Scottish Hospitals Inquiry
Witness Statement of 1 of 2
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Statement

1. This statement relates to my employment within NHS Greater Glasgow and Clyde (NHSGGC) and matters associated with the Scottish Hospitals Inquiry (SHI).

2. I have provided a separate statement pertaining to matters associated with the SHI whilst employed at National Services Scotland (NSS), Antimicrobial Resistance and Healthcare Associated Infection (ARHAI) Scotland.

3. At the time of writing, and having terminated employment with NHSGGC, I have no access to emails or documents to help inform or support development of this statement. As such, this statement is not laid out as a timeline and I am unable to provide clarity regarding dates associated with much of my statement.

Personal Details

4. My name is Susan Dodd. I live at the address provided to the inquiry. I am a nurse consultant in infection prevention and control (IPC) in ARHAI Scotland.

5. I was seconded from my post as lead infection prevention and control nurse (IPCN) at the Royal Hospital for Children (RHC) in NHSGGC to ARHAI Scotland in August 2019 before accepting a permanent position with ARHAI Scotland in January 2020.

Current Role

6. I am the clinical lead for the National Policy, Guidance and Evidence (NPGE) Programme, one of five clinical programmes within ARHAI Scotland. My NPGE programme work involves developing and maintaining the Scottish National Infection Prevention and Control Manual (NIPCM) as well as supporting education to promote its content. The reactive work involves supporting the health boards with incident and outbreak management, responding to enquiries and responding to commissioned work which may be received from a variety of sources.

Professional History

7. I qualified as a nurse in 2003 having completed a Diploma in Nursing. I went on to complete a BSc in Health Studies in 2006 before moving into infection control in 2008. I completed my MSc in Infection Control in 2014.

8. My first role as a qualified nurse was on a surgical rotation programme within NHSGGC. I relocated to London in 2004 and worked as a staff nurse in a polytrauma and high dependency unit before accepting a deputy charge nurse post in 2006 on the same unit.

9. I commenced my first IPCN band 6 post in 2008 in NHSGGC. The IPC service in NHSGGC was divided into five sectors. Specifically, I had responsibilities within the Western Infirmary General (WIG) and Gartnavel General hospital (GGH) inclusive of the West of Scotland Cancer Centre (WoSCC). This was known as the North West Sector. I was promoted to a band 7 senior IPCN in 2010 and had responsibilities across the same sites.

10. In 2014 I was seconded to an acting lead IPC nurse post in the north west sector for a period of approximately ten months to cover maternity leave before then returning to my band 7 role. On return to this role, many of the services within GGH had migrated to the Queen Elizabeth University Hospital (QEUH) and the WIG was officially closed. The IPC sectors within NHSGGC were restructured. The north west sector became the west and partnerships

sector which continued to include GGH and WoSCC. It also encompassed the NHSGGC community hospital sites and prison clinical rooms.

11. In March 2017, I accepted the lead IPC nurse role in the paediatric sector. This was my first time working in a paediatric setting.

Responsibilities, role and reporting structure at the Royal Hospital for Children (RHC)

12. I had no involvement in the planning and commissioning stages of the RHC or QEUH.

13. The RHC is situated on the QEUH Campus. I was based in the office block which housed staff members who work across both the adult QEUH and paediatric RHC sites however I only had IPC responsibility for RHC. There was no clinical activity within the office block.

14. The paediatric sector included the RHC and the neonatal intensive care unit (NICU). The NICU was part of the existing southern general hospital (SGH) estate. When the patients from RHC Ward 2A moved over to QEUH wards 6A and 4B, I had responsibility for these areas too. The paediatric patients only occupied some of the beds in ward 4B. I only had responsibility for the beds containing paediatric patients. I had no responsibility for paediatrics situated at the Royal Alexandria Hospital (RAH) or the neonatal unit within Glasgow Royal Infirmary (GRI).

15. The lead IPC nurse role was the most senior role on each sector site. I led a small team consisting of one senior band 7 infection control nurse (ICN), two band 6 ICNs and an administrator. I had oversight of a patient caseload within the paediatric sector and provided IPC advice to clinical teams. The role also included maintenance of a schedule of audit for each of the clinical areas, reporting of results and helping develop action plans for areas requiring

improvement. Education was also within my remit and involved delivering proactive or reactive education to staff depending on the situation.

16. My line manager was Sandra Devine, who was the associate nurse director for IPC. Tom Walsh was the infection control manager (ICM). Sandra Devine and Tom Walsh reported to the Healthcare Associated Infection (HAI) executive lead, Dr Jennifer Armstrong. Pamela Joannidis, was the Nurse Consultant for IPC. Pamela was my predecessor and had extensive experience in the paediatric setting.

17. I reported to Sandra Devine as my direct line manager. Any concerns or issues I had were sent to Sandra and Tom. Pamela would often be included also and would deputise for Sandra in her absence. Tom, Sandra and Pamela were based at another site. They didn't routinely visit RHC other than occasional visits to attend an Incident Management Team (IMT) meeting. I don't recall ever having any direct communications with Dr Armstrong. I rarely had contact with anyone more senior than Tom Walsh. I would typically see Tom once every month for Senior Management Team (SMT) meetings. My main contact was Sandra Devine.

18. An infection prevention and control doctor (IPCD) was allocated to each sector with one lead IPCD for NHSGGC. When I first joined the IPC service in 2008, the lead IPCD was Dr Craig Williams. I cannot remember the date when he left this role. After Dr Williams left, Dr Teresa Inkster took over as lead IPCD.

19. There were teams of microbiologists based in the laboratories. When there was no IPCD available, IPCNs could contact a microbiologist in the labs to ask them for advice. Sometimes the microbiologists would also contact the local IPCNs directly if they wanted to report a result of particular concern for example, an organism which was resistant to multiple antibiotics. It's my understanding that some of the microbiologists had some IPC experience

although IPC was not their formal role. I am unable to comment on any formal IPC training undertaken by microbiologists.

20. I attended weekly lead nurse meetings chaired by Sandra Devine alongside the other lead nurses for each sector. At each of these meetings we provided an update of sector issues and outbreaks and had discussion around the investigations and management where appropriate. We also reported any site concerns for example audit scores inclusive of key findings of concern, issues with any estates or capital planning works which may have posed an IPC risk to patients or unusual patient infections.

21. I also attended senior management team (SMT) meetings monthly. These were chaired by Tom Walsh and attended by the lead IPCNs for each sector as well as Sandra Devine, Pamela Joannidis, Ann Kerr and each of the sector IPCDs. Ann Kerr was the lead nurse for the IPCT data team in NHSGGC. A summary of all on site outbreaks and incidents was provided at this meeting also.

22. Every two months the acute infection control committee (AICC) took place. This was chaired by Dr David Stewart and later Dr Chris Jones and attended by all those previously noted as attending SMT including myself, in addition to an infectious diseases consultant, lead pharmacist for the Board and estates and facilities representatives. As with the previously noted meetings, a summary of all on site outbreaks and incidents was provided at this meeting.

23. Standard Infection Control Precautions (SICPs) are applied by all staff for all patients at all times in all care settings. The purpose of SICPs is to prevent transmission of infection. When a patient is suspected or confirmed to have an infection, actions are taken to ensure that any transmission risk to other patients is minimised. Additional controls may be required which are commonly known as Transmission Based Precautions (TBPs).

24. TBPs typically include placement of the patient in a single room, enhanced cleaning of the environment and equipment and/or additional personal protective equipment (PPE). Ward 2A consisted only of single rooms preventing the need to move patients if they tested positive for an infection. Enhanced cleaning in terms of frequency and products was in place routinely on ward 2A. This was commenced relatively early at the outset of concerns. PPE was used according to the infectious pathogen and the way in which it is known to spread.

25. SICPs and TBPs are described in chapters 1 and 2 of the National Infection Prevention and Control Manual (NIPCM).

26. When I first joined the IPCT in 2008, clinical patient results were collated in the laboratory using a paper-based system. An IPCN would collect a paper list of all the patients with reportable isolates each day. A paper record for each patient was generated by the IPCN to allow all relevant information to be documented. Paper records detailing all daily alerts enabled IPCTs to recognise any potential outbreaks however the system was not completely robust. The introduction of ICNet greatly improved this process. I cannot recall exactly when ICNet was rolled out in NHSGGC, but it was well established by the time I took up the role of lead nurse role at RHC.

27. ICNet is a clinical surveillance software system. Many health boards across Scotland are now using this system. I believe it to be used widely across the UK. ICNet has lots of functions and can be customised to suit a service. In NHSGGC it was used as a patient IPC alert system and for surveillance purposes. Results were reported based on the location the sample was obtained which in turn provides a directory of results for each of the wards in that sector. The system also had the ability to capture data relating to surgical procedures including line insertions for individual patients. This provided easy reference to patient line insertion dates and locations which was of particular use when an IPCN was investigating a blood stream infection (BSI).

28. I'm not aware that any clinical teams outside of the IPC service within NHSGGC were using or had access to ICNet. I am unsure what level of access microbiology had to ICNET.

29. ICNet was used by all IPCT sectors across NHSGGC and was managed and maintained by a data team. The data team was led by Ann Kerr who was the overall surveillance lead. Each IPCN was granted access by the data team to patient results for their own sector. I understand that laboratory staff entered all patient laboratory results onto the laboratory information management system (LIMS). ICNet then pulled the relevant results over from LIMS. The organisms reported on ICNet were determined by the NHS Alert organisms/condition list published in the NIPCM. This is a nationally agreed minimum list of alert organisms which is not exhaustive. For each organism reported on ICNet, an open case for the patient was generated. The local IPCT would review and manage each case. This would include informing clinical teams of the result and advising control measures required to prevent onward transmission. The IPCN managing each alert would then use ICNet to document advice provided for that individual patient.

30. It was also necessary to determine if the organism isolated from the clinical patient sample was considered a healthcare acquired infection (HCAI) and if so, where the HCAI was attributed to. Determining whether an organism has been acquired in the healthcare setting involves a number of considerations which will include; the date of the patient's admission to hospital and any prior admissions, healthcare outside of an inpatient stay, date of sample, previous history of the patient having had the organism, symptom onset and presence of the organism amongst other patients in the ward. Often a 48-hour rule is applied; samples obtained 48 hours or more after admission would typically be considered a HCAI however after considering all factors, it may be determined that the organism was community acquired.

31. Some of the organisms now listed in the NHS Alert organisms/condition list were not on the list in 2017, specifically some of the environmental organisms.

This meant that IPCNs had no awareness of clinical isolates unless laboratory staff or an IPCD contacted us by phone to inform us of the finding in a clinical sample. They would do this if the resistance pattern was concerning, if the organism was very unusual or sometimes if they had seen more than one in a short period of time. We had the ability to manually open a case on ICNet for these patients. Some months after we had started seeing an increase in gram negative bacteraemia (GNB) on ward 2A, Dr Inkster requested that some of these GNBs were added to the ICNet alert system.

32. The data team would also set triggers on ICNet. This would alert local IPC teams to potential clusters of the same organism in the same area over a specified time period. For example, if two or more of the same organism had been detected in a clinical sample obtained from two or more patients in the same ward within a two-week period, a trigger was generated. The local IPCT would then investigate these cases to determine if cross transmission had occurred or if there was a true increased incidence of an organism associated with the healthcare setting.

Outbreak and incident management and assessment

33. Following an ICNet trigger or notification from laboratory teams of multiple isolates of concern, the IPCT would review patient cases to establish if the cluster of results required further exploration.

34. If further exploration of the cases was required, a problem assessment group (PAG) would be convened. A PAG is a group of key individuals brought together to consider the initial information, potential or actual IPC risk and whether or not there is a need for an incident management team (IMT) to be convened. A PAG typically includes IPCT representatives, members of the clinical and nursing team and depending on the trigger being investigated, a member of the senior management team and domestic services.

35. The PAG would typically undertake an assessment of the incident to inform escalation using the Healthcare Infection Incident Assessment Tool (HIIAT). The HIIAT considers four components in relation to the incident; severity of illness, impact on services, risk of transmission and public anxiety. Each component is scored as either minor, moderate or major and the overall impact is then calculated based on a Red, Amber, Green (RAG) rating system. The RAG rating determines the onward reporting requirements.

36. If the PAG deemed it was necessary to convene an IMT, the invite list would be extended to include relevant parties. This may include wider clinical and SMT representation, wider facilities representation and a member from the communications team. Initial investigations would often be undertaken to inform discussions at the first IMT. For example, the IPCT would consider recent audit scores in the clinical area affected, review domestic cleaning in the area and observe staff IPC practices. Facilitates colleagues may be asked to collate any recent audit scores or routine environmental test results. Discussion at the initial IMT would determine further investigations and controls required to mitigate against any IPC risks. The HIIAT assessment would be undertaken at each IMT and cannot be agreed by one person but requires input from multiple IMT representatives.

37. In respect to ward 2A PAGs and IMTs, I tried to attend all of these as the lead IPCN. I was new to the sector and I was keen to establish relationships with the wider service teams. As the concerns with ward 2A began to escalate, I also felt it was important that I was visibly present as the most senior IPCN representative on site. This also helped me to stay abreast of all the incidents and developments which were increasing in number.

Events after appointment to Lead Nurse Role in 2017

38. Very early on into my appointment as lead IPCN, ward 2A was giving me cause for concern. In the first eight weeks I was in post, there were six or

seven clusters of infection which required a PAG to be convened for each. I reported all of these to the senior IPC management team. I cannot recall ever having seen so many clusters in one area over the years I had been working in IPC. Although I had managed outbreaks in the equivalent adult setting at the WoSCC they were infrequent and contained relatively quickly in comparison to ward 2A. I had not been made aware of any outbreaks or incidents or concerns relating to ward 2A, or any other ward in RHC prior to my commencement in post.

39. Some of the cases and clusters were generated on ICNet, others were reported to me by Dr Inkster or a laboratory microbiologist. An example of this would be one of the early cases of a patient blood culture sample which had grown Elizabethkingia. Elizabethkingia was a very unusual organism and was not on the HPS national alert organism/condition list, it therefore did not generate an alert on ICNet. I had come across an isolate of Elizabethkingia before and had to seek Dr Inkster's advice regarding it. I certainly hadn't seen any other cases in RHC or in my previous posts. I also reviewed the literature regarding its relevance in a clinical sample.

40. Dr Inkster undertook a review of the lab system to identify any prior cases over recent weeks or months within RHC. She identified two other cases, and both were associated with ward 2A in time and place. We reviewed the literature to help understand sources of the pathogen. It was an environmental pathogen associated with water and soil. One of the few pieces of literature described finding it in samples taken from condensation. This led us to consider the condensation which had been reported regularly dripping from the chilled beams in ward 2A as a potential source. A PAG was convened to discuss these cases.

41. In response to the Elizabethkingia findings a request was made for estates colleagues to sample the condensation on the chilled beams then undertake cleaning of the ventilation system. Dr Inkster also instructed that the water outlets were sampled by the estates team. The local IPCT also carried out a visual inspection of ward 2A environment. Patient samples were sent for

typing. The typing process allows strains of the same organism to be identified based on genotypic differences. Results assist IPC in understanding the epidemiology of the patient cases and establish links between cases or potential sources such as the environment. However, where patient types do not match with environmental types, this does not rule out a link between the two. My recollection is that all three patient cases were different types and from memory Elizabethkingia was not found in the samples taken from the chilled beams. I believe there were other organisms found in the condensate samples, but I do not recall what they were.

42. In the initial weeks an increase in bacteraemia rates was also observed. There was a general upward trend which was concerning although I am unable to recall specific numbers. Clinicians had also reported a perceived increase in fungal infections on ward 2A. My recollection is that review of lab data did not find a general increase in fungal infections however it did identify higher than expected cases of Aspergillus. I recall there were three patient cases and all of them had been significantly affected by invasive Aspergillus infection. One of the key hypotheses was mould growth within the ceiling tiles. There had been a water leak on the ward. I cannot recall the date of that. But once the leak had been resolved, the affected ceiling tile had been replaced. During investigations into the cases of Aspergillus, the ceiling void was inspected by myself and Dr Inkster and extensive mould was found on the surrounding ceiling tiles in the internal ceiling space. We also sought out any construction works taking place near ward 2A which have been known to be associated with aspergillus infection amongst patients. I don’t recall us identifying anything of significance in regard to construction works. We also reviewed the CLIC Sargent house which was a resident facility for patients and families nearby. Again, I do not recall us identifying anything of significance in CLIC Sargent house.

43. All these incidents coupled with two or three gastrointestinal outbreaks on ward 2A in those initial weeks had generated significant concern certainly by myself and Dr Inkster and the staff on the ward. These were all reported

individually by myself to the IPC SMT. To demonstrate our concerns relating to the total volume of incidents, I compiled a list of all the PAGs convened specifically in relation to ward 2A since I had started in the lead nurse post. It was a brief high-level summary detailing the trigger for each PAG, the concerns identified, the controls applied and the patient case numbers. I emailed this to Sandra Devine and Tom Walsh and possibly other members of the SMT. We did not have an IT system that triggered multiple incidents or a protocol in place describing the need for such a report in a scenario such as this. Nor would I expect there to have been one. The point was that the concern relating to the volume of incidents in one ward was out of the ordinary. From memory, I generated the summary around May 2017. In addition to sending it by email to Sandra and Tom, I also presented it at our weekly lead nurse meeting and SMT meeting. It is possible I also shared it with AICC. My understanding was that it was going to be shared with the Board Infection Control Committee (BICC). I am not aware whether this happened or not as I did not attend BICC. By submitting this summary report, I wanted to ensure my concerns around the volume of incidents over a short period of time were escalated. Dr Inkster shared my concern.

44. At the meetings I talked through the content of the report and my concerns. I do not recall much discussion or having received many questions or queries regarding the detail of the incidents. The updates for my sector at lead nurse, SMT and AICC meetings were typically far more extensive than that of the other sectors. It seemed to be that RHC was a clear outlier in terms of volume and type of incidents and most of these were associated with ward 2A. I do not recall being sought out by the senior management team to explore concerns or reports further.

45. In those early weeks the local IPCT undertook a number of investigations and applied controls in response to the incidents. Visits to the wards 2A and 2B by the IPCT were enhanced from weekly to daily with myself, or another IPCN in the team, undertaking the visit. We observed staff practice on the ward including hand hygiene, adherence with PPE use, cleaning standards, line

care and we spoke regularly to staff to help identify concerns or knowledge gaps. There were some initial concerns identified including clutter in patient rooms, and items on the clinical hand wash basins. Some of the staff PPE practice was not optimal and there were high levels of dust found. The IPCT acted on these issues immediately and the nursing and clinical team were very responsive to training and support. Audits provide a snapshot of standards and on a working ward this can be variable. Any issues picked up at the time of inspection or audit were addressed immediately. IPC education sessions were provided for staff to reinforce good SICPs. We observed parent practices on the ward also. In addition to the education sessions provided to staff, education sessions were also provided for parents on ward 2A/2B to ensure they were aware of the IPC measures they needed to adhere to and the reason why these were important. Following education and support, practices improved with the exception of the domestic cleaning which required more input.

46. Line care and application of aseptic technique was considered closely. The local IPCT observed techniques, monitored documentation, inspected the theatre where lines were inserted and considered dressing types and bungs used. We also inspected the areas where IV medications were prepared and the way they were prepared. We were seeking to understand whether there may have been a breach or change in practice, or a change in equipment used which may have triggered the increase in positive blood cultures. Some points were noted in practice which had to be addressed but nothing which would demonstrate an overall rise in blood cultures on the unit. Staff line care on the unit in general was good. We met with the quality improvement group for catheter line associated bloodstream infections (CLABSI) also who described the work they had been doing. I do not recall a lot of the detail regarding this group.

47. Domestic cleaning on the ward was also inspected. Cleaning frequencies on the ward were determined by the national cleaning specification which is produced by Health Facilities Scotland (HFS). It provides a blueprint to help

local health boards determine a frequency of cleaning, dependent on the level of risk in an area and the type of room that is involved. My recollection is that there was one domestic during the day on ward 2A. She had to undertake the first daily clean of all patient rooms and the general clinical areas before commencing a second daily clean of rooms occupied by patients with infection.

48. The IPCT did have concerns with the domestic cleaning on the ward, which were reported to the domestic team a number of times, not just by the IPCT but by the senior charge nurse (SCN) as well. The SCN would often copy me into her emails. Initial concerns would be reported to the local domestic supervisor. I can't recall the name of the specific supervisor at the time. When I emailed my concerns, I would typically include Billy Hunter who was the facilities manager at the time and Mary Anne Kane, who I think was the interim director of facilities.

49. Some areas of the hospital were very dusty. Especially the stair wells and corridors. The building seemed to generate much higher levels of dust than other hospital sites I had worked on. Health Protection Scotland (HPS) did not identify any concerns during an external audit however, I believe the domestic resource had been increased prior to their visit and whilst this was positive, this was not maintained, and issues recurred again after the HPS visit.

50. There were meetings convened by Dr Teresa Inkster with Billy Hunter to discuss the list of domestic concerns. I think the first meeting regarding 2A would have been in 2017. The local IPCT and clinical staff were becoming frustrated with the lack of long-term resolution. Issues would be rectified quickly only to recur again a short time later. Examples of the problems included high level dust, access to the patient rooms to enable cleaning and responsibilities for cleaning patient beds. I suspect this was because there was not enough domestic resource on the ward. Eventually after several meetings with general managers in facilities, first Billy Hunter and then Karen

Connolly, the domestic resource on ward 2A was increased and the standard of domestic cleanliness improved.

Overview of infections and timeline

51. A short time after I had reported the increased number of incidents on ward 2A, the local IPCT recognised an increasing number of blood cultures amongst 2A patients which had grown Stenotrophomonas maltophilia. This is a GNB associated with the environment and was another organism I had no recollection of having seen reported before. Having investigated a lot of practice on ward 2A and having seen improvements with the practice issues identified, it was at this point that I felt there may be something of significance within the 2A environment causing these infections.

52. Infections in healthcare cannot be eliminated completely but IPC measures exist to reduce the risk of infection acquisition. This is of specific importance amongst the vulnerable patient groups. In general, referral of positive blood cultures to the IPCT would typically be gram positive organisms such as Staphylococcus or Streptococcus. Gram positive organisms often harmlessly colonise the skin or respiratory tract and sources of infection can be the patient's own flora or that of a healthcare worker. Over time clusters of infection continued to present amongst the ward 2A patients. Gram negative organisms (GNO) are typically associated with the environment. Water and soil are known to be environments in which they flourish. Different types of GNO were regularly appearing in blood culture samples amongst ward 2A patients. It wasn't just the number of positive samples but the range of unusual organisms.

53. In order to effectively monitor for an increase in any single pathogen, it is necessary to understand the background rate of infection. This was considered for the Stenotrophomonas cases. One of the challenges we faced was that we only had data pertaining to cases dating back to the hospital opening in 2015. Prior to this, the patients had been on another site and

therefore comparisons were more difficult to draw. My recollection is that there had been very few cases of Stenotrophomonas between 2015 and 2017 amongst 2A patients. Possibly only one or two.

54. I recall much debate around this at IMTs. It was suggested that Stenotrophomonas wasn't part of the routine test historically and testing methods had advanced over the years therefore the increasing numbers were because there was now the ability to detect it in the labs. This was raised a number of times I think in a bid to understand the extent of the issue and whether it was truly associated with ward 2A. Throughout the IMTs, Dr Inkster was often challenged on the significance of the data and overall case numbers and whether it warranted the controls being advised.

55. Challenge, debate and discussion at an IMT are essential to utilise the expertise of those in the room and ensure that all possible hypotheses are being considered and explored and appropriate controls are in place. As the incidents associated with the 2A environment were increasing, there was a growing sense of tension at the IMTs and Dr Inkster as the chair was being challenged a lot. It often didn't feel supportive but rather it is my impression that at times, as an experienced microbiologist and IPCD, Dr Inkster's opinion was not always respected by everyone at the IMTs.

56. It's important to continually review the hypothesis for an incident and the data considerations were complex. Many of the patient cases were clinically unwell as a direct result of these GNB and this was reflected in what clinicians were seeing amongst their patient cohort. In my opinion there was justified reason to continue outbreak investigation and implement controls to ensure that risk was minimised as far as practically possible.

57. In September 2017 Dr Christine Peters was providing IPCD cover for Dr Inkster. She contacted me to report a patient blood culture on 2A which had grown Cupriavidus. This was yet another organism I was unfamiliar with. Dr Peters briefed me on investigations into a case of the same pathogen in 2016

in a patient who had been on 2A. Investigations at the time had found growth of Cupriavidus in a sink within the aseptic pharmacy, and my understanding is that the sink was removed. I had no knowledge of this incident prior to Dr Peters informing me. The aseptic pharmacy was located on the same floor and in close proximity to wards 2A and 2B. The aseptic pharmacy prepares intravenous medicines under sterile conditions such as chemotherapy and nutritional products. They did so for many of the patients on ward 2A. On finding the second case of Cupriavidus in 2017, practices in the aseptic pharmacy were inspected. My recollection was that the only action for the department was to relocate storage of dirty waste. All other practices were of a high standard. Investigations then focused back on ward 2A.

58. Every inpatient ward in RHC received a weekly visit from a member of the IPCT to offer support and discuss any patients on the ward for whom there were infection control concerns. An IPCN may return to some of the wards if a new patient referral was received. In comparison, myself or another of the IPCNs would visit ward 2A almost every day, sometimes twice per day, and for significant periods of time. Of my time spent at RHC, a disproportionate amount of my time was spent in Ward 2A. The management of issues on ward 2A throughout the period of concern overwhelmed what would be considered as my routine day to day role. I often felt concerned that an issue or concern somewhere else in the sector would be missed because of this. I noted this concern often at lead nurse meetings.

59. In response to the concerns on ward 2A, the IPCT applied many controls and spent a lot of time supporting the outbreak management. It was agreed at one of the IMTs that a member of the facilities team would accompany the IPCN on our daily visits also. I very often did these daily visits with Karen Connolly who was the general manager within the facilities team. We were also accompanied by the SCN on the ward and later the lead nurse, Melanie Hutton. The purpose of this was to ensure we all had sight of any findings and actions could be taken immediately with any areas of concern identified.

60. All typical IPC controls and monitoring were in place, increased cleaning with chlorine-based detergent, strict patient isolation, education sessions, audits, daily unit visits. Despite this there seemed to be little effect on the number of positive blood cultures being reported. Throughout the course of the affected time period, more extreme controls were applied such as installation of portable hand wash basins, ward decant, installation of portable ventilation units, extensive ward repairs. This was exceptional and I had never experienced a response like it. In my opinion it was necessary.

The water incident: Investigations and controls

61. Water sampling was undertaken many times in response to the patient infections. Water sampling was undertaken by the estates team at the outset but then DMA Canyon took over responsibility for sampling. Not every outlet was sampled but locations were directed by our early hypotheses. We hypothesised that water from the shower or splashing from clinical hand wash basins (CHWB) may have been able to contaminate the patient's line. Testing focused on areas where the patients had been. CHWBs and showers within patient rooms were included. The IPCT considered whether the giving sets used to deliver IV medication may have become contaminated if in close proximity to an outlet and so areas where the staff were preparing the medications were also included. We also tested water in the main theatre used to insert lines and in the imaging department which many of the patients had visited. Over time some sampling was undertaken from various outlets across the clinical areas in which 2A patients occupied. My recollection is that wider sampling across the QEUH site was performed when we were considering decant.

62. I am unable to recall specific dates however water sampling identified GNOs at different points during the water incident, some of which had also been identified in clinical samples from patients. Cupriavidus, Stenotrophomonas and Pseudomonas aeruginosa were all found in water samples. There were

other positive isolates but I cannot recall them all. Both patient and water isolates were sent for typing. Many of the water isolates did not match patient isolates. However, organisms have the ability to change and multiply in the right conditions such as water or soil. This means that there may be multiple types of the same organism found. Typing of organisms help rule in an environmental source but cannot rule it out.

63. I recall Dr Inkster advising the estates team that there had to be a clear protocol in place for the way in which they collected samples including whether it was pre or post flush samples that were being taken which would help determine where in the system the contamination was. Dr Inkster would explain the need for appropriate sampling protocols both at IMTs and with estates colleagues on a one-to-one basis. My recollection is that an agreed written protocol was produced. I never collected any samples or got involved with testing.

64. Flow straighteners in the taps within the RHC and QEUH were a known risk factor for bacterial growth. As part of the response to the incident, these were removed from all outlets in high-risk settings within RHC which included all the clinical areas occupied by 2A patients. During this process, Dr Inkster requested an outlet for examination in the labs. I am unable to recall the date of this. My understanding is that she dismantled the outlet and inspected and tested individual components. GNOs were isolated from the test samples as was fungi. There was also a build-up of biofilm internally.

65. Chemical dosing of the water system was performed on more than one occasion. This was usually in response to further positive water sample results. Estates teams would lead on chemical dosing. Early dosing was performed for wards 2A and 2B but later this was extended to the wider hospital site. We also performed splash tests at the sinks using a dye to help better understand and visualise the splash contamination zone.

66. Point of use filters (POUFs) were also procured and fitted to all taps and showers across the 2A pathway although I am unable to recall specific dates of this action. There are different manufacturers of POUFs that health boards can procure from. They can be attached to any outlet. They have very fine filters inside them to filter out any pathogens in the water. The filters were not an easy solution and came with challenges.

67. The filters last either 30 or 60 days, depending which type is chosen. There must be a schedule in place for replacement and a recording system noting which date each individual POUF was installed. This meant estates staff were having to regularly access patient rooms to replace POUFs. When washing hands, hands should only come into contact with the flow of water. When the POUFs were installed, it left very little space for hand washing and this meant hands could quite easily touch the filter or touch the sink, risking further contamination. They made handwashing logistically more challenging. The filters also had to be cleaned appropriately as per manufacturer's instructions. Domestic staff had to be trained how to do this.

68. It was the first time I had any experience of their use in practice during my time as an IPCN. I would typically expect POUF to be a short- term measure used when an immediate risk associated with the water system has been identified and removed again following rectification of the issue identified. My understanding is that there are a few clinical wards or areas in the UK who use them on a long- term basis having had prior concerns with their water system and I assume as a precautionary measure.

69. As further cases of GNB were reported amongst 2A patients and following IMT discussions, more extreme measures were deemed necessary and mains water supply was no longer to be used by any staff, patients or visitors across the clinical areas occupied by 2A patients. More than twenty mobile hand wash basins were delivered to the ward. These portable sinks were supplied with bottled water, which was attached underneath. These allowed nursing

staff to still wash their hands and the children to have access to running water. The portable sinks supplied warm and cold water.

70. A programme of works then took place to remove and disinfect all the mains water outlets. This was followed by further chemical dosing of the full water system. I do recall at one point there being concern around the volume of chemical dosing that had taken place. I cannot recall the volumes, but my understanding was that it was a significantly higher dose than should have been administered.

71. The control measures were considered necessary to reduce the risk of exposure to environmental organisms. However, it was clear that it was challenging and unpleasant for the patients not to have the use of the showers in particular.

72. We considered early on the possibility of oral consumption of pathogens but felt this was doubtful. On a precautionary basis, the children were provided with bottled water to drink. My understanding is that some patients in ward 2A would typically get sterile bottled water to drink during specific stages of their transplant.

73. My understanding from IMT discussions was that there was one water system supplying the adult QEUH building and another system supplying the RHC. I believe that within those systems, there were branches which could be isolated. Water testing was expanded as the incident progressed to the adult QEUH site. I do recall Dr Inkster had expressed many times in the IMTs that the water contamination identified in ward 2A was unlikely to only affect ward 2A and it was possible the problem was more widespread.

74. During the water incident, from memory I think this would have been in 2018, an external expert, Susanne Lee, was consulted. Dr Inkster was keen to get independent advice and support recognising that this incident was unusual in type and size. I can recall being advised that meetings with experts were to be

kept brief due to the costs associated with their consultancy services and for this reason there was to be a prior list of questions and queries compiled for the experts. I cannot recall who advised me of this. It may have been Tom Walsh or Sandra Devine. I was not at the meeting with the experts. Dr Inkster attended but I'm not sure who else was in attendance.

The Water incident: Drains

75. The IPCT first notified of a build-up of biofilm in the drains around early summer 2018. The clinical hand wash basins in RHC had drains which ran horizontally for around two to three inches before then draining vertically. It was this horizontal section which harboured high volumes of black grime. The IPCT undertook an inspection of all drains in ward 2A and found large numbers to contain the same black grime to a larger or lesser extent. I reported it to Dr Inkster and admittedly at that point I wasn't sure if there was a direct link between the drains and the patient infections. Inspecting drains isn't something I had found necessary previously or indeed experienced as a contributing factor within any of the outbreaks I had helped manage.

76. Following another spike in gram negative infections we noted findings relating to grime in the drains at IMTs. The IPCT carried out a review of all the sinks across the RHC site. This review found that most areas were affected to some degree with the worst affected areas being on the lower floors. In some of the drains it was visible to see that the drain circumference had narrowed because of the volume of biofilm build-up and water was slower to drain as a result. We also identified foreign objects in a few of the drains such as a toy car, penny coins and nail picks. The nail picks were found in theatre drains and had obviously washed down the drain during surgical scrubbing. There were photographs of drains that were almost fully occluded due to the volume of nail picks.

77. There was some literature associating biofilm growth with clinical infections and this was discussed at the IMTs also. The hypothesis was that on exiting

the outlet, water was hitting the drains dispersing the biofilm which was potentially contaminating patient lines or hands. Aerosolisation of bacteria was also considered.

78. A process for cleaning the drains was developed and rolled out across the 2A pathway. Due to the volume of biofilm build up, it was necessary to use a manual method and a bottle brush to remove it in addition to chemical cleaning. My recollection is that chlorine was poured down the drains after manual cleaning prior to a full clean of the CHWB being performed. A risk assessment was completed using the Healthcare Associated Infection System for Controlling Risk in the Built Environment (HAI SCRIBE) to ensure risk to patients was minimised during the process. This included removal of patients from their rooms whilst cleaning and disinfection of the drains took place. A Hydrogen Peroxide Vapour (HPV) clean of the room was performed before it was returned for clinical use.

79. HPV wasn't a standard or routine form of cleaning used in the hospital at the time. It was typically reserved for use following construction works in a clinical area or after outbreaks which may have been recurring or proving difficult to control. HPV was undertaken by an external company. HPV process requires all equipment to be removed from the room and manual cleaning to take place first. A machine would then be placed in the room to disperse the HPV which looked like a fog. The fog was able to access areas which may be missed or inaccessible during manual cleaning. It is a timely process when compared to manual domestic cleaning and this would impact room availability for patient treatment.

80. A regular maintenance programme for drain cleaning was established following this. Chemical product was poured down the drains on a weekly basis to try to prevent biofilm reforming. My recollection is that domestics were trained to do this however, if a manual brush clean was required, estates would undertake this duty under full HAI SCRIBE controls. The drains in Ward 2A were never replaced. To replace the actual drain, the whole clinical hand

wash basin needed to be replaced. However, waste pipe components, spigots, at the back of the drain were replaced. These were found to have corroded.

81. A private company was approached to scope the drains and help determine the condition of the points beyond what could be observed visually. My recollection is that biofilm was identified beyond the visible drain areas. Sampling of the drains was undertaken also in ward 2A and various other clinical areas occupied by 2A patients. Samples identified a number of organisms including GNOs.

82. There were a couple of theories regarding the cause of recurring biofilm. The first was as a result of the chemical dosing which had taken place to treat the water previously. My recollection from discussions at IMTs and following feedback from the water experts was that chemical dosing can erode the pipes, contributing to a build-up of biofilm. The other was as a result of reduced water pressure following installation of the point of use filters. The design of the drain running horizontally was also a contributing factor because it allowed a small pool of water to sit in the drain encouraging biofilm growth. Sealant towards the back of the drain had also caused an obstruction.

The Water Incident: Communication with patients and families

83. Routinely, IPCNs did not inform patients and/or families of test results. This was the responsibility of clinicians. If there were specific IPC queries clinicians couldn't answer, the local IPCN would be contacted to speak to the patient/family.

84. Duty of Candour describes responsibilities around communication with patients and exists in two parts; professional and organisational. Duty of candour in itself is a straightforward process but the incident which may have led to harm isn't always straight forward. In this case it was very complex. It takes time for those investigating an incident to gather the necessary

information to establish the cause of an incident. In this case the answers as to the cause of the patient infections weren't obvious. I wasn't involved with any direct parent communications but from discussions at IMTs and concerns raised by clinical staff it was clear that patients and parents were not being informed of the full extent of the concerns and the investigations being undertaken by the IMT.

85. I recall Professor Gibson expressing her concern about communications with parents. She felt that she needed support when speaking to them so that their questions could be better answered in respect to the environmental risk and the control measures in place. Dr Inkster offered to go with Professor Gibson to speak with patients and their families. The nursing team were approached by parents regularly with questions and queries relating to the incident and the controls in place. The SCN expressed at IMTs that the staff found this very difficult because they didn't have the answers to their questions. I recall Jamie Redfern and Jennifer Rodgers instructing the SCN to tell all the nursing staff not to provide any information about the water incident to parents if they were asked. They were told to instead contact Jennifer Rodgers or Jamie Redfern who would act as the single point of contact and go to the ward to speak with patients and families directly. My understanding was that this approach was to ensure that nursing staff weren't put in a difficult position but also so that all parents were receiving the same information and therefore less confusion would be created. I think that given the complexities of the incident that this was probably a sensible approach in terms of a communication process. I wasn't aware of the detail of what families were being told or the extent of the information provided.

86. One of the agenda items for the IMT was to discuss communications. Dr Inkster would raise various aspects of communication with IMT members. Communication discussions regularly included concerns raised by staff and parents and the growing unrest on social media groups. There was also often debate around the HIIAT assessment of public anxiety associated with the incident. There was growing media interest in the incident. Many discussions about the content of press statements took place outside of the IMTs.

87. Despite the communications led by Jennifer Rodgers and Jamie Redfern, there was building discontentment and concern from parents. From their perspective, they were being provided with information and I assume reassurance that controls were in place, then there would be further infections or another issue with the environment and naturally they would no longer feel reassured. Written statements were prepared and handed out to parents. I can't recall who prepared the statement. At the same time various media reports were also being published. A parent eventually approached the media directly with their concerns which resulted in significant media interest.

88. There was also a closed Facebook group that only parents of children in ward 2A had access to. None of the clinical staff or management staff had access to the group and the IMT were acutely aware that concerns were being discussed on this forum. This made communications more difficult as there was no NHSGGC representative able to see the concerns being raised and in turn, offer explanation or reassurance.

The Water Incident: Communication with Staff

89. I recall at least two large meetings held specifically for staff on wards 2A and 2B to communicate updates on the water incident. It is possible there were more. I attended one of these alongside Jamie Redfern who led the communication to staff. I was there to provide support should there be any IPC questions from staff. I can recall this was a well-attended meeting. It was also extremely difficult in the sense that staff tension was high and there were several staff members visibly upset. I do not think Jamie found it easy either. I could see that he was visibly struggling and was trying his hardest to answer the questions from staff as fully as he could. He appeared empathetic towards staff.

90. Although I think Jamie did a good job speaking to staff, I do feel it could have been avoided had staff communications taken a different approach from the outset.

The ventilation system

91. Prior to my appointment as Lead IPCN at RHC I had no real knowledge of any ventilation issues on the RHC or QEUH site. I have vague recollections of concerns being noted at Lead IPCN meetings in relation to the ventilation system in the adult Bone Marrow Transplant (BMT) unit, ward 4B in QEUH. This had happened prior to my appointment to the RHC post. I worked on the WoSCC site at the time of the concerns and was therefore aware that patients were transferred back from the QEUH to Wards B8 and B9 in WoSCC for a significant period of time whilst ventilation issues were rectified.

92. In my role as an IPCN, I had never had any reason to become involved with ventilation before. Ventilation was an area I had minimal knowledge of and would generally take it for granted that ventilation specifications were as they should be. I had never had an IPC incident prior that had warranted review of ventilation within ward areas. When I worked on the GGH site I would occasionally be informed of an issue with the pressures in one of the BMT rooms in WoSCC. However, patients would be promptly removed from the room until estates rectified the problem then the patient would be returned. From recollection, issues in WoSCC were identified quickly, rectified quickly and I don't ever recall patient infections being considered to be as a direct result of any ventilation failures.

93. When I moved to RHC, I became aware at a relatively early stage that the specialist ventilation rooms on ward 2A did not meet specification. I was also aware that the overall QEUH site did not meet ventilation specifications only having 3 air changes per hour (ACH) rather than the required 6 ACH. Kathleen Harvey-wood was a clinical scientist who worked on the site. She had many years of experience working with the 2A patient group in Yorkhill prior to transfer to RHC. I recall discussions with Kathleen around the air sampling which used to take place in Yorkhill and the ventilation in RHC being of a lesser standard. I can't recall if Kathleen was directly involved with air

sampling or not. Dr Inkster also confirmed this and I was aware that she had previously conveyed her concerns to SMT regarding this.

94. IPC consider patient placement generally to fit into one of three room types; positive pressure rooms, negative pressure rooms and general rooms which would only have the basic ventilation specification. Negative pressure rooms are used for patients who have a known infection, typically spread by the airborne route or a high consequence infectious disease like Viral Haemorrhagic Fever. This helps prevent the infection transmitting from the patient in the room to others on the ward. A BMT would not contain any negative pressure rooms. Negative pressure rooms would typically be found in an infectious diseases unit and in some cases, the emergency department (ED) and intensive care unit (ICU). Positive pressure rooms house patients who are immunocompromised and vulnerable to infection and act as a protective barrier helping prevent infection moving into the room. These rooms are likely to be found in wards which house the most immunocompromised patients such as BMT, other transplant units and in some hospitals the ED or ITU may have positive pressure rooms. The remaining general rooms make up the vast majority within hospital settings.

95. Some patients are both immunocompromised and have a transmissible infection. Therefore, some hospital sites have positive pressurised ventilated lobby (PPVL) rooms which perform a dual function in protecting the patient whilst also helping prevent transmission of infection to outside of the room. This is achieved by air extraction via a negatively pressurised ensuite area within the room. PPVL rooms have a lobbied area which also provides a space for clinical staff and visitors to prepare IPC measures prior to entering the patient room such as taking off any outdoor jackets or shoes, performing hand hygiene, putting on PPE etc.

96. A digital or mercury dial outside the room indicates the pressure inside each of the specially ventilated room types. The pressure fluctuates when the door is opened and therefore it is important they remain closed when not in use.

The room should be properly sealed, including the windows with no gaps in the walls or plaster to prevent air leaks affecting the pressures. The extractor needs to be positioned appropriately whether that is in the room or in the bathroom. From what I understood at the time, all these things are essential to achieve the ventilation regime. I took for granted that these requirements had been met as part of the hospital construction.

97. I had no formal training on healthcare ventilation and the extent of my understanding was limited. I couldn't describe the technical reasons as to why the ventilation didn't meet specification. Dr Inkster and Dr Peters offered support in helping me understand some of basic detail.

98. It was agreed prior to my commencement in the lead nurse role to upgrade half of the rooms to a ventilation standard compliant with specification. I recall this being noted at senior meetings, possibly AICC. I don't recall who led the review and decision making in terms of the upgrade. I had little to do with this work.

The Ventilation system: Investigation and controls

99. Concerns beyond the ventilation specification were also apparent. Condensation on chilled beams was a recurring problem. Before working in RHC I had never heard of or seen a chilled beam. My understanding is that they were a relatively new technology used to cool the air. These chilled beams were present in all of the patient rooms in ward 2A rooms and many other patient rooms across the wider site. Staff had reported condensation collecting on them and dripping down onto the floor below. Sometimes they dripped onto the patient beds or equipment in the room. The condensate was often visibly dirty. Ward staff reported this to estates teams when it occurred. I recall coming into work one Monday morning and being told that the condensate dripping from the chilled beams had been extensive across the site. It was described to me as it appearing as though it had been raining inside the building. This had occurred in both the adult and paediatric site. My

recollection is that the bed managers reported this by email. I can't recall who the email was sent to but I'm sure I was cc'd. Estates advised that the condensate build up was a result of changing weather conditions. If there was a change in temperature and particularly when it was very warm outside the condensate would collect and I recall estates colleagues explaining that it was difficult to rectify due to this. I recall there being a lot of discussion about this at IMTs due to these challenges and the nature of the recurring problem.

100. There was also a visible build-up of dust in vents. To address this, ventilation cleaning regimes were established. Like many of the works required in ward 2A rooms, this would require the patient to be removed from the room and full HAI SCRIBE measures in place before the work could be undertaken.

101. Dr Inkster again requested the support of independent external experts, this time Peter Hoffman and Malcolm Thomas to seek their views on risks associated with the existing ventilation system and potential controls. To seek independent advice would be a reasonable step to take with an incident of such complexity and size. However, it is likely that Dr Inkster was also seeking support that she perhaps should have been receiving from IMT members. Rather than helping her explore the hypotheses, it appeared as though many IMT members were asking her to justify her position in regard to the hypotheses, investigations being requested and controls being implemented.

IMT meetings

102. The IMT expanded in size over time with more senior staff attending regularly. Dr Inkster was quite clear regarding the extent of her concerns relating to the risk associated with ward 2A environment and later ward 6A. There was natural anxiety around this. The senior clinical team including Professor Gibson, Dr Murphy and other medical staff, Jamie Redfern and Jennifer Rodgers were understandably distressed at what this meant for patients and how the logistics of how they managed the service going forward. I recall the Chief Operating Officer (COO), Grant Archibald, attending one IMT around the

time of the decant. I'm not aware of the COO having ever attended an IMT before.

103. There was also a lot of tension and at times frustration conveyed at IMTs by some senior management staff in particular. I recall Kevin Hill and Tom Steele being very frustrated at points throughout the incidents. Frustrations appeared to be directed at Dr Inkster. Dr Inkster often had to ask for reports or results on multiple occasions which were necessary to allow the IMT to fully explore the hypotheses. However, these were not always made available.

104. The content of previous minutes would be debated for a long time and IMTs often extended well beyond the allotted one-hour meeting time. I recall there being a change in practice at one point in NHSGGC regarding minute taking. These were to be changed to action notes instead. Often the action notes did not capture all the necessary detail, or some members would not be content with the context of the notes. The notes would then be updated following discussion, but I don't think there was a clear system for circulating final notes for each IMT. I didn't look forward to attending IMTs because I felt that it wasn't a supportive environment. It was also evident that supplementary discussions were taking place outside of IMTs and over time I no longer felt fully informed before or after an IMT. There were pre meetings before many of the IMTs attended by the SMT. I wasn't clear on the governance or decision-making taking place outside of IMTs. In terms of anything I was reporting at the lead IPCN meeting each week and at the AICC, I am not clear on what happened to those reports or what action was being taken.

105. At an early stage, HPS were invited to join the IMTs for support and transparency. A representative from HPS attended almost every IMT. Most commonly Annette Rankin attended and latterly Lisa Ritchie accompanied Annette. There were often multiple questions posed to the IMT by HPS seeking to understand investigations and actions. HPS provided post IMT updates to the Scottish Government Healthcare Associated Infection Policy

Unit (SGHAIPU). It was common to then receive further enquiries from SGHAIPU.

106. By early 2018, the National Support Framework had been invoked by SGHAIPU. This is deemed necessary when an NHS Board requires additional support in the event of a healthcare infection outbreak or incident or data exceedance. When invoked, the framework sets out a series of actions for the NHS Board to take to ensure the necessary improvement. I don't recall ever having seen an action plan or having ever been called to discuss the implications of it with the senior IPC management team.

107. Clinical teams understandably expressed a huge amount of concern at IMTs. Professor Gibson, SCN Emma Sommerville and SCN Angela Howatt attended most frequently. Professor Gibson in particular asked a lot of probing questions of the wider IMT. She did so professionally and was respectful and supportive of the chair. In general, all the clinical representatives were respectful of the IMT process whilst clearly visibly frustrated at the degree of concerns relating to the environment, the impact of the controls and ultimately the impact on their patients. The clinical team supported the view that infection rates appeared to be high and certainly were as a result of unusual pathogens not typically seen in their patient group. There were lots of concerns expressed by clinical staff regarding communications with patients noting the volume of questions posed to them by parents on a daily basis.

Decant of ward 2A and 2B patients in RHC: selection of location for decant

108. Around late 2018 there were wider concerns regarding the ventilation supplying ward 2A. From my recollection this was as a result of an external inspection of the system which identified multiple issues. Despite controls being in place for the water, for the drains, and for the wider ventilation issues there still appeared to be a risk to patients. There continued to be clusters of infections reported in the ward 2A patients and the number of concerns which had been raised over the prior 12 to 18 months in addition to the now known

ventilation issues. A decant of ward 2A to another area was necessary to enable the ventilation system to be brought up to the required specification and make other necessary repairs to ward 2A.

109. Jamie Redfern led the options appraisal for the decant. The IMT as a whole were involved in the decision-making process but I assume the final decision would have been signed off by the executive management team.

110. The options appraisal listed all the potential options for decant locations and the pros and cons of each. I think there may have been around seven or eight options. Considerations were not just around IPC but crucially what was practical and safe from a clinical perspective. There were also considerations around the equipment needed for paediatrics and safe staffing levels as well as quick access routes to PICU, theatres and radiology within RHC.

111. The WoSCC was considered noting that the ventilation system there was of the appropriate standard. However, the WoSCC was ruled out because there was no paediatric intensive care or specialist paediatric teams on site. Both needed to be available on the same site to respond to any patient who may deteriorate quickly.

112. A pop-up hospital was also considered. My understanding is that these have been used internationally and for military hospitals. The time it took to construct this on the RHC prevented this being an option alongside concerns regarding where it could be sited.

113. The adult QEUH was then considered. The IMT didn't go through each ward in QEUH one by one. Ward 6A was suggested from the outset therefore there must have been prior consideration with service managers from the adult site. My recollection is that ward 6A was a medical care of the elderly ward. It was noted that the adult services could move some of those patients to GGH and vacate the ward for use by the paediatric patients. It was also close to Ward 4B, which was the adult haemato-oncology unit and the proposal was that

some of the 4B specially ventilated rooms could be used for the paediatric BMT patients. The IMT agreed that Ward 6A would be the best location because of its locality to ward 4B as well as services within RHC.

114. If the considerations were only about IPC, I would suggest that WoSCC would have been the best location for the decant recognising that this area had successfully and safely treated BMT patients previously. Taking account of all the considerations however, I was in agreement that ward 6A was the right decant location.

115. The intention was that the decant was going to be short lived and was based on the planned works to the ventilation system. The IMT often spoke about getting back into Ward 2A for Christmas.

The decant – preparation of ward 6A

116. Once the adult patients had been moved from ward 6A and all equipment had been cleared from the space, a senior IPCN and I undertook an inspection to determine if any works were required prior to the ward 2A patients being transferred. Dr Inkster joined us on a couple of the inspections. There was quite a volume of work required to allow patients to decant. Many of the shower areas had water ingress around the flooring and wet wall damage. Doors to the main ward and the patient rooms were damaged. There was damage to some of the wall trunking and worktops in prep areas. We generated quite a list of issues requiring rectification. Damage such as that identified prevents adequate cleaning and promotes the growth of organisms.

117. There was an intense week of remedial works commenced by the estates team. Once they had completed the work to fix these issues, the senior IPCN and I repeated the walk round and identified a few more issues which required repair. Estates were on hand to respond quickly. The clinical team were also visiting ward 6A to prepare it for their needs and similarly management teams were doing the same to set up appropriate services for the paediatric cohort.

118. From memory there were around three or four inspections by the senior IPCN and I before we eventually said we were content that all issues had been rectified and it was in a state that we could move patients into the ward. POUFs were in place on every outlet and drain and vent cleaning schedules were commenced on a routine rolling programme. I was not involved in the actual decant of patients, this was very much led and undertaken by the clinical staff on ward 2A and 2B.

119. There were mixed views about the decant. The fact it was having to happen at all was distressing for many however it was on a background of multiple issues on ward 2A and therefore I think there might also have been a degree of relief for some that the decant was taking place allowing ward 2A to have issues addressed thoroughly.

Problems in 6A after the decant

120. It was becoming apparent that following the closure of ward 2A, more problems had been discovered and a return to the ward before Christmas was unlikely. My recollection is that the extent of the problems with the ventilation system were greater or different to that prior to the decant and a full upgrade of the ventilation system was necessary. The details of the technical findings are beyond my knowledge or understanding.

121. We received another unusual blood culture result in [redacted] 2018 belonging to a paediatric patient who had very recently died. The patient had died on PICU but was under the care of the [redacted] team and had been on ward 6A prior to PICU. The blood culture was positive for Cryptococcus. This was another pathogen I was unfamiliar with and had never seen in a clinical sample before. Over the following days further samples taken from the same patient were also positive for Cryptococcus. It seemed evident that [redacted] had had widespread systemic infection as a result.

122. Cryptococcus is a type of fungus. An initial review of the literature associated it with soil and pigeon droppings. There had been problems on the QEUH site with pigeons and seagulls and a high volume of bird excrement could be found around the site. Staff had contacted the IPCT previously to complain about the presence of the dead birds on the roof top gardens.

123. A second case of Cryptococcus was then reported to the adult team. This time it was from a blood culture taken from an adult patient cared for in the QEUH building prior to the paediatric case. The adult patient died in the January 2019.

124. Both patients had grown Cryptococcus in blood cultures taken within a short period of time, from memory there were less than 20 days between cases, and both were considered hospital acquired given the length of time they had been in hospital prior to clinical samples testing positive for Cryptococcus. This was another example of two patients, associated with the same place over the same time period with the same unusual pathogen.

125. The local IPCT began a review of the building for pigeon droppings. There was no doubt that the whole site had lots of evidence of pigeon infestation. Pigeons could be seen roosting under ledges, around the lower-level windows and in the external atrium areas. This was all clearly visible from within the building. They were found nesting in courtyards, on generators and on windowsills of patient rooms. After speaking to staff during ward visits to explore the extent of visible pigeon excrement external to the patient wards, they began highlighting it to the IPCNs when we were undertaking our routine visits. The volume of excrement created by the pigeons was significant and staff would report to us that they had regularly informed facilities of the problem. My understanding is that facilities had previously tried to address the issue of high numbers of pigeons nesting around the site. The IPCT had not been aware of the extent of the problem until investigations into the Cryptococcus cases started.

126. The plant rooms were inspected by Dr Inkster and facilities staff and significant pigeon excrement was found. My understanding is that some was dry indicating it was old, and some was wet, indicating it was new and pigeons were still accessing the area. The ventilation as a mode of transmission became one of the main hypotheses. We also considered windows which may have not been properly sealed and questioned staff to understand if the patients had been taken to the main foyer of the hospital for any reason where there could have been an exposure risk. We considered the downdraft resulting from the landing of the emergency helicopter on the hospital roof. We hypothesised that it may have unsettled fungal spores and forced them into clinical areas allowing inhalation by patients. We sought out any areas of soil which patients may have accessed but none were found.

127. There was recognition of the fact that Cryptococcus can lie dormant and these cases may have demonstrated reactivation of the virus having acquired it some time prior to hospital admission. One of the patients had been in hospital in England some time prior which may have been a possible source and this was recognised by the IMT. Noting these points however it was difficult to ignore the time, place and person association between the two cases on the QEUH site. I feel it was only right that this was fully investigated and all possible links to the hospital explored.

128. Remedial action began, which focussed on decontamination of the plant rooms and all areas containing pigeon excrement. I believe an external company was procured to try to control the pigeon numbers on the site however I am not familiar with the details of this.

129. The IMTs held to investigate the Cryptococcus were becoming heated and Dr Inkster as the chair continued to be challenged extensively on her views that this may have been associated with the ventilation. I recall Tom Steele challenging Dr Inkster many times and my impression was that the questions posed were a result of pre meetings in advance of the IMT. As previously

noted, it did not feel like a supportive environment and the views of Dr Inkster appeared not to be respected.

130. My understanding is that there were cases of mucormycosis being investigated by the IPCT on the adult site around the same time. I believe there were two cases. Mucormycosis is also a type of fungal infection which progresses rapidly. I know very little about the detail of these cases.

131. The Cryptococcus incident and the cases of mucormycosis were both reported in the media and I think this fuelled the tension at the IMTs. They were further evidence of possible concerns with the hospital environment. I found the IMT very difficult to participate in by this time. I did not feel that the views of the IPCT were well received, and tension just kept building. There was little feeling of teamwork to explore the hypotheses. Anxiety amongst clinical staff and parents had increased significantly again.

132. It had been agreed to install portable HEPA filter units in ward 6A to increase the ventilation specification. These were added to every patient room and all other clinical areas. Air sampling was performed to test their efficacy. The particle counts were high and Dr Inkster and Dr Peters undertook another inspection of ward 6A. The seals around showers were breaking down and water ingress was a problem with black mould evident under flooring and behind the wet wall. It was agreed that some of the shower areas required wall replacement. The remedial works required decant of each patient out of their single room again, one by one and it was a slow process.

133. On visiting the ward around this time, I spoke with a contractor who was replacing the wet wall in an en-suite area. He described the back of the shower as being like Weetabix. It was just crumbling in his hands. He said that water resistant Gyproc had not been used in the en-suite area. I do not recall the name of the contractor or know which company he was from. I reported this to estates colleagues and at IMTs being held around that time.

2019 Onwards

134. A further decant of patients from ward 6A to the Clinical Decisions Unit (CDU) within the RHC was required. This was relatively short term, I recall around seven to ten days, and allowed repairs to be undertaken to shower areas in ward 6A. I cannot recall the process undertaken to select CDU as the decant area however inspections were undertaken of the area prior to the decant.

135. Following repairs to ward 6A the patients returned and were still on ward 6A when I left to take up my role in ARHAI Scotland. I do recall the number of GNB had reduced somewhat however a lot of controls remained in place including POUFs, HEPA filters and enhanced visits from the IPCT accompanied by facilities staff to ensure a quick response to any defects identified.

Impact on Staff

136. It is my impression that the impact on the staff was significant. I know from many conversations with staff who worked across wards 2A and 2B that they found it stressful and worried about harm coming to patients. Time spent responding to the incident was time taken from caring for patients.

Impact on patient and families

137. It was evident from information shared at IMTs that the impact for patients and families was significant and cannot be underestimated. As a parent myself, it was impossible not to think of the effect it was having on both the children and their families. They were fully reliant on the clinical team and the hospital to keep them and their child safe and yet their confidence in the hospital environment had been eroded.

Personal Impact

138. The personal impact on myself cannot be compared to that of the patients who acquired infections or the parents who had to endure the pain of watching their children suffer. I enjoyed many years working within IPC in NHSGGC. I enjoyed working in the paediatric setting and I enjoyed working with the clinical teams and felt I had established good relationships with them. However, the pressure that was associated with supporting these incidents was intense and relentless for the entire time period spent at RHC. I worked a lot of overtime which was a detriment to my own family life. By the time I had commenced my role in ARHAI Scotland I feel a significant degree of my confidence had been eroded having spent more than two years unable to resolve the infection rates. In hindsight I feel this could have been negated by a more open and transparent culture within NHSGGC.

Closing comments

139. From an infection prevention and control perspective, the challenges associated with the built environment were not in keeping with the expectations of a new build facility and it is my opinion that the built environment contributed to infections. When compared with my time spent working on older hospital sites, the frequency and severity of issues reported in relation to the built environment was significantly higher.

140. The complexity of the faults associated with the water and ventilation system are for the Public Inquiry to explore however it is my opinion that the approach to exploring the hypotheses associated with incidents and with findings from investigations was not cohesive, transparent or supportive.

141. 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.