by the Inquiry Team on the 12th August 2024 that I became aware that my bundle should have comprised (Appendix A) "A45379981 – Bundle 9 – QEUH Cryptococcus Sub-Group Minutes & A44348959 – Draft Cryptococcus Report". The absence of the Draft Cryptococcus Report from my bundle was notified to the Inquiry Team on 16th August. I was notified on 19th August that my bundle had been updated to include a different draft report, dated 7th October 2021, by an email with the wording "I have also uploaded a copy of the Crypto report (screenprint 1) into your connect workspace if you need to review your statement further. As this is a new document I have altered the object ID number and heading, to reflect, in Appendix A". This left little time to review my statement if I were to return it in a timely manner. As far as is thus possible, I have reviewed my statement in accordance with the different report version and see it as accurate where it

refers to it directly. I apologise from any minor discrepancies due to report versions that may inevitably remain.

Declaration

38. I believe that the facts stated in this witness statement are true. I understand that proceedings for contempt of court may be brought against anyone who makes, or causes to be made, a false statement in a document verified by a statement of truth without an honest belief in its truth.

39. The witness was provided access to the following Scottish Hospital Inquiry bundles/documents for reference when they completed their questionnaire/ statement (Appendix A).

40. The witness verbally introduced or provided the following documents to the Scottish Hospital Inquiry for reference when they completed their questionnaire statement (Appendix B).

Appendix A

A45379981 – Bundle 9 – QEUH Cryptococcus Sub-Group Minutes

A49682615 – Crypto Report Draft October 2021 (003)

Appendix B

A49595979 – CV – Peter Hoffman

CURRICULUM VITAE

Peter **HOFFMAN**

This is my last full CV from 2010 with significant updates up to retirement in 2021 added immediately before the publications list

Present post

Consultant Clinical Scientist in the Infection Control Unit, Laboratory of Healthcare-associated Infection, Centre for Infections, Health Protection Agency (this continued into Public Health England and the UK Health Security Agency)

Qualifications

B.Sc. (IIii) Microbiology, University of Bristol 1976
Honorary Diploma in Hospital Infection Control (HonDipHIC), University of London 1999

Registered as a Clinical Scientist with the Health Professions Council

Committees and Working Groups

Department of Health, Advisory Committee on Decontamination Science and Technology. Member 2010 – present.

Department of Health, Steering Group for isolation facilities in acute healthcare redrafting Health Building Note 04, Supplement 1. 2010 – present.

Hospital Infection Society, Working Group on the facilities required for minimally invasive surgery and minor procedures. 2009 – present.

Rapid Review Panel (as an Arms Length Body) 2009 – present.

Department of Health, Steering group for drafting Health Building Note 00-09 Infection Control in the Built Environment. 2008 – present.

Department of Health, Steering Group for drafting Health Technical Memorandum 01-01, Decontamination of Reusable Medical Instruments, Parts B, C and D. 2009 – present.

Department of Health, Dental Decontamination Survey Board. 2009 – present.

Department of Health, Steering Group for drafting Health Technical Memorandum 01-06 Decontamination of Flexible Endoscopes, 2008 – present.

Department of Health, Steering Group for drafting Health Technical Memorandum 07-01 Safe Management of Healthcare Waste, 2008 - present

International Federation of infection Control, Special Interest Group on infection control and hospital buildings, 2007 – present.

Advisory Committee on Dangerous Pathogens, Clinical Care Subcommittee. 2007 – present.

Department of Health, Steering Group for drafting Health Technical Memorandum 01-07, Decontamination of Healthcare Laundry, 2007 – present.

British Standards Institution CH/216 Chemical Disinfectants and Antiseptics. 1994 – present.

Department of Health, Uniforms and Infection Control Working Group, 2006.

Department of Health, Engineering and Decontamination Advisory Committee into the Decontamination of Surgical Instruments Including Prion Removal (ESAC Pr). 2007 – 2010. (Committee disbanded and reformed as the Advisory Committee on Decontamination Science and Technology; membership continued)

Hospital Infection Society Operating Theatre Working Group - 1999 – 2005 (Chair Prof H Humphreys); lead member Commissioning and Monitoring Subgroup; member Operating Theatre Practices & Rituals Group.

Hospital Infection Society. Rinse water for heat-labile endoscopy equipment 1999 – 2002.

Department of Health/Health Protection Agency UK Endsocope Task Force and Expert Advisory Sub-group. 2004 – 2005.

British Society for Antimicrobial Chemotherapy. Burns Working Group. 2002 – 2004.

NHS Purchasing and Supply Agency. Clean Hospitals Program Advisory Group 2002 – 2003.

NHS Purchasing and Supply Agency. Near-patient alcohol hand disinfectant specification advisory group 2003.

UK Working Group on Body Piercing Creation of a Standardised Qualification. 2001 – 2003 (Chair Dr B Walsh).

London Specialised Commissioning Group. Paediatric Bone Marrow Transplant/Oncology Review Group. Review of Infection Control Aspects of Tertiary Care in South-East England. (Reviewers: PN Hoffman and S Pedler) 2004.

Health Protection Agency. Multi-resistant Acinetobacter Working Group 2003 – 2005.

NHS Estates Agency health Technical Memorandum 2025 (Ventilation in Healthcare) Refresh and rewrite advisory group. 2004 – present.

Health Protection Agency/Department of Health. Rapid Review Panel. 2004 – 2009 (disbanded in that form in 2009, continued membership as an Arms Length Body)

HABIA Health Safety & Science Forum. Member 2005 - 2007

Ambulance Infection Control Network. Member 2005 - 2007

NHS Estates Advisory Group on drafting of healthcare ventilation guidance Health Technical Memorandum 2025. 2004 – 2007

Member of interdisciplinary working group to produce the curriculum for a national qualification on infection control in body piercing and tattooing (convened by Kingston & Richmond Health Authority, Dr B Walsh). 2001 – 2003.

British Standards Institution TCI/082/01 Industrial Laundering 1999 – 2008 (committee disbanded).

Member of Central Sterilising Club working party on re-use of single-use instruments (1993 - 1997)

Member of Central Sterilising Club working party on processing of healthcare laundry (1997 - 1998).

BMA Steering Group member for "A code of practice for sterilisation of instruments and control of cross infection" (report published 1989).

Member of Association of Port Health Authorities' Aircraft Subcommittee's Disinfection of Aircraft Working Party (1992 - 1995; reported 1995)

Member of NHS Estates Business Agency theatre linen specifications working party (1995 - 1996, reported 1996).

Grants

Hospital Infection Society major research grant ([redacted]). Brown DWG, Cheesebrough JS, Hoffman PN, Green J. Investigation of patterns of environmental contamination with small round structured viruses on hospital wards and the development and evaluation of decontamination procedures. 1998

Health Protection Agency R&D fund ([redacted]). Thompson G, Bennett A, Hoffman P, Davies A, Bonington A, Isalka B, Duffell E, O'Brien S, Macartney I, Turner A, Walker J, van Tam J, Phin N. The requirement for respirator use during an influenza pandemic. Investigations into whether medical procedures generate aerosols necessitating respiratory protection. 2009.

International consultancies

Short Term Consultant to Western Pacific Region of the World Health Organization – Beijing. June/July 2003. Preparation of a risk assessment of air conditioning and the transmission of SARS in domestic premises, public buildings and non SARS-risk

areas of hospitals, and guidance on the ventilation of SARS-risk areas of hospitals and fever clinics.

Short Term Consultant to Western Pacific Region of the World Health Organization – Beijing. May 2004. Preparation of a strategy for building decontamination following a laboratory escape of SARS virus and assisting in the incident investigation.

Auditor on the Egyptian hospital infection control audit 2005 in a national infection control audit organised by the Egyptian Ministry of Health and Population and the U.S. Naval Medical Research Unit (NAMRU 3).

International education

Invited lecturer on national Australian infection control course. Fremantle Hospital, Western Australia, 2003. This involved a series of lectures over one week to a group of about 30 medical and nursing healthcare workers from Australia.

Invited lecturer on the first Egyptian infection control program, organised by the Egyptian Ministry of Health and Population and the U.S. Naval Medical Research Unit (NAMRU 3). 2003 – 2005. This involved a series of lectures and practicals over one week to a group of about 40 senior medical and nursing healthcare workers from every govenorate (administrative region) of Egypt. Three such weeks occurred during 2003-5.

Invited lecturer to Juntendo University Medical School, Tokyo 2004. This involved a series of lectures over one week to a group of about 40 medical and nursing healthcare workers from within Juntendo Hospital and Medical School.

Invited lecturer on the Stellenbosch University's Diploma in Infection Control, hospital design module, run every two years at Tygerberg Hospital, Cape Town, from 2006 to the present. This involves a series of lectures, group projects, group discussions and site visits within Tygerberg Hospital and to other Cape Town hospitals. Each course has about 30 medical and nursing healthcare workers from around South Africa.

External Examiner, Diploma in Infection Control, Stellenbosch University, Republic of South Africa.

Invited lecturer on a study day ("Advances in epidemiological surveillance, prevention and control of hospital infection") at the Universita degli Studi de Molise, Campobasso, Italy in 2007.

National education commitments

University of Greenwich. Contributor of a unit to e-learning package on disinfection & sterilisation as a unit of an online M.Sc. in Biomedical Science. 2003 – 2005. This is a course aimed at non-medical healthcare staff (mostly biomedical scientists).

Lecturer and convener. Hospital Infection Society/Health Protection Agency. Diploma in Hospital Infection Control course, a required module for the Diploma in Hospital Infection Control, 1995 – present. This week-long course takes place twice a year. The day I convene is on hospital hygiene and I coordinate myself and three other presenters, adjusting the content in line with student feedback and my own assessment of the day.

Course organiser, lecturer and tutor. Engineering Aspects of Infection Control (a one week residential course) and required module for the Diploma in Hospital Infection Control. Eastwood Park Training Centre. 1996 – present. I am the sole organiser of this unique course. It is intended to equip senior infection control practitioners with the ability to comprehend the principles and practices underpinning aspects of infection control they are normally unfamiliar with, but which are vital to infection control and will, in some emergency and outbreak situations, need a fundamental understanding. The course covers specialist ventilation (operating theatres and isolation rooms), endoscope washer-disinfectors, surgical instrument washer-disinfectors, hospital food hygiene, healthcare laundry, sterile supply departments and steam sterilisers. The lectures and practicals (Eastwood Park has unique teaching laboratories for washer-disinfectors, specialist ventilation and steam sterilisers) are by specialist engineers and there are site visits (kitchen, laundry and sterile supply department) hosted by the facility managers. I organise the material to be taught in these lectures and practicals and am in constant attendance during teaching, site visits and practicals and in effect function as a co-presenter, highlighting the infection control significance, or lack of it, of the engineering principles. This is further explored in evening discussion sessions where I, both with and without co-presenters, lead group discussion on the application of engineering principles in a variety of infection control scenarios. This course has undergone significant changes since its inception in 1996, both as a result of attenders' feedback and my perception of requirements gleaned from my wider role in infection control. The course generally has a range of nationalities attending with about two-thirds from the UK.

University of London, Diploma of Hospital Infection Control – Examination Committee 2001 – present.

University of London, Diploma of Hospital Infection Control – Course Committee 2001 – present.

University of London. Examiner on Diploma of Hospital Infection Control 2003 – 2006.

Lecturer. M.Sc. in Clinical and Public Health Bacteriology. London School of Hygiene & Tropical Medicine. 1998 – present.

Lecturer. M.Sc. in Clinical Microbiology. Royal London Hospital. 2003 – present.

Lecturer on the Diploma in Infection Control Nursing at London South bank University. Two lectures each year: "Applied Microbiology" and "Decontamination". Annually since 2006.

Health Protection Agency internal education commitments

Lecturer on "Disinfection and sterilisation" and practicals on hazardous spill clearance and laboratory suitability for fumigation to specialist laboratory staff as part of an HPA training for workers in high containment laboratories.

Lecturer on "Disinfection and sterilisation" to trainee Biomedical Scientists at the HPA Centre for Infections.

Teaching commitments – examples from the last 5 years (as of 2010)

2005

"Training the Trainers" – a one week series of talks and practicals as part of an Egyptian Ministry of Health and Population and the US U.S. Naval Medical Research Unit (NAMRU 3). 2003 – 2005. This involved a series of lectures and practicals over one week to a group of about 40 senior medical and nursing healthcare workers from every govenorate (administrative region) of Egypt. (See above under International Consultancies).

Lecturer and convener on Hospital Hygiene day on the core Diploma in Hospital Infection Control taught module. I both present on this day and organise the teaching of three co-presenters. Those attending are 25 Consultants and Specialist Registrars in Medical Microbiology and senior Infection Control Nurses. Two such courses that year.

Lecture on "Sterilisation and disinfection" to infection control link practitioners at the Chelsea & Westminster Hospital, London. These are healthcare staff who act as infection control practitioners within their individual specialities. Three such presentations that year. About 20 attendees per lecture.

Lecture on "Design and ventilation in healthcare facilities" at North Middlesex Hospital. This was mainly to engineers and Estates Department people, but infection control and those working in relevant departments such as operating theatres; about 30 attendees.

Lecture "Ventilation and infection control". M.Sc. in Clinical Microbiology. Royal London Hospital. About 30 Specialist registrars and Biomedical Scientist attended.

Lecture on "Decontamination issues" at Whiston Hospital, Liverpool. This was to infection control, ward and specialist department nursing and medical staff and Estates department staff; about 50 attendees.

Course organiser, lecturer and tutor. Engineering Aspects of Infection Control (a one week residential course) a required module for the Diploma in Hospital Infection Control.. Eastwood Park Training Centre. See above under "national training commitments". Fifteen attendees, mostly Consultant Medical Microbiologists and Specialist Registrars with some more experienced Infection Control Nurses. Two such courses run this year.

Lecture “Airborne infection transmission outside operating theatres” at the Institution of Mechanical Engineers, London. Those attending were mainly members of the Institution – Mechanical Engineers and those involved in mechanical aspects of hospital design, as well as manufacturers of ventilation systems and some Consultant Medical Microbiologists. About 150 attendees.

Lecture “Disinfection and sterilisation in healthcare” to Directors and Deputy Directors of Chinese regional Centres for Disease Control as part of the Chinese Infectious Diseases Mission to the UK to access the UK’s experience in building hospitals and laboratories. Four principal attendees plus administrators and translators.

Lecture “Hospital Hygiene” on the M.Sc. in Clinical and Public Health Bacteriology. London School of Hygiene & Tropical Medicine. About 25 attendees, mostly Specialist Registrars and Biomedical Scientists, from UK and overseas. This is an annual commitment.

Lecture “An exploration of recent endoscope decontamination failures” at the Health Protection Agency annual conference. About 60 attendees from the spectrum of HPA scientific and medical staff.

2006

Lecturer on the Diploma in Infection Control Nursing at London South Bank University. Two lectures each year: “Applied Microbiology” and “Decontamination”. About 20 Infection Control Nurses attended.

Course organiser, lecturer and tutor. Engineering Aspects of Infection Control (a one week residential course), Eastwood Park Training Centre. DipHIC module: details as before.

Lecturer and convener. Hospital Infection Society/Health Protection Agency. Diploma in Hospital Infection Control course. DipHIC module: details as before.

Lecture on “Sterilisation and disinfection” to infection control link practitioners at the Chelsea & Westminster Hospital, London. Details as before.

Lecture “Hospital Hygiene” on the M.Sc. in Clinical and Public Health Bacteriology. London School of Hygiene & Tropical Medicine. Details as before.

Lecture “An exploration of recent endoscope decontamination failures” at the annual meeting of the Central Sterilisation Club. The Club is a multidisciplinary group comprising medical Microbiologists, scientists, engineers, Infection Control nurses, SSD managers and industry. It is the UK’s oldest infection control society and had opinion formers in a variety of disciplines. About 120 attendees.

Lecture “Ventilation and infection control”. M.Sc. in Clinical Microbiology. Royal London Hospital

Lecturer on the Stellenbosch University's Diploma in Infection Control, hospital design module, run every two years at Tygerberg Hospital, Cape Town. This involves a series of lectures, group projects, group discussions and site visits within Tygerberg Hospital and to other Cape Town hospitals. About 30 medical and nursing healthcare workers from around South Africa attended.

Lecture "Linking infection spread to hospital design and engineering" at the 6th International Meeting of the Hospital Infection Society, Amsterdam. Those attending were Medical Microbiologists, Infection Control Nurses and scientists from around the world. About 80 attendees.

Lecturer "Infection control and endoscope decontamination" at the annual meeting of the Hungarian Infection Control Society. This was a lecture to about 120 delegates at a comparatively newly-formed infection control society.

Workshop presenter "Water, air and other environmental factors influencing infection control" at the 7th Congress of the International Federation for Infection Control, Stellenbosch, South Africa. Those attending were Medical Microbiologists, Infection Control Nurses, engineers and scientists from around the world with a mainly African focus. About 100 attendees.

Lecturer on a training day on specialist healthcare ventilation at Southmnead Hospital, Bristol. This was a bespoke training day where I was the sole lecturer on all aspects of ventilation and infection control from basic principles to advanced applications. Those attending were about 15 infection control specialists from the Bristol area.

Lecture "Operating theatres: Design, ventilation and testing" at a joint meeting of Microbiologists and Infection Control Nurses of Northern Ireland. About 15 medical Microbiologists and Infection Control Nurses attended.

Lecture "Tuberculosis, infection control and hospital design" at the seminar Problematic Pathogens In Health Care Settings, Birmingham. About 30 medical Microbiologists attended.

Lecture "Principles of isolation" at a Bristol and Bath Infection Control Nurse study day. About 60 infection control and other nurses attended.

2007

Lecturer on the Diploma in Infection Control Nursing at London South Bank University. Details as before.

Course organiser, lecturer and tutor. Engineering Aspects of Infection Control (a one week residential course), Eastwood Park Training Centre. DipHIC module: details as before.

Lecturer and convener. Hospital Infection Society/Health Protection Agency. Diploma in Hospital Infection Control course. DipHIC module: details as before.

Lecture on “Sterilisation and disinfection” to infection control link practitioners at the Chelsea & Westminster Hospital, London. Details as before.

Lecture “Hospital Hygiene” on the M.Sc. in Clinical and Public Health Bacteriology. London School of Hygiene & Tropical Medicine. Details as before.

Lecturer. “Ventilation and infection control”. M.Sc. in Clinical Microbiology. Royal London Hospital. Details as before.

Lecture “Tuberculosis, infection control and hospital design” at the seminar Problematic Pathogens In Health Care Settings, Birmingham. Details as before.

Lecture “Chemical disinfection in laboratories” at the 10th Annual Conference of the European Biosafety Association in Heidelberg. This was part of a pre-conference educational workshop. About 50 biosafety professionals attended.

Lecturers “Principles of infection control”, “The hospital environment” and “Disinfection” on a study day (“Advances in epidemiological surveillance, prevention and control of hospital infection”) at the Universita degli Studi de Molise, Campobasso, Italy in 2007. The audience was about 50 medical and nursing workers at the university and hospital in Campobasso. Also a tutorial on SARS and infection control to a postgraduate group (about 10) as a separate session.

Talk “Research and policy” at a workshop “Airpath”, an engineering based international group coordinated from University College, London exploring infection transmission by outdoor air. About 20 engineers, modellers, microbial ecologists and medical microbiologists attended.

Workshop presenter “Hospital construction: what is important for infection control?” at the 8th Congress of the International Federation of Infection Control, Budapest. Those attending were Medical Microbiologists, Infection Control Nurses, scientists, engineers and healthcare designers, about 80 people.

Lectures “Isolation” and “Infection control rituals in the operating theatre” to an Infection Control Nurse study day, East Surrey Hospital. About 40 Infection Control Nurses attended.

Lecture “Decontamination” to an Infection Control Nurse study day, Kingston. About 80 Infection Control Nurses attended.

Lecture “A microbiological view of ventilation for highly immunocompromised patients” at an isolation room study day, Erasmus University, Rotterdam. About 60 clinicians, engineers and nurses attended.

2008

Lecturer on the Diploma in Infection Control Nursing at London South Bank University. Details as before.

Course organiser, lecturer and tutor. Engineering Aspects of Infection Control (a one week residential course), Eastwood Park Training Centre. DipHIC module: details as before.

Lecturer and convener. Hospital Infection Society/Health Protection Agency. Diploma in Hospital Infection Control course. DipHIC module: details as before.

Lecture on "Sterilisation and disinfection" to infection control link practitioners at the Chelsea & Westminster Hospital, London. Details as before.

Lecture "Hospital Hygiene" on the M.Sc. in Clinical and Public Health Bacteriology. London School of Hygiene & Tropical Medicine. Details as before.

Lecturer. "Ventilation and infection control". M.Sc. in Clinical Microbiology. Royal London Hospital. Details as before.

Lecture "Tuberculosis, infection control and hospital design" at the seminar Problematic Pathogens In Health Care Settings, Birmingham. Details as before.

Lecture "Chemical disinfection in laboratories" at the 11th Annual Conference of the European Biosafety Association in Florence. This was part of a pre-conference educational workshop and was a repeat of the over-subscribed workshop at EBSA Heidleberg in 2007. About 50 biosafety professionals attended.

Lecture "Controlling airborne infections: what do Infection Control Teams need to know?" at the Hospital Infection Society's Spring meeting. About 120 Consultant Medical Microbiologists and Specialist Registrars attended.

Lecturer "The Environment: when is it important in infection control?" at an Infection Prevention Society National Study Day in Infection Prevention and Control in the Community. About 150 hospital and community Infection Control Nurses attended.

Talk "Outdoor environments and hospital-associated infections" at a workshop ("Airpath") an engineering based international group coordinated from University College, London exploring infection transmission by outdoor air. About 20 engineers, modellers, microbial ecologists and medical microbiologists attended.

Lecturer on the Stellenbosch University's Diploma in Infection Control, hospital design module, run every two years at Tygerberg Hospital, Cape Town. This involves a series of lectures, group projects, group discussions and site visits within Tygerberg Hospital and to other Cape Town hospitals. About 30 medical and nursing healthcare workers from around South Africa attended.

Lecture "Respiratory protection in healthcare – an infection control perspective" at the 14th International Conference of the International Society for Respiratory Protection, Dublin. About 200 attended, mainly occupational hygienists, physicists, industrial hygienists, modellers, testers, standards setters and manufactures.

Lecture "Sterilisation and disinfection" at Bart's and the Royal London Hospital. About 40 Infection Control Link Nurses attended.

Lecture “Sterilisation and disinfection in special treatments” in a study day Health, Safety and Hygiene in Special Treatments. Those attending were Environmental Health Officers, Community Infection Control Nurses, tattooists, body piercers, and beauticians. About 60 people attended.

2009

Lecturer on the Diploma in Infection Control Nursing at London South Bank University. Details as before.

Course organiser, lecturer and tutor. Engineering Aspects of Infection Control (a one week residential course), Eastwood Park Training Centre. DipHIC module: details as before.

Lecturer and convener. Hospital Infection Society/Health Protection Agency. Diploma in Hospital Infection Control course. DipHIC module: details as before.

Lecture on “Sterilisation and disinfection” to infection control link practitioners at the Chelsea & Westminster Hospital, London. Details as before.

Lecture “Hospital Hygiene” on the M.Sc. in Clinical and Public Health Bacteriology. London School of Hygiene & Tropical Medicine. Details as before.

Lecturer. “Ventilation and infection control”. M.Sc. in Clinical Microbiology. Royal London Hospital. Details as before.

Lecture “The environment: when is it important in infection control” to an infection control study day, Chichester. About 60 ward and Infection Control Nurses attended.

Lecture on “Sterilisation and disinfection” to infection control link practitioners, Croydon; about 30 attendees.

Lecture “Reducing infection transmission: the solution must match the problem” at a NHS Innovations Village study day by Mid-Essex Hospital Services. This program uses “Showcase Hospitals” as practical areas to assess novel technologies in combating healthcare-associated infections. This talk was to infection control practitioners, ward staff, specialist department staff and administrators in Showcase Hospitals as well as those designing and manufacturing the technologies used. About 100 people attended.

Lecture “Decontamination” as part of an Infection Control Nurse study day at St Peters Hospital, Chertsey. About 60 nurses attended.

Lecture “Infection control and the hospital environment” to a Hospital Infection Society study day for trainees in microbiology. This was the first such HIS trainee day. About 50 trainees (mostly SpRs) attended.

Lecture “Decontamination in practice” at the annual conference of the Infection Prevention Society. About 150, mostly Infection Control Nurses, attended.

Society membership

Hospital Infection Society
Central Sterilising Club
Infection Prevention Society (Associate member)

Journal commitments

Assistant Editor – Journal of Hospital Infection

On the International Education Council of the International Journal of Infection Control

Added 2024:

Awarded British Standards Institution International Standard Maker 2018 for contributions to EN 17169:2020 Tattooing. Safe and hygienic practice

Awarded Brendan Moore Award 2020 from the Infection Prevention Society

Awarded Honorary Membership of the Healthcare Infection Society 2020

Specialist Editor of the Journal of Hospital Infection and frequent reviewer for that journal – 442 submissions reviewed as of July 2024, 24 reviewed for its sister journal Infection Prevention in Practice plus a few for other journals.

Publications to 2020

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Scottish Hospitals Inquiry
Witness Statement of
Dr Emilia Crighton

Introduction

1. My name is Dr Emilia Mihaela Crighton. I am currently employed by NHS Greater Glasgow and Clyde ('NHS GGC') as Director of Public Health.

Work Experience

2. I am a doctor with full GMC registration and licence to practise, GMC 4407584. I gained entry to the GMC Specialist Register on 3rd May 2004. I have been a Consultant in Public Health Medicine since May 2004 initially in NHS Argyll and Clyde (NHS AC) and then NHS GGC following NHS AC dissolution in 2006. Over that period had different additional leadership and managerial roles like lead clinician for screening services (2006-2012); clinical director (2005-2006); head of health services section (2012-2022); interim director of public health (2015-2016 and 2022-2023); director of public health (since 2023). Prior to training in public health medicine (1999-2004; employed by NHS GGC and based in NHS AC), I held trainee senior house officer or registrar posts in orthopaedics; accident and emergency; general medicine covering different specialities, including infectious diseases and haematology in Raigmore Hospital, Inverness (1994-1997) and Dundee Teaching Hospitals, Dundee (1997-1999).

3. I have served as Convenor of the Faculty of Public Health in Scotland Committee providing national professional leadership and advocating for changes to public health policy.

4. I have experience in leading and supporting the investigation and management of health protection cases and incidents, including major incidents due to CBRN threats (chemical, biological, radiological and nuclear materials). I have strong leadership; analytical; problem solving; influencing; and communication skills and a track record of identifying and implementing solutions to complex population health challenges.

5. Academic and professional qualifications: Baccalaureate (Romanian; Mathematics; Physics; Informatics); Doctor Medic (University of Medicine and Pharmacy Cluj, Romania); Master of Public Health (Glasgow University); Fellow of the Faculty of Public Health (UK); Fellow of the Royal College of Physicians (Edinburgh and Glasgow).

6. The Scottish Hospitals Inquiry (the 'Inquiry') has asked me to provide a written statement in preparation for the Glasgow III hearings commencing later this year in relation to my experiences during my time at NHS GGC.

7. The inquiry have asked me to review the following documents:

- the circumstances of my appointment as Chair of the IMT - Gram Negative Bacteraemia (GNB) – Paediatric Haem Onc, - meeting 23 August 2019 (**Bundle 1, Document 78, page 348**)
- my involvement with the SBAR dated 25 August 2019 - Ward 2A Gram Negative Bacteria (**Bundle 4, Document 41, page 165**)

8. This statement seeks to provide that information to the best of my recollection.

NHS GGC Role and IMT

Appointment as chair of IMT

9. On 22 August 2019 I was asked by my line manager Dr Linda de Caestecker, the then Director of Public Health, if I could help the next day, 23rd of August 2019, and chair the IMT meeting for Gram Negative Bacteria in paediatric haemato oncology; the Medical Director Dr Jennifer Armstrong asked for help from public health.

10. On 23rd August 2019 I took the IMT chair role; the previous chair, Dr Inkster, attended the IMT meeting. **(Bundle 1, Document 78, page 348).** During the meeting I witnessed a quite hostile tone of challenge from a senior clinician and Annette Rankin (Health Protection Scotland representative) towards Sandra Devine when she advised the group about the background to seeking a new chair and the advice previously received about the IMT being chaired by a consultant in public health medicine.

11. During the meeting I noticed the clinicians' challenge and frustration about the collective inability to have stopped new infections and their expressed need for a safe environment to treat high risk patients. I took these as a sign of their deep care for the welfare of their patients and of the strong desire to bring the incident under control.

12. In my experience chairing IMT meetings requires generic chairing skills that are applied to the specific situation of an incident. Given the nature of public health work I am used to bringing together different perspectives in complex situations to generate solutions. Enabling respectful, civil deliberation is essential to the working of a group and its ability to make sound decisions, especially when working in complex circumstances.

Background – source of infections

13. From both my hospital and public health professional, and personal, experience I am fully aware of the potentially devastating impact infections can have on the life of an individual and their families, irrespective of the source of their infection.

14. At the time of taking the IMT Chair on 23rd August 2019, from my clinical experience I was fully aware of the increased susceptibility to infections among this immunocompromised group of patients. We live in a microbiological world, carry microorganisms on and in our bodies and are continuously exposed to microorganisms in the air; water or surfaces all around us.

15. Looking for the potential source of infection is part of the clinical skills; often times a source is not obvious and a root cause analysis could be carried out. Identifying the source and mode of transmission accurately not only enables effective control measures to prevent other people from getting the infection but avoids implementation of unnecessary and potentially harmful control measures.

16. Identifying sources of infection through epidemiological investigation is a basic public health skill that dates back to mid-19th century, enriched by developments in research methodology; statistics; microbiology; genomics; metagenomics. A key challenge in epidemiology has been the establishment of causality links, beyond observed associations that could be due to chance; bias; or confounding; or the cognitive bias of “clustering illusion”.

17. Phylogenetic fingerprinting using whole genome sequencing (WGS) together with epidemiological and environmental investigation has been identified by the European Centre for Disease Prevention and Control (ECDC) as a means to deliver ultimate resolution for detecting and analysing transmission routes and tracing sources of infection. I was aware that the Glasgow laboratories

have developed bioinformatics capability to carry out WGS as a means to identify the linked infections in outbreak investigation, as used in the HIV outbreak in the City.

18. Investigating the source of infection is particularly important when there is an increase in the number of people infected with a specific micro-organism - that points to the possibility of a possible common source of infection; such instances would be considered a potential incident or outbreak.

19. Traditionally, when managing incidents due to infections, we define “the case” – i.e. who would be part of an incident; formulate a hypothesis about potential source of infection; the route of transmission (airborne; person-to person contact) and portal of entry in the body. Bearing in mind the infection control chain, control measures are proposed to interrupt the chain and stem out clinical infections.

IMT investigations

20. On 23rd August 2019 the IMT members discussed the case definition and agreed to include any patient with bloodstream infection (BSI) due to organisms commonly found in the environment and who were in contact with Ward 6a or supporting services within the last month; there was no restriction to any specific bacteria; this allowed for any such type of infection to be investigated.

21. At that time there were a number of control measures already in place to reduce exposure of the patients to organisms commonly found in potable water – chlorine dioxide and point of use filters; or air – HEPA filters, linked to the prior hypothesis that the source of infections was the hospital environment. Patients were decanted into Ward 6A from Ward 2A; and were receiving chemoprophylaxis to prevent infections. New patients requiring chemotherapy were diverted elsewhere in Scotland.

22. A large proportion of the IMT meetings was dedicated to tracking the proposed environmental control measures. As new cases of infection occurred, in spite of the control measures, additional or alternative hypothesis named new potential environmental sources of infections like chilled beams; exposure to unfiltered water elsewhere; water leaks in Ward 6A kitchen; and additional control measures were proposed and implemented.

23. Route cause analysis was later proposed and carried out to look for common sources of infection or transmission. Additional possible sources of infection were considered.

24. The IMT also received reports of the enhanced supervision and hand hygiene audits, which are important links in infection prevention.

25. In support of the hypothesis, I sought epidemiological evidence to support the existence of an outbreak: two or more; or an excess above what would be expected, infections caused by the same bacteria that would be genetically the same. Epidemiological data presented by Dr Kennedy on 23rd August 2019 showed patterns of infection among the haemato oncology paediatric patients similar to those seen in Yorkhill hospital before the move to QEUH. **(Bundle 6, Document 27, page 95)**

26. The epidemiological data presented did not support the existence of an outbreak and there was a need to establish the norm of the expected rate of infections using both historical data and comparative data to units in Scotland or UK if possible; the analysis was commissioned from Health Protection Scotland. The analysis showed the local infection rates to be similar to those seen in other Scottish Units. As NHS GGC did not have an excess of infections compared to other Scottish units the existence of an outbreak was discounted.

27. Utilising the Glasgow laboratories capability to carry out whole genome sequencing Professor Leanord carried out the whole genome sequencing of the most common type of infection present - Enterobacter. The result showed the infections in different patients were not related to a common source or one another – meaning there was no outbreak and the most likely source of these infections was endogenous - the patient's own gut flora.

28. The root cause analysis (RCA) carried out to identify the reservoir of bacteria and the route of transmission highlighted the complex patient pathways as patients spent time outside NHS GGC environment as well. The RCA could not identify a common reservoir.

29. The combined findings from Health Protection Scotland report; Root Case Analysis; hand hygiene audits; water testing results and the implementation of estates work enabled the IMT to recommend the lifting of Ward 6A restrictions to treating new admissions on 14th November 2019. The epidemiological evidence would have allowed the reopening to admissions after the first meeting I chaired as I communicated to the Medical Director.

30. Based on objective evidence, the ward was positively declared microbiologically safe from 13th September 2019. The strongly held belief that the hospital environment was the source of patient infection required any proposed environmental controls to be implemented; additional, external analysis of epidemiological data; new tests like WGS; and ultimately clinicians' participation in the root cause analysis of infection for each patient and their understanding of infection chains and control.

31. A re-opening bundle covering ongoing surveillance; case investigation; escalation and reporting procedures was agreed together with additional resources.

32. The proposal was heard by the Chief Nursing Officer who agreed to it in November 2019 and nevertheless escalated NHS GGC Board to level 4 on infection control. I have no knowledge of the reasons behind the escalation decision.

33. As IMT chair I witnessed a group of colleagues from NHS GGC; Health Protection Scotland and later Scottish Government, come together to find solutions that ensured highest level of patient safety. In my view, the group evolved from having a narrow focus on a single issue – the hospital environment - to an open minded, exploratory approach that tried to ensure the true and specific cause was identified and effective controls were in operation.

Communication and wider engagement

34. The IMT meetings had communication as a standard agenda item; in addition, I communicated with the senior managers; and set up specific communication meeting with Haemato-oncology clinicians to discuss the epidemiological findings. I also presented the epidemiological findings to the Chief Nursing Officer (CNO) and her office staff; during the meeting an in-depth analysis of infection rates in Haemato-oncology including comparison to other units in Scotland, was commissioned by CNO from Health Protection Scotland.

35. I met the Cabinet Secretary Jeane Freeman when she visited Ward 6A; Professor Leanord and I provided an update on the investigation findings including the findings of whole genome sequence analysis.

36. I was included in the group presenting to NHS GGC Board the outcome of the investigations behind the recommendation to open Ward 6A; at that time, I asked that resource was made available to complete Whole Genome Sequencing for all bacteria isolates to establish if there were any links between patients or between patients and the environment.

Conclusions

37. The subsequent Whole Genome Sequencing analysis demonstrated the utility of the method in outbreak investigations and enhanced our understanding of the microbiological diversity of hospital environments. The findings do not support the hypothesis that the hospital environment in the QEUH/RCH was the cause of observed infections among haemato-oncology patients.

38. My role as IMT chair was limited as it was an additional duty in support of the Director of Public Health. That had the advantage of maintaining a strong focus on the effective working of the IMT meetings, informing all decision makers.

39. I was later asked to comment on the methodology employed in the Case Note Review and I was puzzled and expressed my disappointment with the methodology, which was dismissive of the new world-class standards of investigating outbreaks. See Public Health Commentary Case Review**.** **(Bundle 27, Volume 4, Document 34, page 364)**

40. As the last chair of the IMT it would have been my duty to seek re-assurance that all outstanding investigations have been carried out and the findings published for the benefit of learning and future patient safety. As the NHS GGC's Executive Oversight Board took over, my role in the immediate aftermath of the Incident became extinct and I will welcome the Public Inquiry findings and recommendations.

41. In my role of Director of Public Health, I read a number of expert reviews commissioned by NHSGGC to enhance our understanding of the interplay between the hospital environment and infections. In addition, I lived through the full immersive experience of outbreak management during the Pandemic. When managing risk of infection for individuals and populations the complexity can only be addressed using an iterative approach that gives consideration to all aspects in the infection chain construct through deliberation and takes account of wider impacts of any proposed control measures.

SBAR dated 25 August 2019

42. Regarding my involvement with the SBAR dated 25 August 2019 - Ward 2A Gram Negative Bacteria (**Bundle 4, Document 41, page 165**), as chair of the IMT on 6 September 2019, under agenda item 5 Incident Update, I have listened to and facilitated discussion of the issues raised in the SBAR as described in the minute of the meeting. The IMT agreed to send the updated SBAR back to the microbiologists.

43. At the following IMT meeting on 13 September 2019, an in-depth review of the microbiology and epidemiology data took place and the IMT concluded that ward 6A was microbiologically safe. On the evening of 13 September 2019, I received a document produced by Health Protection Scotland at the request of IMT entitled ”To support NHSGG&C IMT: Mycobacterium chelonae cases and the incidence of gram-negative bacteraemia (paediatric haemo-oncology)” Author: HPS; Audience: NHSGG&C – Incident Management Team; Date of issue: September 2019. The document footnote said “2019-09-13 GGC SBAR Final Draft”. (‘HPS SBAR’) (**Bundle 3, Document 16, page, 127)**

44. The HPS SBAR analysis showed that, following the patient's move to ward 6A/4B in September 2018, the rates of environmental infections in Glasgow Unit have been similar to the combined environmental infection rates of Edinburgh and Aberdeen Units, meaning that there was no excess of environmental infections. On detailed examination of the HPS SBAR content I could see no data justification for the restrictions imposed to new admissions to ward 6A at the beginning of August 2019.

45. The following day, Saturday 14 September 2019, I wrote to Jane Grant, Chief Executive, and Jennifer Armstrong. I provided evidence that contradicted the opinion expressed in the SBAR dated 25 August 2019 recommendation point 2; and challenged the need for a re-assessment of the ward 2A decant option appraisal - recommendation 1; for their consideration and advice.

46. The subsequent HPS analysis published in the "Review of NHSGG&C paediatric haemato-oncology data" report October 2019, show there has been no excess in environmental infections in Glasgow compared to the combined Aberdeen and Edinburgh Units, for any periods of analysis between June 2015 to September 2019. The only excess observed has been in the rate of the gram negative (including enteric bacteria) rates for the period October 2017- September 2018 and for this period, as noted above, no links were established between the environment and patient infections. **(Bundle 25, Document 1, page 9)**

47. Learning from other areas of public health practice like national screening programmes or cancer care, in my view, it would be beneficial for patient's quality of care and ultimately patient safety for national (preferably UK wide) prospective data on infections to be collected, analysed using pre-agreed methodology and published for all UK haemato oncology Units.

Whistleblowing

48. I had no involvement in any of the whistleblowing process.

Declaration

I believe that the facts stated in this witness statement are true to the best of my knowledge, information, and belief. I understand that this statement may form part of the evidence before the Inquiry and be published on the Inquiry's website.

The witness was provided with the following Scottish Hospital Inquiry documents for reference when they completed their statement.

Appendix A

A43255563 - Scottish Hospitals Inquiry - Hearing Commencing 12 June 2023 - Bundle 1 - Incident Management Team Meeting Minutes (IMT Minutes)

A37530019 – Scottish Hospitals Inquiry - Hearing Commencing 9 May 2022 – Bundle 3 - Governance - Volume 1 (of 3)(external version)

A43299519 - Scottish Hospitals Inquiry - Hearing Commencing 12 June 2023 - Bundle 4 - NHS Greater Glasgow and Clyde: SBAR Documentation

A43293438 - Scottish Hospitals Inquiry - Hearing Commencing 12 June 2023 - Bundle 6 - Miscellaneous documents

A49585984 – Bundle 25 - Scottish Hospitals Inquiry - Hearing Commencing 19 August 2024 - Bundle 25 - Case Note Review Expert Panel, Additional Reports, and DMA Canyon (External version)

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

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