Scottish Hospital Inquiry

Glasgow 4 Part 2

Consequential Witnesses statement of
Kathleen Harvey-Wood

Your professional practice at Yorkhill

1. Whilst you have already provided a detailed CV in your earlier statement. Please could you summarise your connection to, involvement with or association with the paediatric haemato-oncology service in the Schiehallion Unit at Yorkhill from 2005 to 2015 and the extent of your experience/knowledge/understanding of environmentally relevant bacteraemia at Yorkhill?

A.

1.1 I was employed by NHS Greater Glasgow and Clyde as a Principal Clinical Scientist in Paediatric Microbiology, retiring after 40 years of service in May 2023.

1.2 2003, due to a Clinical Scientist colleague leaving to take up a promoted post with another Health Board, I was given responsibility for the Virology Laboratory and to set up and run the Molecular Section in the Microbiology Department at Yorkhill. This involved developing Molecular Polymerase Chain Reaction (PCR) assays for various viruses, bacteria and fungi, which were used quite extensively by the Paediatric Haemato-oncology service. PCR is a rapid and more sensitive technique to detect infections compared with traditional culture methods.

1.3 From 2005 to 2015 my connection to Schiehallion Unit (SCH) at Yorkhill was attending weekly ward MDT meetings to discuss Virology and PCR results.

Telephoning and reporting out Virology results, advising on further investigations and viral screens.

1.4 The Paediatric Virology Laboratory and Molecular Section moved from Yorkhill to the new Laboratory Building, QEUH in April 2012 and was then moved to the Virology Department at Glasgow Royal Infirmary (GRI) in August 2015 after Yorkhill Hospital had transferred to QEUH/ RHC site.

1.5 One of Principal Clinical Scientists, who was responsible for the Bacteriology clinical liaison and reporting of results for the SCH Unit, Yorkhill, retired in 2013. The post was not replaced, and the responsibilities and workload were reassigned.

1.6 I then took on the responsibility for the Bacteriology Clinical liaison for the SCH Unit (at Yorkhill Hospital) which involved telephoning results to Clinicians, visiting the ward daily with an excel spread sheet of the Bacteriology results, including the positive blood cultures and attending the weekly MDT meetings. I had previously covered these duties on a Saturday morning (on the rota) and when the Clinical Scientist was on annual leave or sick leave.

1.7 I helped with guidance on interpretation of results and advised which investigations were needed for the Haematology / Oncology patients in the SCH Unit. I also requested additional tests where appropriate and was also involved in testing bacteria for antibiotic sensitivities. I subsequently become more involved with the Bacteriology Clinical service provision to SCH when the Virology Laboratory and Molecular Section was transferred to GRI in 2015. This is when I started looking at the blood stream infections and gathering data.

1.8 The Principal Clinical Scientist, responsible for SCH Unit clinical liaison and a Senior Nurse, SCH, managed the patients line care. Weekly excel spreadsheets of blood culture and line infections/line site infections results

were produced. I don't have access to any of this information or data. They both retired around the same time and neither of the posts were replaced.

1.9 I did have an awareness of environmental infections at Yorkhill. My Clinical Microbiology liaison responsibility was for PICU ward at that time. This also included the SCH patients who were critically unwell, bacteraemic and requiring PICU Care.

1.10 At Yorkhill, any increase in BSI infections was investigated in collaboration with the Infection Control Nurse, Pamela Joannidis and Estates Staff. Environmental screening was performed and a source of the outbreak found. I am not saying there were no Environmental infections at Yorkhill. From time to time there were "outbreaks ", however they were always addressed and work undertaken/ investigations to find the source and corrective or remedial action taken at an early stage.

1.11 I can recall an outbreak of Ps.aeuruginosa in PICU (2017) that was linked to the sink taps. Using Pulsed-field gel electrophoreses (PFGE) typing, which is a technique used to separate very large DNA molecules by applying an electric field in a gel matrix, isolates of Ps.aeruginosa from patient and environmental samples matched and the source of Ps.aeruginosa from the taps was found. There will be records of this outbreak in the Microbiology Department. I handed over and emailed historical documents of relevance to the Public Inquiry to Dr Christine Peters before I retired.

1.12 There was what we described as a "spring bloom" at Yorkhill, occurring in spring season when the temperature starts to rise. There are factors that can lead to increased risk of infections during the spring months. This could be due to changes in patient populations, increased activity and seasonal variation in microbial activity. Changes in temperature and humidity during spring could affect the survival and transmission of some pathogens (1). In the spring, hospital water systems can experience a bloom of environmental organisms including opportunistic pathogens like Legionella and

Pseudomonas which can lead to infections. These “blooms ”are often triggered by increased temperatures and nutrient levels in the water and can be exacerbated by factors like stagnation and biofilm formation.

1.13 From memory and as far as I remember the term “spring bloom” was an observation and used also by my colleagues in Microbiology. It was not investigated as it did not have a detrimental effect on patients at Yorkhill.

Incidence of environmentally relevant bacteraemia cases at Yorkhill

2. Please review the list of ‘microorganism species of environmental concern’ from 2005 to 2022 listed in Tables 11A to 11F of the HAD Report (Bundle 44, Volume 1, Pages 97 to 106) and the conclusion of the authors expressed on page 109 of the bundle that refers to the “significantly higher number of cases observed historically when the haemato-oncology paediatrics service was located at Yorkhill compared with QEUH cases”. On the basis of your expertise and experience, to what extent would you accept that there was a significantly higher number of environmentally relevant bacteraemia cases in the paediatric haemato-oncology patient population at Yorkhill from 2005 to 2015 compared to the QEUH/RHC from 2015 to 2022? Please explain the basis of your answer.

A

2.1 Based on my expertise and experience and working in Yorkhill hospital for 32 years, I would not accept that there was a significantly higher number of environmentally relevant bacteraemia cases in the paediatric haemato-oncology patient population at Yorkhill from 2005 to 2015.

2.2 Question is what is the relevance of comparing BSI infections in another older hospital building (Yorkhill opened in 1914 and remained on this site for 100 years, it was rebuilt in 1972) compared to new build hospital on a different site that has single rooms, different water supply and ventilation system.

Looking at the data provided, I have made the following observations.

P97-106 Tables 11A - 11F of the HAD Report.

2.3 What is the definition of “cases” used? Why are the cases added together to give a total number for both hospitals. If the purpose of the report was to compare environmental infections between the two paediatric hospitals.

2.4 Paediatric population patient definition not clear. What age group was compared? Yorkhill admitted children up to age 13 yrs. RHC admits children up to the age 16 yrs. So different demographics. There are also the teenage cancer patients some of which may be older than 16 yrs and have not yet transitioned to adult Haem/Oncol service.

P 95 “examination of individual cases of bacteraemia attributable to environmentally relevant microorganisms”.

2.5 Vague definition of environmental microorganism.

2.6 Not all the environmental organisms were included in the cases of bacteraemia and what was the criteria used for defining a relevant microorganism.

2.7 For example, the environmental gram negative Herbaspirillum spp was not included. There was no data provided on gram positive environmental organisms and Non-Tuberculous Mycobacteria (NTM) eg Mycobacterium chelonae.

2.8 Why only 2 fungal species included in the data : Cryptococcus neoformans at RHC -1 case (very rare infection in Paediatrics and was the first time I had seen this infection in my 40 years as a Clinical Scientist working in Paediatric Microbiology) and 2 cases of Scopulariopsis brevicaulis at Yorkhill.

2.9 Each organism listed in the tables in alphabetical order have the year and month isolated and for both hospitals in separate columns. If the organisms was not isolated that year it is not noted. Should have included each year of

the period examined to the tables and added 0 cases if no organism of that species was isolated.

2.10 Note decrease of organisms and cases in 2015 the year of the move to RHC and when there was also lower BSI. In new hospital buildings in the UK, the risk of blood stream infections can be significantly reduced through careful design and implementation of IPCT measures from the planning stage (2).

2.11 Then there is an increase in cases from 2015 to 2018 and note the decrease seen in environmental organisms/ cases after 2018. This is due to interventions, e.g. Chlorine dioxide added to the hospital water system.

2.12 Will discuss additional interventions later.

2.13 If look at the years 2020, 2021 & 2022 post interventions, there is 0 isolates/cases for most of the environmental organisms as these years are not included in the tables.

2.14 **A column in the tables refers to Clusters.** Chapter 3 P67 describes the definition of clusters and Table 3 Ranking of Clusters.

2.15 A probable cluster is defined as “greater than or equal to 2 cases from the same ward and are less than or equal to 1 month apart in time”.

2.16 The tables show more probable and possible clusters at Yorkhill; this may be due to patients being less likely to be in other wards in the hospital and be in the same ward compared to at RHC. The patients are exposed to the same risks of transmission if in the same ward.

2.17 The HAD Report did not note or document the mixed BSI infections and how was a cluster defined if the infection was due 3 or 4 different organisms.

2.18 The wards column in both of the hospitals Yorkhill and RHC was not discussed. Of note is that cases of environmental organisms were found in both the Adult (QEUH) Paediatric (RHC) hospitals at the QEUH site.

2.19 The paediatric Haemo-Oncology patient, SCH unit was moved to Ward 6A and 4B, QEUH in Sept 2018 and CDU, RHC for 3 weeks 22.01.18 -12.0.19. At RHC more wards were involved compared with Yorkhill. Cases were documented in other wards in RHC showing the environmental contamination was widespread these included: CDU,ED, 2C, 3C, NICU, Clinic 1 OP, PICU.

Page 96 Acinetobacter Cases (Table 11A P 97).

2.20 Acinetobacter was more frequently grown from Yorkhill (Table 11A). Yorkhill cases reported with 7 of the 8 cases of unspeciated Acinetobacter. The authors refer to the changes in a diagnostic tool to speciate these organisms. "It is important to note that some of the differences observed in Acinetobacter spp. maybe attributable to changes diagnostic tools to speciate these organisms."

2.21 P96. "Matrix Assisted Laser Deabsorption / Ionization "MALDI" became available at QEUH" (inferring move in 2015) – date not given. The MALDI technology became available at the Microbiology Dept when it moved to QEUH in May 2012, which includes 3 years at Yorkhill before the hospital moved.

2.22 The MALDI will have allowed for more accurate and faster identification of the Acinetobacter species from 2012. The main benefit of this technology is the rapid results available in hours rather than 24-48 hrs.

2.23 The MALDI diagnostic tool would have enabled the Acinetobacter spp to be speciated. However, it is the genus that is relevant as various species were isolated at both hospitals.

2.24 Table 11A shows that Feb 2012 was the last month that Acinetobacter was reported out at genus level from Yorkhill. A possible cluster of Acinetobacter at genus level was described at Yorkhill in March and April 2010, these 2 cases may have not been of the same species. Not sufficient evidence at the genus level of identification to describe as a possible cluster.

2.25 P96 Acinetobacter cases were described as normal at Yorkhill, “however this pattern was the norm at Yorkhill, suggesting that this may be the usual presentation in this population” …. compared with sporadic cases at QEUH. In my opinion as a Microbiologist, Acinetobacter BSI cases would not be described as normal (3). A BSI infection with an environmental organism is not considered a normal infection. Any BSI is not normal. The presence of any microorganism in the blood is considered abnormal as the blood stream is sterile.

Table 14 Stenotrophomonas maltophilia Cases

2.26 Yorkhill 2008 n= 9 (highest year) RHC 2018 n =11highest year cases from 5 wards/ 4 wards if CDU=CDIthe organism was isolated from other wards in RHC and is more widespread, indicating a hospital issue and not local to SCH Unit 2019 n = 4 (cases fallen)

2.27 There were no new cases of S.maltophilia after 2019. Years 2020, 2021 and 2022 not included in the data so assume there was 0 cases.

2.28 Also of note there was no cases of Steno.maltophilia from June 2015 to May 2016 during first year post move to RHC.

P108 : “Among 66 bacteraemia cases attributable to Stenotrophomonas 1/3 were from RHC and 2/3 were from Yorkhill”.

2.29 The period examined covers 17 years Jan 2005 to Dec 2022, which is comparing 10 years before move to 7 years after move, so the time periods being compared are different with a longer period of time at Yorkhill. Time period should have been 7 years at both sites.

2.30 After the opening of the refurbished SCH Unit, I emailed Dr Bagrade, Lead Infection Control Doctor, to bring to her attention details of the first case of colonisation with Steno.maltophilia which was isolated from a faeces sample and is not part of the normal faecal flora. The Lead ICD was not interested in

this case and was told not to look for Steno.maltophilia in faeces. There is an email trail to support this.

2.31 Page 32 of the HAD Report, “S.maltophilia is found very widely in hospital environment but comparatively rarely causes infections even in the immunocompromised and careful strain typing is needed to identify any actual environmentalsource”.

2.32 S.maltophilia is now recognised as an important pathogen in Haem/ Oncol patients associated with high mortality rates particularly in BSI. This requires close liaison with IPCT to ensure environmental screening is performed and taking the relevant samples is vital in managing these infections (4).

P109 Conclusion and Table 16 Clustering data:

2.33 P109 “Significantly higher number of cases observed historically when haem/oncol paediatric service was located at Yorkhill “

2.34 “There were 1.9 times more bacteraemia cases attributable to potential environmentally transmitted pathogens at Yorkhill compared to QEUH”.

2.35 **P114 Table 16** “2 fold lower incidence of cases at QEUH compared with historical cases at Yorkhill”. Authors refer to Fig 13 which is a graph of BSI incidence among adult haem/oncology patients.

2.36 The authors data from the tables does show more cases at Yorkhill. This is observed historically - what is the relevance to the new hospital cases when comparing a different location and building. I don’t accept that this is significant in relation to the environmental infections at RHC/QEUH. From memory Yorkhill environmental BSI infections did not have the same consequences or concerns at the time regarding patient morbidity or safety.

Rate of change of incidence of environmentally relevant bacteraemia cases between Yorkhill and QEUH/RHC

3. Please review Figure 22 of the HAD Report and the text discussing it (Bundle 44, Volume 1, Pages 116 to 119) and the conclusion of the authors in the second bullet point on page 119 that "Among paediatric haemato-oncology patients, we see an ~2 fold decrease in incidence and cases of bacteraemia attributed to environmentally relevant microorganisms following transfer of services from Yorkhill to QEUH; lower incidence at QEUH was statistically significant". To what extent is this conclusion consistent with your experience at Yorkhill and subsequently at the QEUH/RHC? Please explain the basis of your answer.

A.

3.1 "Environmentally relevant microorganisms "- a definition would be helpful as not given and did not provide data for all the environmental microorganisms.

3.2 Following transfer of services from Yorkhill to RHC, QEUH, one would expect there to be a decrease in incidence of and cases of bacteraemia attributed to environmental organisms. As moving patients to a new hospital building, particularly one with a high proportion of single rooms which can contribute to a decrease in infection rates, especially for airborne and contact-transmitted infections, due to the improved design, construction and maintenance of a new hospital. However, this decrease was only seen for the first year after the move.

Fig 22. Graph

3.3 There is no legend on the graph - assume red line is Yorkhill and the blue line is RHC.

3.4 Not sure if this is Fig 19 graph with the trend lines added? as the peaks and troughs are of different values and are higher in Fig 22 than in Fig 19.

3.5 Legend is incorrect in Fig 19 as blue line is labelled as BMT and red line as North, which does not refer to Paediatric patients.

3.6 Both graphs are described as using BSI/ 1000 days data for environmental relevant organisms and the Y axis have the same scale 0- 25.

3.7 Graph Fig 22 shows peaks and troughs of BSI, with peaks seen at Yorkhill which were narrower with more troughs below 5% BSI incidence rate.

3.8 It is worth noting that the troughs at RHC are higher (2017-2020) than Yorkhill, showing that the BSI incidence was controlled at a lower level at Yorkhill.

3.9 Reduction of BSI in 2015 post move then increase seen in 2016. This was also documented in Dr Christine Peters / Kathleen Harvey- Wood Report (Bundle 19, Doc 19, P 143), with a maximum peak seen in 2018 at RHC which correlates with the documented water incident.

3.10 Following interventions introduced late 2018 and the move back to the refurbished SCH unit in March 2022 - BSI infections fall post 2018 and in 2022, falling to levels similar to 2015 when the patients were first transferred to RHC when the hospital opened.

3.11 Of interest is the trend lines described as “fitted line showing change over time” - this can be seen to be decreasing in Yorkhill prior to the move and a stepwise jump after the move.

3.12 Both the trend lines for Yorkhill and RHC are on a downward trajectory. The trend line before Yorkhill moved is lower than the RHC trend line after the move.

P119 - bullet point 2 authors conclusion:

3.13 “2 fold decrease in incidence of cases and bacteraemia attributed to environmentally relevant microorganisms following transfer of services to QEUH from Yorkhill ”

3.14 The conclusion made in the second bullet point in page 119 drawn from Fig 22 graph, the interpretation of the data made by the authors bears no resemblance to the accuracy. The decrease is from late 2018 onwards and is due to many interventions and mitigations which I have discussed in my response to other questions.

I have also reviewed other graphs of BSI incidence. 7.2.7 P94

3.15 Data is obtained on bed days where available from Jan 2005 to Dec 2022 for RHC. Should read: Data is obtained on bed days were available from Jan 2005 to June 2015 for Yorkhill and June 2015 to Dec 2022 for RHC. Yorkhill moved to RHC/ QEUH on 15th June 2015.

3.16 Why were bed days used as a denominator for BSI, as at Yorkhill patients remained in hospital for longer, different chemotherapy regimens and antibiotics were available at that time. Now have newer chemotherapy and monoclonal antibody regimens and new antibiotics to treat environmental infections. Patients may have other complications which would lengthen the bed stay time such as a concurrent viral infection eg during HINI epidemic in 2009, Adenovirus, Cytomegalovirus (CMV), Epstein-Barr virus (EBV), post bone marrow transplant. Now have new antiviral drugs available for treatment (5)

3.17 Haemo-Oncol patients have a higher risk of contracting viruses because their immune systems are suppressed so are at a greater risk of complications.

3.18 Many treatment protocols that a decade ago would have required hospital admission can now be given on a day care basis so have less bed days. Adjustments of standard of care to shorten hospital treatment include outpatient therapy and switching to oral antibiotics allowing earlier discharge.

3.19 More paediatric Haemo-oncology patients now also attend day care which is an area in the SCH ward (also there was an area in ward 6ADC QEUH when the ward was transferred to QEUH).

3.20 The patients attend for chemotherapy, iv antibiotics, blood samples are taken. There is now a Paediatric outpatient parental antibiotic therapy (OPAT) service at RHC (6). Intravenous antibiotics can be given once daily as an outpatient. Day care cases are also exposed to environmental organisms. A BSI may be acquired from a day care visit.

3.21 Aware that the incidence of bacteraemia rates by 1,000 beds is often measured in hospitals and is a standard for HCAIs. This helps track the rate of BSI in relation to the total number of patient days spent in the hospital. Is this the appropriate denominator for defining the incidence of environmental Infections?

What was the definition of a BSI used - how many days after admission?

P94, Fig 17. Graph title: "Incidence of all cases of bacteraemia among paediatric patients over the study period".

3.22 The graph shows incidence of ALL bacteraemia and the results of all years 2005-2022. Y axis is labelled as bed days (per 1,000).

3.23 Authors comment "At time of move to QEUH, bacteraemia incidence was similar to rates at Yorkhill but steadily declined from early 2018 onward."

3.24 No description of the period from 2016 after the move to the peak in 2018. Graph shows a decline from late 2018.

7.2.8 P 95 Section Heading "Bacteraemia attributable to environmentally relevant microorganisms in Paediatric patients in GGC".

3.25 Title of the section is loosely descriptive: Does this include all Paediatric patients in GGC and not just the Haem/Oncology patients only? There were paediatric patients in a children's ward at Royal Alexandra Hospital (RAH), the paediatric ward is now closed.

3.26 They looked at the of incidence of environmentally relevant bacteraemia cases as shown in **P95 Fig 18 Graph** title: "Incidence of bacteraemia from

organism of potential environmental concern among paediatric patients over the study period."

3.27 As for tables - vague definition of "environmental concern"

3.28 The blue line should be labelled RHC/ QEUH and not BMT.

3.29 The years are presented in a 2-year interval scale on the X axis compared with yearly interval scale on the X axis as in Fig 17 Graph. Intervals start at 2004 when there was no data.

3.30 If the X axis was spaced out the peaks would be clearer. The Y axis scale has also different labelling and intervals compared with graph. Fig 17(0-50) which makes direct comparison more difficult. There were peaks and troughs of BSI infections at Yorkhill but the peaks were not prolonged and actions were taken. The RHC peak in 2018 is a double peak and includes the year 2019.

3.31 The graph is described as showing BSI "Steadily declines from 2018 onwards". This suggests that whatever factors are influencing bacteraemia incidence overall are also having an impact on bacteraemia attributable to environmental relevant pathogens. Further suggesting that the environment is unlikely to be playing a significant role" Would expect a decrease in BSI in 2015 as patients have moved into in a new clean hospital with single rooms, improved treatment practices, line care, new Hickman line products and sites.

3.32 Again as for Fig 17, there was no description given of the period from 2015 to the peak at 2018.

3.33 In 2018 there were further interventions - a new guideline on line management was introduced and the Central Line Associated Bacterial Infections(CLABSI) Group which was set up in May 2017 started to show improvements in resolving BSI by late 2018. Chlorine dioxide was added to the water, hot and cold-water temperatures were monitored, POU filters were added to the taps (mid 2018), metal parts inside the taps were replaced with plastic ones.

What is meant by an 'Outbreak'

4. At section 2.2 the authors of the HAD report discuss what is meant by an outbreak. Do you have any comment on their approach either in general or by reference to the application of such an approach from your perspective as a clinical scientist?

A.

4.1 In my perspective as a Clinical Scientist, I would refer to the National Infection Prevention and Control Manual NIPCM (Last updated:15 May 2023). Chapter 3-Healthcare Infection Incidents, Outbreaks and Data Exceedance (7) and Appendix 13 (8).

4.2 My responsibility was to inform the IPCT by telephone or email of 2 cases of the same organism (species level) isolated from SCH patients or if the laboratory results showed an increase in the number of cases as described in the NIPCM: A healthcare associated infection outbreak

a) Two or more linked cases with the same infectious agent associated with the same healthcare setting over a specified time period.
or
b) A higher-than-expected number of cases of HAI in a given healthcare area over a specified time period. A healthcare infection data exceedance

c) A greater than expected rate of infection compared with the usual background rate for the place and time where the incident has occurred.

4.3 Following the detection of an outbreak the IPCT should undertake an initial assessment using the Healthcare Infection Incident Assessment Tool (HIIAT).

4.4 Detection and recognition of a Healthcare Infection incident/outbreak or data exceedance.

4.5 An early and effective response to an actual or potential healthcare incident, outbreak or data exceedance is crucial. The local Board IPCT and HPT should be aware of and refer to the national minimum list of alert organisms/conditions listed in Appendix 13" (8).

4.6 In addition there is the GGC Outbreak and Incident Management Plan (9).

4.7 The HAD report P20 refers to "two or more cases of infection caused by genetically distinct micro-organisms". They mention that the "genetic sub typing is slow". However, it is not feasible or practical to wait for typing results and 2 cases should not be ignored and the first 2 isolates should be sent for typing. I would consider it important for IPCT to act on and investigate an "outbreak" if 2 organisms of the same species were isolated in time and place before another case is found, as waiting would put patients at risk. I would also refer to Appendix 13 (8), which is regularly reviewed. This was not referred to by the HAD Report.

4.8 Environmental bacteria are not "normally" associated with Hospital Acquired Infections (HAI) and interestingly since the problems at RHC, 3 additional environmental organisms have been added to Appendix 13 (8) , P3 Table 1, Section Environmental Bacteria - previously 4 organisms were listed, have added the environmental bacteria: Chryseomonas indologenes, Cupriavidus pauculus, Sphingomonas.spp., so now 7 environmental organisms are listed.

4.9 In addition Appendix 13 has been updated to v3.3 15 May 2025 and includes Non-Tuberculous Mycobacteria (NTM) also known as environmental mycobacteria that are "more likely to be encountered" e.g. Mycobacterium chelonae and Myocbacterium abscessus.

4.10 The HAD report refers to the source of BSI infections from the gastrointestinal tract. Faecal/ oral route and gut colonisation. This would be considered as an endogenous infection and NOT related to the environment. Endogenous infections arise from microorganisms already present in the body. While exogenous infections are caused by pathogens from external sources and are

introduced from outside the body from the environment. It has been reported that we are seeing a smaller percentage of exogenous hospital acquired infections (HAI's). The majority have an endogenous origin (P.Gastmeier 2020) (10), which has not been the case in the QEUH, where the increase in infections were exogenous.

4.11 HAD Report P22 "environmental bacteria occur widely in the general environment" and refer to a publication by S.Khan et al (2016) (11).

4.12 Tap water was collected from residences in Glasgow, what post codes? - not given, was hot or cold water sampled?

4.13 Both gram negative and gram positive organisms were confirmed in the tap water.

4.14 Cupriavidis, Sphingomonas and Burkholderia spp (11) (table 2) were found in low levels in domestic water supply.

4.15 No Steno.maltophilia, Ps.aeruginosa, Acinetobacter, Serratia, Chryseobacterium, or Elizabethkingia were found.

4.16 The paper discusses antibiotic resistant bacteria prevalence found in municipal drinking water and not in hospital water. The aim of the study was to look for presence of resistance genes using PCR methodology.

4.17 I am not sure of the relevance of this publication as to "what is meant by an outbreak".

4.18 However patients are exposed to hospital water stored in tanks and hospital plumbing systems. The important point to make is that these are Haemotology/ Oncology patients who are immunosuppressed, on chemotherapy and have lines in situ.

4.19 Point of use filters (POU) are now fitted on the taps should filter out these organisms (12) (13 - Fig1).

Polymicrobial BSI

5. Can you assist the inquiry as to whether there was any change in the number of patients presenting with multiple microorganisms in a single blood culture (that might be referred to as polymicrobial BSI) between Schiehallion at Yorkhill and Schiehallion at the RHC?

A.

5.1 As I am retired and no longer employed by NHSGGC, I am unable to obtain or access the data on BSI results prior to 2014 to compare SCH at Yorkhill and SCH at the RHC.

5.2 From memory I was not aware of there being a problem with multiple micro-organisms isolated from blood cultures taken from Haem/ Oncol patients at Yorkhill prior to the move.

5.3 However, there were 11 mixed blood cultures in 2014. Blood cultures with more than one organism post move of the SCH Unit to RHC/ QEUH are shown in the in Graph: Number of mixed blood cultures per year (CP/KHW Report Bundle 19, Document 19, page 148): of note it is the significant increase (as shown by the standard deviation bars) from 11 mixed blood cultures in the first year after the move to QEUH site in 2015, to 36 blood cultures in year 2016- 2017 and 40 blood cultures in 2017-2018. This was of concern, with some blood cultures isolating 3 or 4 different environmental organisms.

5.4 The HAD Report has produced no data on the mixed blood cultures/ BSI infections.

Positivity rates in Blood Cultures seen at Yorkhill

6. Please refer to the October 2018 draft Report (Bundle 19, Document 19, Page 143) and the earlier presentation (Bundle 27 Volume 6, Document 9, page 107) that you prepared with Dr Peters. Do you hold any data showing the

‘positivity rates in Blood Cultures seen” at Yorkhill prior for any of the period from January 2005 to June 2014? If so, can you produce a chart (with associated data tables) covering that period in the same format as the chart at Bundle 19, Document 19, Page 146 and interpret that data for the Inquiry?

A.

6.1 As I am retired from NHSGGC , I hold no data and have no access to the laboratory telepath system to enable me to gather the data of the blood culture results from the period Jan 2005 to June 2014 or to produce a chart of the percentage positive blood cultures prior to June 2014 in the same format as the chart in Bundle 19, Document 19, page 146.

Scope of the HPS Reviews

7. Please refer the minute of the PICU IMT meeting on 6 June 2018 which makes reference to an increased incidence Acinetobacter within PICU at which you were present. (Bundle 1, Document 25, P105 – 108) . Was there any discussion at this meeting or any other point in 2018 of the need to extend any analysis of historical infection rates back to 2005 in order to capture the incidence and cases of bacteraemia attributed to environmentally relevant microorganisms at Yorkhill back to that date?

A.

7.1 PICU IMT was held due to the increased incidence of Acinetobacter within PICU. From memory the Acinetobacter infections were isolated from Bronchoalveolar lavage (BAL) samples and not BSI. The remit of the IMT was to investigate the source of the infections, swabbing of sink drains and removal of 3 trough sink drains. The issue of sharing equipment and staffing levels were also discussed.

7.2 There was no discussion at this IMT regarding a look back exercise to extend the analysis of infection rates back to 2005, in order to capture the incidence and cases of bacteraemia attributed to environmentally relevant

microorganisms at Yorkhill back to that date (and was not documented in the minutes) or as far as I can remember at any other point in 2018.

7.3 PICU Consultants were emailed a monthly excel spreadsheet with the positive blood culture results and percentage positive blood culture rate from PICU patients. In addition, an annual report of the positive blood cultures, number of blood cultures taken from the patients and percentage positivity rate for the year was also emailed. This data was produced (also for PICU, Yorkhill Hospital) and emailed by myself as part of my clinical liaison responsibilities for PICU.

Additional information to assist the Inquiry

8. The Inquiry is attempting to understand the extent to which it can be said that the adequacy of ventilation, water contamination and other issues have or have not adversely impacted patient safety and care at the QEUH/RHC. Do you have any further information that you have not yet given the Inquiry that you consider would assist the Inquiry in understanding that issue?

A.

8.1 In my opinion the adequacy of ventilation, water contamination and other issues HAVE adversely impacted on patient safety and care at QEUH/ RHC.

8.2 In answering this question, I have raised more questions than answers and as to why the HAD Report states P95 7.2.8 “Further suggesting that the environment is unlikely to be playing a significant role in harbouring and transmitting pathogens to paediatric patients “

8.3 In the Had Report (Tables 11A- 11F), it is not clear if they just looked at BSI infections in Haematology/ Oncology patients. But have concluded that this applies to paediatric patients without the data to support this finding.

8.4 Have the authors interpreted this from the graphs (Fig 17, Fig 18 &19)? **If the findings of the HAD Report have shown that there is no environmental**

source and no increase in BSI infections at QEUH/ RHC why then were there:

a) IMT's to discuss BSI infections and an increase in positive blood cultures (CP/KHW Report Bundle 19, Vol 9, Page 143 -167)
b) The introduction of Point of use filters put on the taps, which are still in use today in some wards RHC and including in the QEUH adult hospital.
c) Shower heads and taps changed to different manufacturer.
d) Chlorine dioxide added to the water storage tanks and water system in both hospitals and this is still being performed now.
e) Hydrogen Peroxide Vapour (HPV) cleaning of Wards 2A and 2B (IMT 06.06.18 Bundle 1, Doc 24, p99-104). This was performed twice in June 2018. HPV was used in other wards in RHC eg PICU, NICU.
f) Drain cleaning with Actichlor to treat a source of environmental bacteria linked to drains. Links in time, place and person (see question 4).
g) Cupriavidius was found in drains (14) (15). Drain testing also isolated Sphingomonas, Kleb.oxytoca, Pantoea and Kluyvera.
h) SCH patients were given antibiotic prophylaxis - Ciprofloxacin, due to the risk of infection with environmental organisms.
i) Why then was the SCH unit closed to new admissions and patients transferred to ward 6A/4B in the adult QEUH hospital on 26.09.18?
j) Patients were transferred to other Paediatric Hospital in Edinburgh and Paediatric ward, Aberdeen 02.08.19.
k) NIPCM Chapter 4 - Infection Control in the Build Environment and Decontamination (16) now includes POU and water testing added to the manual due to the water issues at QEUH /RHC is now a Scotland wide guideline.

Ventilation

a) Rooms in SCH (2A/2B) were very humid before the refurbishment. I experienced this myself when on the ward and they had a fan in the doctors' room.

b) Unable to control the temperature in the QEUH/RHC hospitals. This is still a problem even today as patients have to ask for a fan in the room as they are too warm and humid. Humidity and uncontrolled temperature are ideal conditions for environmental organisms to thrive.
c) SCH ward (before refurbishment) had 3 air changes per hour when the hospital was built which should have been 10 air changes per hour. General wards should have 6 air changes per hour.

Why were the SCH unit wards 2A & 2B, RHC closed and refurbished if the environment is unlikely to be playing a significant role in harbouring and transmitting pathogens?

a) The unit was closed for 3 and a half years from Sept 2018 to March 2022 at a cost of £8.9 million. The refurbished ward has now its own ventilation system units separate from the rest of the hospital. Hepa filters were installed and air changes are now 10 per hour.
b) The opening of refurbished SCH unit was covered by the press and TV. STV video (17) reports that Tom Steele is “happy with the air, heating, water and that the systems have gone through due diligence”.
c) The Microbiology Department was not involved in environmental screening prior to the opening of the unit and NHS Scotland Assure did not sign off the re-opening.
d) Prof Brenda Gibson has commented in her witness statement (12.06.23 P56 Paragraph 240) that since returning to the refurbished ward (March 2022) infections have reduced dramatically. “If there was a problem this has resolved”.
e) This reduction in BSI from 2022 can be seen in both the HAD report graphs and tables.
f) Only 2 Fungal species were included in the environmental BSI cases tables 11A- A11F. (g) Air sampling was routinely performed (weekly) in the SCH Unit at Yorkhill Hospital and SPC charts produced and reported. This air

sampling service was transferred to the Microbiology Dept at GRI, when the Clinical Scientist responsible retired in 2013.

g) H. Kennedy et al 2011 (18), the authors note that patients at the highest risk of invasive fungal infections (stem cell transplant) should be nursed in cubicles with HEPA filtration which has been shown to effectively reduce spore counts.
h) As far as I am aware air sampling is not being performed in the refurbished SCH ward since it re-opened and there is no routine programme of air sampling.
i) PICU, RHC: concerns with infections in PICU and ventilation specification. After the Royal Hospital for Children & Young People, Edinburgh opening was cancelled 24 hours before it was due to open, PICU, RHC was then reviewed and ventilation upgraded.

Current ongoing issues

a) Why are there ongoing problems in QEUH/ RHC if the “infections show no link to the environment”?
b) There have been incidences where the hospital water was still not to be used as recently as this year, when a probe into the water was found to still be unsafe, 7 years after the water incident in 2018 (19).
c) Staff have had to use hand gel as the water was not safe due to high levels of Chlorine dioxide in the hospital water system (20).

Summary

8.5 In summary, due to the inadequacy of the ventilation, water contamination, increase in environmental BSI infections and the impact on patient safety the above mentioned mitigations were required to be put in place, which were effective in reducing the cases of BSI infections.

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Fig 1

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Declaration

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.

Signed: [redacted] Print name: KATHLEEN HARVEY-WOOD

Appendix A

A43255563 - Bundle 1 – IMT Minutes

A48381842 - Bundle 19 – Documents Referred to in the Quantitative and Qualitative Infection Link Expert Reports of Sid Mookerjee, Sara Mumford & Linda Dempster.

A49871632 - Bundle 27, Volume 6 – Miscellaneous Documents

A52317814 - Bundle 44, Volume 1 – NHS GGC Expert (HAD Report)