Scottish Hospitals Inquiry
Witness Statement of
Professor Craig Williams

INTRODUCTION

1. My name is Craig Lester Cranage Williams.

2. I am currently employed as a Consultant Microbiologist at the University Hospitals of Morecambe Bay in Lancaster. I have held this appointment since 2018.

3. As a consultant my week is made up of a 40-hour week split into ten 4-hour sessions (referred to as PAs).

4. Currently, I am working as a Clinical Microbiologist. I also have an honorary contract as visiting professor at The University of Central Lancaster (UCLAN).

OVERVIEW of PROFESSIONAL BACKGROUND

5. I have been employed in multiple Consultant Microbiologist and Infection Control Doctor roles. My speciality is Clinical Microbiology.

6. My medical career began at Walton Hospital in Liverpool. I was a Pre-registration House Officer in 1982. Between 1983-1985 I was the Senior House officer on a general medical rotation.

7. Between 1985 – 1987 I worked on a Pathology Rotation including Microbiology at the Royal Liverpool Hospital.

8. Following a two-year Rotational Registrar appointment in the West Midlands Regional Health Authority between 1987 and 1989, I began the role of Senior

Registrar in Bacteriology at the Western Infirmary, Glasgow. I was also an Honorary Clinical Lecturer at the University of Glasgow.

9. Between 1993 and 1995 I became a Consultant Microbiologist at Scunthorpe General Hospital.

10. In 1995 I took up the role of Consultant Microbiologist and Infection Control Doctor at the Royal Alexandra Hospital in Paisley.

11. In 1997 I undertook the additional role of Clinical Director of Diagnostic Services in the Royal Alexandria Hospital, Paisley.

12. Between 2001 and 2002 I was employed as an Infection Control Doctor and Consultant Microbiologist at Hull and East Yorkshire Hospitals.

13. I was then employed with the Yorkhill NHS Trust between 2002 until 2016. This trust was subsumed into NHS Great Glasgow and Clyde (NHSGGC). Between 2009 and 2016 I also undertook the role of the Lead/Co-Ordinating Infection Control Doctor for NHSGGC

14. Between 2011 and 2019, for 1 day a week, I held the position of Professor of Healthcare Acquired Infection at the University of the West of Scotland.

15. Between 2016 and 2018 I was Consultant Microbiologist and Infection Control Doctor at Dorset County Hospital, Dorchester. I was also Clinical Director of Pathology, Pharmacy and Medical Physics.

AREAS OF RESEARCH

16. From 2011 – 2019, I held a part time post at the University of the West of Scotland. I undertook this research post alongside my clinical work. My research to date has included publishing over one hundred peer reviewed articles. My primary research interest is mixed species biofilm infections in

immunocompromised patients. This covers how bacteria in mixed species biofilms interact with each other, how they interact with the patient and ultimately finding the best way to remove them.

CONSULTANT MICROBIOLOGIST at NHSGGC, 2002 – 2016

17. Between 2002 and 2016 I was employed as a Consultant Microbiologist with the Yorkhill NHS Trust, which subsequently became part of NHSGGC.

18. From my appointment in 2002, I worked as a Consultant Microbiologist at the Yorkhill Hospitals which included the Royal Hospital for Sick Children and the Queen Mothers Hospital. During this period, I worked a 40-hour week, which was split between microbiology and infection control.

19. I worked with another Consultant Microbiologist and three clinical scientists. The laboratory was then relocated from Yorkhill to the newly built South Sector laboratory based on the Southern General Hospital site.

Description of Role; Microbiology

20. My role involved laboratory work, mainly covering paediatrics, but with some adult work relating to the maternity services at the Queen Mothers Hospital. My duties were to advise the technical staff in the laboratory about which organisms were relevant and which antibiotics to report to the clinical teams. I also worked on the wards managing patients with infections, giving advice to colleagues on antibiotic choice and duration and providing clinical advice on the investigation and management of patients with infectious diseases.

21. I was head of Department for the Microbiology Laboratory at RHSC. As such I was accountable for the quality of work coming out of the department and for ensuring that there was the appropriate microbiology support for the clinical specialties in the hospital. During that time, I would have reported to the Clinical Director for Laboratory Medicine for Yorkhill.

22. I have been asked who reported to me. The biomedical and clinical scientists reported to me regarding the quality of work from the laboratory. They would report to me regarding clinical aspects of the work, but would report to the Head Biomedical Scientist for RHSC regarding holidays or pay progression etc. They also reported to the Senior Biomedical Scientist with responsibility across the laboratory disciplines and the more senior laboratory management.

23. Following the merger of the laboratory to form the South Sector laboratories the paediatric focus of the laboratory was lost and the samples from children were processed in the same way as the much larger number of adult samples. I also became involved in giving advice regarding the management of adult patients with infection mainly out of normal working hours. My Consultant Microbiology colleagues, some with significantly less experience in paediatric microbiology, than me, became involved in giving advice about paediatric cases.

24. The laboratory part of my work consisted of dealing with the results from new samples as the preliminary results became available, which was normally in the morning. The clinical microbiology team would normally review the new batch of patients' blood cultures which had become positive. A consultant colleague, a clinical scientist or myself would then contact the ward clinical team to ensure that the patient who had the positive blood culture was placed on appropriate antibiotics. We would also provide advice regarding the further management of the patient and advise on any additional investigations which may have been required. We also received a significant number of incoming calls from clinicians on the wards raising queries about patients who were being treated for infection.

25. In addition to looking at blood cultures we would do a bench round in the laboratory each morning. We would go to each section of the laboratory and talk to our colleagues the biomedical scientists who were processing the samples in that section of the laboratory. They were then able to finalise the samples and issue reports to the wards on those samples. I would usually deal with infection control work in the afternoon alongside answering questions

usually by telephone from colleagues on the wards who could telephone for advice at any time of the day

26. I would also attend multi-disciplinary team meetings to discuss the patients with the clinical teams. This involved reviewing progress and results on all of the patients on that unit. I attended these on a weekly basis along with one or two clinical scientists.

Description of Role Infection Control

27. The infection control doctor(ICD) is usually a Consultant Microbiologist. As a microbiologist you are fully aware of the relevant microbiology results before you start managing incidents relating to infection control. The role falls into two main areas. The first is daily advice on infection control. At Yorkhill I would have daily discussions with the infection control nurses about any infection control problems which were ongoing with individual patients. The discussions included advice on the relevance of any microbiology results and together we would formulate a plan to reduce the chance of any cross infection. The Infection Control nursing team, being full time infection prevention and control specialists provide the majority of “hands on “infection control advice in most organisations are supported by a part time (ICD). The second area was managing outbreaks of infection. In the event of an outbreak an Incident Management Team (IMT) meeting would be convened. This was usually chaired by the ICD and if necessary, would consist of the Infection Control Nurses (ICN), clinicians, managers, domestic services and estates. The IMT would aim to ensure that the source of the outbreak was identified, and any subsequent cross-infection controlled. The IMT would also oversee any remedial measures to put in place to prevent recurrence.

28. Over time, with the involvement of Health Protection Scotland (HPS), the outbreak response teams became more structured. This included the creation of Problem Assessment Groups (PAGs). A HIIAT (Healthcare Infection Incident Assessment Tool) scoring report which if the score was red or amber was submitted to the HPS.

The Structure of the Microbiology Department at Yorkhill

29. The microbiology department at Yorkhill was split into functional sections for example skin and wounds, faeces and surgical samples. We also had the Queen Mother's Hospital on site so there were a small number of samples relating to maternity patients but otherwise it was exclusively paediatrics. The laboratory was a very specialist paediatric laboratory. This included bacteriology i.e. the isolation and antibiotic susceptibility testing of bacteria, mycology which is related to fungal infection and virology as it related to the patient population in Yorkhill, so specific transplant virology. The ability to look at all aspects of infection within one laboratory allowed us to develop a complete picture of any infectious processes going on in complex patients such as those undergoing bone marrow transplantation or having cystic fibrosis. It was a fairly unique laboratory in Scotland. The only peer laboratories would be in places like Birmingham and Great Ormond Street. Because Yorkhill Hospital was a major paediatric centre with a wide range of clinical specialties the microbiology laboratory support reflected that.

30. In the sections of the laboratory as described above there were standard operating procedures containing a list of samples that the Biomedical scientists should bring to the attention of the microbiology clinical staff. This was to ensure that the ward based clinical teams who were looking after the patient could be contacted as soon as any relevant results were available to ensure that the patient was receiving appropriate treatment. This also ensured that clinically appropriate reports were issued on key samples. On the more intensive units there is a lot of microbiology work. This included the bone marrow transplant unit, intensive care units the acute surgical unit and the cystic fibrosis unit.

Structure of the NHSGGC Infection Control Team

31. The Infection Control Manager had overall oversight of infection control within the NHS GGC. The Assistant Director of Nursing in infection control was an ICN

by training and led the ICN teams in each sector of NHSGGC, North, South and Clyde. The role of Lead/Co-Ordinating Infection Control Doctor was established to ensure that consistent advice was being provided by the ICD's working in each sector and to support the Infection Control Manager. These three roles, ICM, Assistant Director if Nursing and Co-ordinating ICD, made up the senior management team for Infection Control in NHSGGC. The Medical Director was the executive lead for Infection Control.

Move to South Sector Laboratory

32. The move to the South Sector laboratory completely changed the nature of the laboratory work that I was involved with. The paediatric microbiology service was incorporated into the adult microbiology laboratory, so paediatric samples became a small part of a much larger workload. I still retained some oversight of the paediatric bacteriology work, but the workload was shared amongst all of the microbiology consultants working in the New South Sector laboratory. The specialist virology work from Yorkhill was relocated to North Glasgow Laboratory and the mycology was also subsequently relocated to North Glasgow. This meant it was much more difficult to obtain a complete picture of infectious processes going on in complex paediatric patients.

33. The decision was taken that there would be no specialist paediatric microbiology section within microbiology, unlike for example biochemistry, where a specialist section was retained. This meant that paediatric specialist samples would be processed alongside large numbers of GP and other samples. The result of this was that staff from the microbiology laboratory in Yorkhill moved from a department where there was a tight focus on paediatric hospital samples to a laboratory processing large numbers of samples from adults and children including large numbers of GP samples which in my opinion blunted the focus on the paediatric work.

2009 – 2016, NHSGGC, LEAD/CO-ORDINATING INFECTION CONTROL DOCTOR

34. Between 2009-2016, subsequent to successful interview, I was Lead/Co-ordinating Infection Control Doctor (ICD) for NHS Greater Glasgow and Clyde (GGC). This was prior to the move to the Queen Elizabeth University Hospital (QEUH).

35. My role as Lead/Co-ordinating Infection Control Doctor was part time and undertaken alongside my role as Consultant Microbiologist. I retained responsibility as the ICD for the RHSC throughout this period and this role has been described in section 27.

36. I have been asked how my work was split between my roles during this period. I would do five PA's as the Lead/ Co-ordinating ICD. This included two PAs as ICD for the RHSC, subsequently the RHC, plus three additional sessions for co-ordinating infection control activities across the three sectors of NHS GGC. I would also that the provide ICD support to the ICM to ensure that the numerous Scottish Government infection control targets which were in place at that time were achieved to the best of our ability.

Description of Lead/Co-ordinating ICD Role

37. The role of the Lead/Co-ordinating ICD was to provide clinical leadership for the Consultant Microbiologists undertaking the role of ICD in the three Sector Infection Control teams. To co-ordinate the available ICD sessions and ensure appropriate levels of ICD support were provided by the clinical lead for microbiology. To work closely with the Infection Control Manager and the other members of the Senior Infection Control Team to develop the service and implement changes. I would also arrange meetings to share learning, discuss practice and ensure that the ICNs and ICDs were all working as a team across NHSGGC and giving consistent advice to clinical teams across the sectors in NHSGGC. This was a co-ordinating not a managerial role. The ICD's who were Clinical microbiologists working 2 PA's in Infection Control were managed by the Clinical Lead for Microbiology.

38. The Lead/Co-ordinating ICD role was distinct from that of the sector-based ICD's who retained responsibility for the provision of Infection Control advice to their sector. In Glasgow there are several hospitals which are large enough to require their own ICD. As the health board amalgamated physicians and surgeons were increasingly moving between hospitals. This highlighted occasions when the advice that was given by infection control teams differed across sites. The purpose of the Lead/Co-ordinating ICD role was to ensure that infection control advice given by ICD's was similar across hospitals.

39. Most microbiologists have a split role between laboratory work and infection control. There are no full time ICDs, the role is usually filled sessionally by Consultant Microbiologists. The Lead/Co-Ordinating ICD role, to the best of my knowledge within Scotland, only exists in Glasgow, other health boards only have one ICD so there is no need for a co-ordinator.

40. It was my responsibility to work with the Consultant Head of Microbiology to ensure that there were sufficient Consultant Microbiologist sessions provided to fill the ICD roles. The role was unusual in that the Lead/Co-ordinating Infection Control Doctor could not choose their own team but could only deploy the individuals made available by the Clinical lead for Microbiology.

<u>The Structure of Infection Control</u>

41. Infection Control is normally managed by hospital site. Each site in Glasgow was equivalent in size to some other health boards in Scotland so a large infection control team was needed to provide support to the clinical teams due to the high number of hospital beds within GGC.

42. The Infection Control Manager had overall oversight of infection control within NHS GGC. The Assistant Director of Nursing in infection control was an ICN by training and led the ICN teams in each sector of NHSGGC, North, South and Clyde. The role of Lead/Co-Ordinating Infection Control Doctor was established to ensure that consistent advice was being provided by the ICD's working in each sector and to support the Infection Control Manager. These

three roles made up the senior management team for Infection Control in NHSGGC

43. Each sector within NHSGGC, North, South and Clyde had its own infection control team. Within each team there would be a Senior Infection Control Nurse (ICN), a number of other ICN's and an Infection Control Doctor (ICD). The only full-time staff were the ICNs who were specialist nurses and had undertaken post-graduate training in infection control.

44. The role of the ICD for each sector is fulfilled with 2 PA's of consultant time from Consultant Microbiologists working in the microbiology laboratory within that sector. The Head of Microbiology managed the Consultant Microbiologists who were acting as sector ICDs.

Infection Control Senior Management Team

45. The Senior Management Team (SMT) was based at the Western Infirmary. I had one session per week with the SMT. The team was chaired by the Infection Control Manager (Tom Walsh). The team consisted of the Lead/Co-ordinating ICD (myself), the Assistant Director of Nursing (Sandra McNamee) and the Lead ICNs and ICDs from each sector.

46. The document Infection Control in the Built Environment: Design and Planning, dated June 2007 **(A33662182 – Scottish Health Facilities Note 30: Version 3 dated June 2007**, **Hearing Commencing 26 February 2024 - Bundle 13 - Miscellaneous - Volume 3, Document 16,)**, was used to ensure that any building work was done safely and to ensure that infection control precautions were implemented.

PLANNING MOVE to QEUH

47. A full-time ICN was appointed to support the project team and provide day-to-day infection control input. The only advice I recall being asked to provide was

basic information on handwashing sinks and fittings in relation to room specifications. We advised that this should be to the relevant HTM's. While there was infection control input, we were not asked to provide any further information than that provided by the ICN (Jackie Barmanory) as part of the project.

48. The next phase of the Glasgow Hospital Laboratory Project was the appointment of a preferred bidder and the commencement of stages one and two of the contract. I was not involved in these meetings and had no input into these documents. The laboratory build, listed within the project documentation was an entirely separate project to the new hospitals build.

Project Team

49. I was included in the project documentation as part of the laboratory group as Clinical Director for Laboratory Medicine, not as an ICD. This was to ensure that the laboratory building, which was built on the Southern General Hospital site prior to the opening of the QEUH, was appropriate for the laboratories which were due to move onto that site. This was a specific project group to deliver the laboratory build. We had dealings with the Project Team for this build, but this was an entirely separate building project to the hospitals build.

50. There was an Infection Control Nurse, Jackie Barmanory, attached to the project at an early stage. Jackie answered questions as they arose and would discuss queries with Sandra McNamee, Teresa Inkster and myself. My recollection is that these questions related mainly to hand hygiene sinks and fittings which we agreed would all be to the relevant national standards.

51. As Teresa Inkster was developing an interest in the built environment, I asked Teresa Inkster to be the ICD link with Jackie to respond to any questions. I also said that Sandra McNamee and I would be happy to be involved in any discussions that she and Jackie felt appropriate. The questions they received were more about the nature of the sinks, taps, fittings, and the positioning of hand hygiene sinks. However, there were no questions around which

ventilation should be used, when and how it should be fitted or any discussions around the details of ventilation or overall water design.

52. The Project Team were based separately in the portacabins next to the build. Early on in the project we were shown room mock-ups detailing the sizes of the rooms. These were plasterboard shells mocked up in a building on an industrial estate somewhere in South Glasgow to give people an idea of the size of the room. These rooms had no fittings either water or ventilation and again we were not asked to comment on anything specific based upon these room mock-ups.

Involvement in Planning Meetings

53. I can recall, as ICD for Yorkhill, having a meeting with Tom Walsh while he was based at the Health Board. John Hood the ICD for North Glasgow and Penelope Redding the ICD for South Glasgow also attended this meeting was to discuss the provision of isolation rooms for the QEUH.

54. This was before the acute division and health board amalgamated. At this time Tom Walsh was the Infection Control Manager and Sandra and Tom were based with the NHSGGC board in Dalian House. At that time a Senior Nurse, Annette Rankin and the Laboratory Manager Isabel Ferguson were leading infection control in the acute division.

55. I cannot recall the date of this meeting, but it was at some point between 2009 and 2013. This was prior to Clyde being amalgamated into NHSGGC.

56. We were asked at this meeting to advise on how many ventilated isolation rooms were necessary for the hospital. We advised that rooms would be needed for respiratory medicine, the intensive care unit, and the bone marrow transplant units. We also advised as to whether the rooms needed to be protective isolation, which is where the patient is vulnerable to infection, or source isolation, which is where the patient has the infection, and it is likely to

spread to other people. The advice was at a general level and did not include developing specifications for ventilated rooms.

57. This was the only meeting I recall being involved in for the planning of the QEUH. I am not sure where that information went because it did not materialise into the final build. We recommended a spread of rooms, so they were available in wards all over the hospital. In the end, I think for engineering reasons, all the isolation rooms were all put together to ensure that the machinery necessary for providing the airflow in these rooms was concentrated in specific areas of the hospital and not provided in each ward of the hospital. I do not recall being referred to during any other stage of the planning or attending any meetings regarding the detailed design specification.

58. In the Infection Control Senior Management Team Meeting Minutes Dated 27 August 2014 **(A40247718 – Infection Control Senior Management Team Meeting Minutes dated 27 August 2014, Scottish Hospitals Inquiry - Hearing Commencing 19 August 2024 - Bundle 13 - Additional Minutes Bundle (AICC/BICC etc), Document 65)** we are referring to ventilation in critical care. My recollection is that we were being asked to advise from an infection control point of view because of a tension between a Scottish Government requirement that the hospital be comprised of 100% single rooms and the need for close observation of patients within critical care units. Several options were discussed including 3 sided rooms or glass sided rooms. There is also a requirement for the same level of protective isolation to be provided in the intensive care unit and the bone marrow transplant unit as there is no anaesthetic support on the bone marrow transplant unit, as if bone marrow transplantation patients require Intensive care they need the same level of isolation as they would be receive on the bone marrow transplant unit.

<u>Involvement in Discussions Regarding Ventilation Design</u>

59. I have been asked if I was made aware of the ZPB Ventilation Strategy document dated 15 December 2009. I was not made aware of this document. I

became aware of it when I was asked about my knowledge of it by the inquiry. I was not consulted about it.

60. I have been asked when I was first made aware of the agreed ventilation derogation, i.e. that 2.5 ACH was the agreed rate. I did not know about the agreed ventilation derogation during the time that I was working at NHSGGC. I recall that I became aware of it either from media reports or via the enquiry website, I cannot be sure which.

61. I have been asked if my views were asked for before the building contract was signed in December 2009. I can confirm that they were not, I was not aware of the contents of this contract, nor was I consulted about it.

62. I have been asked if I know why GGC would agree to derogate from their Employer's Requirements that said that compliance with SHTM 03-01 was mandatory and whether in my opinion the derogation would have had an effect on the safe operation of the hospital. I do not know why they reached this decision concerning any derogation. In terms of safe operation, reading the documents that were provided by the inquiry, the derogation seems to refer to "general rooms". I take this to mean the majority of the rooms in the hospital not on specialist units or clinical areas with specific ventilation requirements. HBN 0301 part A lists the reasons for ventilation in general treatment rooms as "comfort conditions only" not to control exposure to or prevent transmission of pathogenic material. So while the derogation may have had an effect on patient and staff comfort, it is difficult to conclude, given the premise in the HBN, that from an infection control perspective it would have had an effect on "safe operation".

63. I have been asked if I think that this agreement continues to have an effect on the safe operation of the hospital. I cannot comment on this as I have not worked in NHSGGC for over 7 years and have no idea about ongoing operations at the hospital.

CONSIDERATIONS IN THE DESIGN/BUILD OF THE QEUH

Ventilated Rooms

64. The aim of ventilation in infection control is either to stop the ingress of any bacteria, virus or fungus to patients who are prone to infection, particularly bone marrow transplant patients or to prevent infections spreading through the air from an infected patient to other patients. Bone marrow transplant patients can fall into both categories at the same time as while they are prone to infection they can also be infected with respiratory viruses for example and shed large numbers of viral particles into the air around them. Ventilation along with good infection control practices and appropriate personal protective equipment are important in limiting the development or spread of infection.

65. The ventilated rooms provided for the RHC and in specialist units across the adult site, the PPVL rooms, had high pressure air HEPA filtered entering the lobby. This means that there was little possibility of air escaping from the patient's room into the corridor and due to the volume of air going into the lobby, any infection would be diluted to reduce the risk of transmission thus achieving source isolation. Ventilated rooms used to have switchable ventilation to choose between protective isolation and source isolation however this led to the possibility that the incorrect setting could be chosen so the positive pressure lobby ventilation rooms were designed to provide both source and protective isolation.

66. In terms of protective isolation, the air flowing into the lobby is passed through a HEPA (High Efficiency Particulate Air) filter which removes particles down to the size of bacteria and fungi. The HEPA filtered air is provided in sufficient volume to ensure that air blows out of the room and into the corridor so that nothing comes in through the door. This clean air also passes via the patients' room and is extracted from the patient's bathroom. This provides a continuous flow of clean air over the patient. However, for this to work the HEPA filter needs to be fitted and working correctly and the room needs to be sealed to a

standard which ensures that the air flows as designed and cannot leak out from anywhere else in the room.

67. The theoretical risk of having the HEPA filter in the patient's room is that when you open the door to the corridor there is a positive pressure from the room to the corridor so if the patient is infected and shedding viral particles these viruses could be blown out into the corridor and potentially infect others.

68. The technical guidance (SHTM-0301) stated at Appendix 2 that the lobbied side rooms are not suitable for bone marrow transplant patients or for use on infectious disease units. However, there was no further guidance to explain which alternative should be used in these specialist units. I am unclear about why these lobbied side rooms were chosen and by whom. However, I would not say that they are unsafe because similar rooms are in use at Great Ormond Street and in Leeds in the Bone Marrow Transplant units and work effectively as long as they are built and validated to the correct standards and appropriately maintained.

Air Sampling

69. While the Schiehallion unit was at Yorkhill we would sample the air in the bone marrow transplant unit once a month. In carrying out sampling a pump on the air sampling machine is set to take a certain volume of air. The air is then collected centrifugally onto a culture plate and the number of colonies on that plate would equate to the number of colonies present in the volume of air that has been sampled.

70. I do not understand the physics of the particle counter, but it draws in air and counts the number of particles in the air. These particles can be infectious particles or non-infectious dust particles.

71. HEPA filters are supposed to filter bacteria and fungal spores out of the air so that routine microbiology sampling is less useful. In addition the culture plates inoculated in the air sampling machine need to be incubated for 48 hours to

allow any collected organisms to grow so there is a delay in the result being available. The number of particles is immediately available and gives immediate results on effectiveness of the HEPA filter. However, a high particle count cannot distinguish between non-infectious dust particles passing through the HEPA filter or infectious particles So both tests are required and need to be interpreted in conjunction with each other.

72. The equipment needed to perform air testing needed to be validated for the results to be reliable. All NHS laboratories in the UK must have UKAS accreditation, the United Kingdom Accreditation Services. This involves providing validation data on the performance and accuracy of each laboratory test. Historically, every lab used to have its own air sampler. However, the decision was taken by microbiology in NHSGGC, as laboratories were amalgamated, to centralise the service on the basis that the equipment could be well looked after and validated. It did however reduce the availability of and pool of expertise in, the performance of air testing across NHSGGC.

73. Depending on where you are in the country there will be different environmental factors. The damper and the warmer the area is, the more likely there are to be fungus and fungal spores in the air. There is no nationally agreed definition of an acceptable standard of fungus in a transplant unit, this is usually monitored locally by performing air sampling at various areas in the transplant unit and in the outside air to ensure that the appropriate reduction in bacterial and fungal counts is being provided by the ventilation system and the HEPA filtration.

Protecting Patients from Fungal Infections

74. When we walk outside the dust in the air may be full of fungal spores. Our immune systems protect healthy people from fungal infection. If you have no immune system, then any fungus can grow inside you. When the function of the immune system falls below a certain level, you become very susceptible to unusual infections such as fungal infection.

75. Bone marrow transplant patients would always be placed in protective isolation which included HEPA filtered ventilated air. This is because the bone marrow is the home of the immune system. The more you supress the bone marrow, the more risk you have of infection. A very aggressive treatment for acute leukaemia will reduce bone marrow activity. This is measured indirectly by what is called the neutrophil count in the. Neutropenia is less than 0.1 neutrophils per ml and with neutrophils at this level you are at a high risk of infection. There are other patients who would also require protective isolation too such as those with blood malignancies, liver transplants and heart transplants. The duration of the neutropenia can also influence the risk of infection.

COMMISSIONING for BMT Adult Unit

76. I have been asked as to whether I provided input for the document 'Clinical Output Specification (COS), Area Haemato-oncology'**(A38233112 – New South Glasgow Hospital Clinical Output Specification – understood to be the paper referred to in Professor Craig Williams Note titled "BMT document", Bundle 27, volume 3)**. I did not. The document explicitly excludes children's services for which I was ICD at the time.

77. It appears that John Hood was involved in the creation of this document. John Hood was the Infection Control Doctor for North Glasgow which included the Beatson however as there is no date on the document, I cannot be sure if that was the case.

78. Looking at this document, I think John has clearly outlined the requirements for specialist ventilation to match those that were present at the Beatson. The special room requirements are what you would expect in any haemato-oncology rooms.

79. I have been asked why I did not speak to John Hood about the new build in or around 2009. I had no involvement in the design or specification of the new

hospital building. There were no structures in the project plan which requested input from any ICD's in any of the sectors. In addition, I had no reason to be concerned that any building was being proposed that would be out of the ordinary in terms of the specifications required for bone marrow transplant units.

Commissioning for BMT unit Children's hospital

80. I had no input into the selection of designs or specifications for the Bone Marrow Transplant unit at the New Children's Hospital. I was made aware by Dr Brenda Gibson, who was informed by the project team as part of their meetings with clinical users, that the new Paediatric Bone marrow transplant unit was to be provided with Positive Pressure Ventilated Lobbies (PPVL) rooms. I do not know who selected that design of room for this project or why that choice was made.

81. I had no direct experience with the use or operation of this type of room, but I contacted colleagues in other specialist children's hospitals around the UK and found out that this type of room was in use at Great Ormond Street and in Leeds. I spoke with my colleagues at those sites to make sure that the proposed rooms were working appropriately. They advised that the rooms were working effectively in terms of providing clean air into the patient rooms and they were not aware of any problems with infection but that they required a high level of ongoing monitoring and maintenance because they tended to leak. I spoke with John Hartley who was a Clinical Microbiologist at Great Ormond Street. John advised that we needed to make sure that the rooms did not leak, and we would need to do a lot of particle counting and pressure testing around the seams when we began to use the rooms. As soon as the air starts leaking to the patient area the function of the room is compromised.

82. I then emailed Brenda Gibson to advise her that the rooms were being used in other sites and that with appropriate monitoring and maintenance were effective.

RESTRUCTURING in INFECTION Control DUE TO MOVE TO QEUH

83. The Infection Prevention and Control Team would have moved to the new hospital after the project was handed over from the builders. However there was a period between the building being handed over to NHSGGC and patients moving in when teams would be working across the new buildings and the hospitals which were about to close.

84. The move to the QEUH resulted in services previously provided by three separate infection control teams, Paediatrics and Maternity from Yorkhill, Infectious diseases and Haemato-oncology from North Glasgow and the Southern General Hospital into the new build. These different units all had specific infection control problems. As there was not a lot of patient movement between paediatrics, Infectious diseases, the Haemato-oncology units and the general parts of the hospital it was decided to keep Paediatrics as a separate team. I retained responsibility as ICD for the RHC and for the neonatal and maternity units which moved into the retained estate at the Southern General Hospital site. Theresa Inkster retained responsibility for the ID unit and the Haemato-oncology unit and Christine Peters became ICD for the rest of the tower block and the retained Neurosciences block. We were aware that patients moving for Intensive Care would pass between teams but this had been the case when services were based at Gartnavel. There was a lot of debate about how to provide seamless infection control services to a site of this size and complexity but there were not any problems with the cover that we provided that I was made aware of. I retained the Lead ICD function so had a responsibility, alongside the infection control senior management team, to ensure that an appropriate solution to the overall provision of infection control to the new site was put in place.

The Decision to Move the Infectious Disease Unit and BMT to QEUH/RHC

85. The decision to relocate the Infectious Diseases Unit and the Bone Marrow Transplant Unit was not taken by the infection control team but we were asked, as an Infection Control team, to provide our views on this move.

86. I have been asked what the downsides were of making the decision to move the Infectious Diseases Unit and the Bone Marrow Transplant Unit to the QEUH/RHC were. We were happy with the move of the adult Bone Marrow Transplant Unit because there should have been appropriate provision of protective isolation on the new unit. However, we had more of a concern with the move of the Infectious Diseases Unit (Brownlee Unit).

87. We were concerned because in a stand-alone unit, such as the one at Gartnavel, an infectious patient could go straight into the unit into an isolation room. This happened in 2014 when we had a Viral Haemorhagic fever case in Glasgow. In addition, as a stand-alone unit any infectious waste could go out of the back door of the unit and be safely disposed of. With the proposed move they were suggesting the building of an Infectious Diseases Unit in the centre of a tower block in a large hospital. This would mean that any infectious patient would have to be moved through several clinical areas and in communal lifts to reach that unit. The highly infectious waste also needed to move through several units before being disposed of.

88. This also caused difficulty in relation to multi-drug resistant TB (MDRTB) patients requiring to be isolated. This strain of TB it is spread by airborne transmission and required specialist ventilation for that patient. With moving the unit to the centre of a large hospital you were creating difficulties in getting the patient into and out of the unit and providing the appropriate ventilation in the unit. In addition we knew at this point that the isolation facilities for adult patients would be PPVL rooms and it was not clear if the PPVL specification matched the detailed guidance provided by the department of health for the management of MDRTB.

89. My concerns were about the ventilation which needed to be provided for MDRTB patients both in the infectious disease unit and in the adult intensive

care unit should the patient require intensive care as part of their management.

90. Sandra McNamee sent the final email detailing our concerns and that a decision would need to be taken to balance those risks with any perceived benefits of relocating the ID unit.

91. There are minutes from an SMT meeting detailing our concerns around having the adult bone marrow transplant unit in the campus. In this meeting we are referring to the provision of critical care for these patients as there is a requirement for the same level of protective isolation to be provided on the intensive care unit. This is required for patients who are in protective isolation on the bone marrow transplant unit in case they require intensive care and ventilation. It is not usual to ventilate patients on a bone marrow transplant unit because there is no anaesthetic support.

VALIDATION

92. My understanding is that verification is ensuring the specification is correct, whereas validation is making sure that the construction has delivered this specification. The Infection Control Senior management team repeatedly requested information from the project team about the validation reports for ventilation in the specialist units and operating theatres. We were continually assured all areas were being built and validated to the relevant HTM standards, but no documentation was provided. We were never told that validation had not been performed or lead to believe that there were any problems or concerns with the ventilation systems.

93. I have been asked to comment on a document titled A40241814 Attachment to the Email Sent by Professor Craig Williams to Jennifer Armstrong, titled "BMT document" **(A40241814 – Attachment to the email sent by Professor Craig Williams to Jennifer Armstrong, titled "BMT document", Bundle 27, volume 3).** This document was produced after the problems in the adult

bone marrow transplant unit had been identified. It aimed to summarise the background to and current problems with the adult bone marrow transplant unit on the QEUH site prior to a meeting with the contractors to decide the best way forward in resolving the problems. It outlines the original specification document, any progress noted during the building process and the problems identified in the unit. The original specifications clearly identify that there were patients vulnerable to infection who required a protected environment. The air flows and the conditions described were based on the specification provided at the West of Scotland Cancer Centre. This document also clearly details that it is a haemato-oncology area that should be built to a specific specialist specification.

94. The section Build Progress identifies the assurance given by the project team to the clinical team that the ventilation was completed to specification.

95. The table titled 'current deficiencies identified' **(A40241814 – Attachment to the email sent by Professor Craig Williams to Jennifer Armstrong, titled "BMT document", Bundle 27, volume 3)** was put together by Estates colleagues, the Project Team and Peter Moir. This sets out the problems that had been identified in the adult bone marrow transplant unit at that time, 7th July 2015. My conclusions were a summary for Jennifer Armstrong, the medical director, describing the situation as I saw it at the time.

96. There was a discrepancy between the specifications and what had actually been delivered. The rooms leaked, there were no HEPA filters provided. This resulted in particle counts significantly above what we would have expected. For this reason I supported the return of the patients to the Beatson until we were happy that the problems with the unit had been rectified and the unit was performing to a safe specification.

97. The document titled **A40241592 Comments by Professor John Hood on the BMT document**, **Bundle 27, volume 3** is the same document with detailed commentary provided by Dr John Hood after I had circulated the document for comment. The very tight time frame was due to a pre-arranged

meeting with the contractor. This was a summary document to agree the current NHSGGC position and was in no way meant to represent a detailed plan or specification to resolve the problems identified in the adult bone marrow transplant unit at that time.

98. There is a document titled Minutes of the NHS Great Glasgow and Clyde Board Infection Control Committee (BICC) dated 1st December 2014 **(A32221707 – Minutes of the NHS Greater Glasgow and Clyde Board Infection Control Committee held on 1 December 2014, Scottish Hospitals Inquiry - Hearing Commencing 19 August 2024 - Bundle 13 - Additional Minutes Bundle (AICC/BICC etc), Document 28)**. I commented that I still hadn't heard from Fiona McCluskey about the issue with the transplant patients and whether a contingency plan was in place with regard to the MDRTB regulations. Fiona McCluskey was a member of the Project Team from whom we had requested validation reports. From my recollection, one of the project team, I think it may have been Fiona, was asked to come to one of the AICC meetings to update us on the project. We were reassured again at that meeting that all units were being built and validated to the appropriate standards. This minute refers to the validation data that we had requested around the bone marrow transplant units and the feedback from Currie and Brown about whether the PPVL rooms provided adequate isolation for the management of patients with MDRTB met the MDRTB specifications in the department of health document.

99. Dr Armstrong had stated that the issues with the MDRTB patients and the bone marrow transplant patients should be resolved prior to the opening of the new hospital. However to do this we needed to be provided with the validation certificates of all of the bone marrow transplant areas was appropriate. Pamela Joannidis specifically asked the project team by e mail about whether the facilities were built and validated to the relevant standards, and I recollect her receiving a response to that effect. At no time was the Infection Control Senior Management team left with the impression that there were any problems with the validation or that validation had not been undertaken.

Contact with Health Facilities Scotland (HFS) and Public Health

100. The main contact between the Infection Control teams and public health took place at the board infection control meetings where public health were represented.

101. HFS is the equivalent to HPS for Estates and Facilities. If we wanted to engage with HFS we would usually do so through our Estates colleagues. A lot of the questions were highly technical and needed to be phrased appropriately and we didn't have that level of expertise.

102. I have been asked how I ensured that the HFS building notes and guidance documents were complied with. This document covers any new builds. The SHFN (Scottish Health and Facilities Note 30) **(A33662182 – Scottish Health Facilities Note 30: Version 3 dated June 2007, Hearing Commencing 26 February 2024 - Bundle 13 - Miscellaneous - Volume 3, Document 16)** relates to any kind of building or changes in rooms. All the infection control teams are listed because this guidance is applicable across the health board. In following this guidance, you need to risk assess each new build in terms of the risk to patients, the potential harm it can do and the precautions that need to be taken. This document is applicable to all new builds, rather than solely the design of the hospital. There are extensive documents produced during the project by NHSGGC which outline the governance of the new build project.

Assurances from Currie and Brown (External Consultants)

103. I have been asked what assurances, if any, I received from Currie and Brown before handover on 26 January 2015. I requested, by e mail, via the project team, that the consulting engineers, Currie and Brown, review the PPVL specification and the Department of Health MDRTB specifications side by side. There is guidance from the Department of Health that specifies the requirements in terms of isolation of air flow for MDRTB patients. This guidance pre-dates the provision of positive pressure ventilated lobbies

(PPVL) rooms and I was not sure whether the rooms met the requirements for isolation. This became important after the decision to locate the Infectious diseases unit within the new hospital build and my contact with Currie and Brown was about this specific requirement not around ventilation systems in general.

104. In the minutes of the NHSGGC Board Infection Control Committee dated 26th January 2015 **(A32221766 – Minutes of the NHS Greater Glasgow and Clyde Board Infection Control Committee held on 26 January 2015, Bundle 27, volume 3)** at 4.5 titled New Build Project, there is an update that the rooms are compliant with the MDRTB Regulations. I must have received assurance from Currie and Brown that the rooms were specified appropriately to meet the MDRTB guidance. I can't recall what I was engaged with in relation to the Bone Marrow Transplant Unit, however reviewing the minute it may have been to explore the possibility of using the PPVL rooms in the paediatric build for the isolation of highly infectious paediatric patients.

105. I received this confirmation prior to February 2015 and the Infectious Diseases Unit moved in slightly later. My contact was via an intermediary in the Project Team. I did not have any discussions with Currie and Brown directly.

106. The document titled Queen Elizabeth University Hospital – Ward 4B Upgrade Works **(A40241977 – Report by Brookfield Multiplex titled "Queen Elizabeth University Hospital 4B Upgrade Works" Bundle 27, volume 3)** sets out the validations completed by specialist companies. The date of 27th October 2015, evidence bundle p385, confirms that this was undertaken after the deficiencies on ward 4b were uncovered via routine air sampling. The report covers assessments in relation to ventilation, air flows, and how the meters to measure pressure differences are functioning. The report is compiled by expert independent engineers. As an Infection Control Doctor. I would be looking for the signature of the expert performing the validation to confirm whether the rooms/wards are functioning to specification. I do not have sufficient engineering expertise to review the detailed testing outlined in

the document. This is the type of certificate that should have been provided before the hospital was handed over to NHSGGC.

Problems in the Paediatric Bone Marrow Transplantation unit

107. NHSGGC took over the new hospital new hospital on the 26th of January 2015, but patients were not admitted for some time. Before the patients were due to move into the new unit Clare Mitchell, who was at that time the lead ICN for Paediatrics, and I went to visit the paediatric bone marrow unit to see how the clinical team moving in were progressing. I noticed a workman, I think working on behalf of the Teenage Cancer Trust, drilling holes in the walls in the lobbied side room. This surprised me as the rooms were supposed to be sealed and any works undertaken would mean that the rooms would need to undergo a repeat validation.

108. On closer inspection of the lobbied side rooms in the paediatric bone marrow transplant unit, Ward 2B at the Children's Hospital, I noticed that above the air inlet grill in the lobby of the rooms the silver tubing of the ducting was visible. This meant that there were no HEPA filters fitted to the rooms. This rendered them useless in terms of providing protective isolation for reasons described earlier.

109. Further into the room I also saw that the Formica panel at the back of the toilet hadn't been sealed. It was just hung as it would have been in a normal room which suggested that the sealing in the room didn't seem to have been done properly. At this point I immediately sent an e-mail to Tom Walsh and we arranged to meet Graham Archibald, Chief Operating Officer, and David Louden the Director of Estates to urgently discuss the problems with these rooms. David Louden and Grant immediately recognised the urgency and nature of the problem. At the meeting as I had seen deficiencies in the paediatric bone marrow transplant unit, I specifically asked David Louden if there were likely to be any problems in the adult bone marrow transplant unit. He reassured me that everything was okay on the adult unit, so I continued to concentrate on the problems identified in the paediatric units.

Issues with Other Rooms Outside Ward 2b

110. As PPVL rooms were provided elsewhere across the build I asked that the rest of the rooms outside of ward 2b were checked. This included the rest of the rooms on the paediatric bone marrow transplant unit, the paediatric intensive care unit and the adult Intensive Care Unit. These checks identified that none of the PPVL rooms across the site had been fitted with HEPA filters. This meant that we had a major problem in terms of providing source and protective isolation in the paediatric build and source isolation across the site.

111. At this point no patients had been moved in to ward 2b at the new RHC. I attended a meeting with Grant Archibold and the clinical teams including Brenda Gibson, John Hood, Brian Jones and Tom Walsh. I raised the possibility of not transferring patients from Schiehallion to the new hospital as we knew that the old Schiehallion unit was providing a safe environment for children. However, leaving Schiehallion open without the full support provided by the facilities present in the children's hospital was judged, by the group, as a higher risk than continuing to move the Schiehallion patients to the new ward 2b.

112. As part of her contingency planning for the move Dr Gibson had built in a period where no bone marrow transplants were urgently needed so there was no immediate need to undertake paediatric bone marrow transplants in the new facility at RHC. John Hood, who had experience in measuring airflows in rooms, Ian Powrie and I spent some time further examining the PPVL rooms on ward 2b to make sure that we had identified all of the problems. Work then started on fitting HEPA filters to the rooms and sealing and validating them according to an agreed clinical priority list. This programme was overseen by senior clinicians, senior managers and estates officers, which included Tom Walsh and myself. I find it difficult to see how the rooms could have passed validation if the HEPA filters were not fitted and the rooms were not sealed. There are a number of validation criteria for that type of rooms which include pressure differentials and leak tests. We were given assurance from the

project team that the validation had happened, but we didn't see validation documentation. This would normally be completed by an independent contractor.

Validation of Bone Marrow Transplant (BMT) Rooms

113. In the Infection Control Senior Management Team Meeting Minutes Dated 27 May 2015 **(A40247744 – Infection Control Senior Management Team Meeting Minutes dated 27 May 2015, Bundle 27, volume 3)** under heading Project Update, New Build Adult Hospital/Children's Hospital, I mention that the BMT rooms will need to be checked for full validation. This was to make team members aware of the work being undertaken to rectify the problems identified with the PPVL rooms across the site.

114. There is also reference to an ongoing dust problem. This was because the new hospital was occupied before the old estate remaining on the site was demolished. We had concerns about patients walking through a building site to access the new hospital as this may have posed some risk to immunocompromised patients in terms of infection control and also of ingress of dust into the new building via the ventilation system during the demolition. To limit this risk we reviewed and monitored the contractors provided method statements that detailed how they were going to control the dust. This involved using water sprays, doing sectional demolition and having closed containers to take the waste offsite. We also brought patients in through one side of the new building which wasn't in proximity to the demolition work and was a safer entrance. In addition we asked Estates colleagues to check the first-line filters on the main hospital building to ensure that the filters, whose job was to remove large particles of dust were working optimally.

115. On the document titled Infection Control Senior Management Team Meeting Minutes, Dated 24 June 2015 **(A40247758 – Infection Control Senior Management Team Meeting Minutes dated 25 June 2015, Bundle 27, volume 3)** I was not present at the meeting but there is no mention in the minutes of concerns about the adult Bone Marrow Transplant Unit. As far as

we knew at this point the unit had been built to specification and validated to the appropriate standards. Christine has also stated that she was trying to get the validation for the BMT rooms. The Senior Management team had been chasing the validation reports for some time, but the documents were not provided by the project team. However, we were repeatedly reassured by the project team that the hospital had been built and validated to the appropriate standards.

116. There is also mention of VHF (viral haemorrhagic fever) patients being admitted to the hospital and how they would be managed. Tom discusses the positive pressure ventilation rooms in the Schiehallion Unit not performing properly so all of the infection control teams were aware of the problems in ward 2b in the RHC.

Problems with the Adult Bone Marrow Transplant (BMT) Unit9 (Ward 4b)

117. I was on leave when the problems in the adult BMT became apparent. Air sampling was performed routinely on all of the Haematology wards in NHSGGC to check that the ventilation was working correctly. The first routine air testing on the adult bone marrow transplant unit showed problems and the chronology of this is reflected in the document titled Briefing & Report, Bone Marrow Transplant Service, Ward 4b, Queen Elizabeth University Hospital.**(A40241798 – Email chain from Garry Jenkins, copying Professor Craig Williams, forwarded on to Tom Walsh and Jennifer Armstrong, "Subject: BMT Briefing" dated 6 July 2015 (ii) Email Attachment (Word Document), Bundle 27, volume 3.**

118. On the 30th of June Gary Jenkins was contacted by the Clinical Service Manager to inform him that none of the rooms had met the specification. This was based upon air sampling performed across the unit. From the note it looks to me from the chronology that there was an initial attempt to fix this problem by increasing the air flow in the rooms, but this did not rectify the issue.

119. There is an email **(A40241798 – Email chain from Garry Jenkins, copying Professor Craig Williams, forwarded on to Tom Walsh and Jennifer Armstrong, "Subject: BMT Briefing" dated 6 July 2015 (i) Email chain), Bundle 27, volume 3** from Gary Jenkins to Grant Archibald and David Stewart dated 06 July 2015, that states 'please find attached briefing note with regard to the discussion today and BMT issues.' This refers to the decision to move the service back to the Beatson due to the problems identified with the air quality on the adult BMT unit. There were patients in the unit and the decision was to transfer the patients back to the Beatson. The Beatson was still open and functioning as previously, so the patients were returned to an area where we knew that the air quality in the rooms was acceptable.

120. Following the discovery of problems on the adult BMT, the validation and commissioning results for this unit were again requested along with a further engineering review. We had repeatedly requested validation data but didn't receive this. We were reassured by the project team that the validation data was fine.

121. On the second page of the document titled Briefing and Overview, Bone Marrow Transplant Service, Ward 4b, Queen Elizabeth University Hospital,**(A40241798 – Email chain from Garry Jenkins, copying Professor Craig Williams, forwarded on to Tom Walsh and Jennifer Armstrong, "Subject: BMT Briefing" dated 6 July 2015 (ii) Email Attachment (Word Document), Bundle 27, volume 3.** Dr. Williams states that he reviewed the clinical specification for the unit and stated that it seemed fine. This referred to the document titled **A38233112 - New South Glasgow Hospital Clinical Output Specification, Bundle 27, volume 3.**

122. This document titled **A38233112 - New South Glasgow Hospital, Clinical Output Specification, Bundle 27, volume 3**, Area Haemato-Oncology mentions John Hood as the consultant microbiologist and was prepared some time before but is not dated. The document details the overall room requirements for a haemato oncology unit and seems to reflect the facilities which were provided at the existing Beatson unit. The clinical specification

clearly stated that the unit is for immunocompromised patients. The clinical specifications needed to be translated by the specialist engineers into a design. When I reviewed this document, it seemed to me to include all of the engineering features which I would have expected to have been present in a Haemato-oncolgy unit which meant that the original specification provided was correct but that this had not been translated into the completed unit.

RECTIFICATION – PAEDIATRIC UNIT PPVL ROOMS

123. There was a time pressure because bone marrow transplantations are urgent procedures. Once a patient begins on the pathway of a bone marrow transplant, they may need treatment for months, if not longer. If we had to take the decision to send the patient to London, for example, for transplantation as we could not provide the treatment locally, this could result in a massive disruption to the patient and their family. We knew that we needed to get the rooms into a condition where they met the standards and provided safe accommodation for the children so that we could safely resume Bone Marrow Transplants for Children in Glasgow.

124. Brenda Gibson had timed the transplant program so that there would be nobody who was seriously immunosuppressed during the period of the move from Yorkhill to the new children's hospital. However, our assumption was that we would be transplanting again from day one of the move, but this turned out not to be the case.

125. I had a meeting with Grant Archibald and David Louden, as described earlier to discuss the issues that we had found with the PPVL rooms on the paediatric bone marrow transplant unit and across the site. The paediatric bone marrow transplant unit was prioritised, and remedial work started right away. I was focused on how to fix this problem on ward 2b initially but also subsequently across the rest of the PPVL side rooms across the rest of the site. The project was overseen by a group including estates colleagues, the director of Women and Children's services Jennfier Armstrong and the Chief of Medicine for Women's and Children's Services.

126. Before we could put any transplant patients into the rooms we had to fix the problems with the rooms, ensure that the rooms were validated and then undertake final air sampling to measure how effectively the rooms were performing in terms of excluding fungi and airborne bacteria. After the rooms had been sealed and the HEPA filters fitted, we performed very detailed air sampling. The problem then however was with interpretation of the air sampling results as there are no nationally or internationally available standards for an “acceptable” level of fungi in a bone marrow transplant suite. There is published evidence that low levels of fungi can be found intermittently in bone marrow transplant units if enough sampling is done which confirmed our experience at Yorkhill. The problem we were being asked to resolve was whether the work we had done in the lobbied side rooms in ward 2a had improved the facilities sufficiently to allow bone marrow transplants, which were time sensitive, to resume. This was not decided by me alone but by a group which included Prof Gibson, the Chief of Medicine from Women’s and Children’s services, the Director of Women’s and Children’s services and estates colleagues as we were trying to balance a number of risks including transferring patients to English centres for bone marrow transplantation. Minutes of these meetings and decisions should be available.

RECTIFICATION ADULT BMT

127. I was not involved in drawing up the specifications for this unit, this was done by the Project Team in conversation with John Hood. I would have expected that, had there been any concerns regarding the specifications that the contractor Brookfield Multiplex would have sought clarification from the Project Team. In my opinion the specifications make it very clear that this was a haemato-oncology unit, that in this unit a high proportion of patients would be immunocompromised and there was a need for specialist ventilation.

128. I returned from leave on 6th July and attended a meeting which included Tom Walsh, Gary Jenkins, Theresa Inkster and Christine Peters. We discussed the events that had occurred and the problems that had been found in the adult

BMT unit and I fully endorsed the decision to move patients back to the Beatson. After this meeting I was asked by Gary Jenkins and Tom Walsh to take the lead in beginning to resolve the problems found in the Adult BMT. I was not given a specific reason for this but was left with the impression that there had been difficulty in obtaining any agreement between the microbiologists and ICD's involved. Although this problem occurred in a area outside my remit as ICD in paediatrics it had involved a number of ICD's and microbiologists and seemed to fall within the remit of the Lead/co-ordinating ICD, so I agreed.

129. There is an email chain with subject BMT SGUH **(A40241661 – Email chain between Professor Craig Williams and Professor John Hood, "Subject: FW BMT SGUH", dated 7 July 2015, Bundle 27, volume 3)** relating to a draft of the revised specification being circulated. There are comments from Gary Jenkins, Teresa Inkster and Christine Peters. There is reference to a group being set up by the Executive Lead to further discuss this. This e mail trail relates to a meeting that was planned between NHSGGC and Brookfield Multiplex scheduled for the 8th July to begin discussions on how to best resolve the problems found in the adult BMT. My recollection is that the contractors had accepted that they were liable to rectify the problems but we needed to put forward an agreed NHSGGC view as to what the requirements for the unit were. We based this on the original specification to start with but there were to be future detailed discussions regarding the revised specifications following this. This was a brief document with a very high-level specification not a detailed engineering description and while I realise the timelines for asking for comments were short it was driven by the need to formulate an agreed view prior to the meeting with the contractors.

Involvement of External Experts

130. I have been asked which experts I consulted to assist with the BMT Unit specification issue. Initially I asked John Hood, the microbiologist at North Glasgow, to be involved. I also spoke with Peter Hoffmann, a Public Health England expert. His knowledge was incredibly useful.

131. There were a lot of different opinions within the ICD's and Microbiologists in NHSGGC, so we involved Peter Hoffman and HPS to get external experts to provide advice. Peter Hoffman was an expert in the field so my view was that we should be largely following his advice. The relevance of the mention of solid ceilings is because the air flow dislodges dust from behind the ceiling panels if they are not sealed. The final decision on the revised specifications was to be made by Jennifer Armstrong.

132. We were now aware that there were problems with the specialised ventilation in the paediatric area which we were attempting to rectify and in the adult BMT. The specialist ventilation was not performing as we would have expected. Peter Moir was leading on the review to further inform the specifications for the rectification of the adult BMT unit. He was trying initially to compare the specifications which were provided to what was actually present in the Beatson unit at that time.

Submission of Revised Specifications

133. Following the submission of the revised draft specifications, the Project Team, Estates and others including myself took forward work with the contractors to continue to develop the revised specification for the rectification of the adult BMT.

134. There is an email from Peter Hoffman to myself titled Re. BMT Specification and Dated 23 July 2015. **(A40241585 – Email chain between Professor Craig Williams and Professor Peter Hoffman, "Subject: BMT specification", dated 23 July 2015, Bundle 27, volume 3)** and I had previously had a discussion regarding the revised specification. I provided Peter with a draft of the proposed specification, the details of which he refers to. This email was Peter providing his comments on the updated proposal for ward 4B. Peter states that he does not have the remit to approve this document and that it would be good to have this approved by someone in

HPS. While Peter worked with PHE in England the responsibility was with HPS and HFS in Scotland.

135. There is an email from Gary Jenkins to myself and others titled BMT Service: QEUH. **(A40241939 – Email chain from Gary Jenkins to Professor Craig Williams and others, "Subject: BMT Service QEUH", dated 17 to 23 July 2015, Bundle 27, volume 3)** This email was a summary of progress in agreeing the rectification works and specifications and listed outstanding items still to be resolved.

136. In addition to the requirement for the work to be undertaken it was important to emphasise that the work would be undertaken in a working hospital with patients in situ so I emphasised to the contractors that they needed to use the HAI-SCRIBE process because they were working in a live patient environment.

137. The HAI-SCRIBE (Healthcare Associated Infection System for Controlling Risk in the Built Environment) process assesses the nature of the work undertaken, including the location, dust, clinical risk, and creates a matrix suggesting precautions that are required to limit any risk of infection.

138. The HAI-SCRIBE process is to be followed in every building alteration or new build in the NHS in Scotland. It is usually the ICNs who are responsible for ensuring that the HAI-SCRIBE process is completed. They liaise with the Estates department to ensure that they are happy with the assessment. The ICDs would get involved if it any further opinion was needed.

139. In the document titled NHS Great Glasgow and Clyde, Board Infection Control Committee Dated Monday 27th July 2015, **(A32222054 – Minutes of the NHS Greater Glasgow and Clyde Board Infection Control Committee held on 27 July 2015, Bundle 27, volume 3)** there are comments updating the BICC on the situation in the adult BMT and that the rooms in the ID room had been built to a specification that was suitable for MDRTB. We were at that time undertaking a programme of identifying and rectifying any problems found

with the PPVL side rooms located across the site. I expect that my comment would relate to the PPVL side rooms in the ID unit which must have been successfully fitted with HEPA filters and had passed validation. This was a major undertaking. The pressure testing involved blowing large volumes of air into the rooms through a huge fan and there was a lot of concern from the clinical and nursing staff about the noise and intrusive nature of this testing.

Completion of Rectification Project for PPVL side rooms and adult BMT

140. The document titled NHS Greater Glasgow and Clyde, Board Infection Control Committee Dated Monday 27th July 2015 contains a reference to our desire to get the bone marrow transplant patients back within an agreed. timeframe. **(A32222054 – Minutes of the NHS Greater Glasgow and Clyde Board Infection Control Committee held on 27 July 2015, Bundle 27, volume 3)** Due to a variety of reasons, this timeframe seemed to slip. I cannot recall when BMT patients returned to the QEUH from the Beatson, but I think it was after I had left NHSGGC

141. In the Board Infection Control Committee Meeting Minutes Dated 5th October 2015, there is an update where I state that all of the rooms in the adult tower were complete except for two rooms. These rooms were the PPVL rooms. We had a program of working through those rooms based on clinical priority. The rooms needed to be checked, resealed if necessary and validated by specialist external engineering contractors before they could be used for their intended purpose. These were provided both in the adult and the paediatric hospital. This programme of rectification was based upon risk assessed list as to which rooms were most urgently needed and we could not use those rooms for patient isolation either source or protective until the sealing and validation was completed.

142. My recollection is that by around November 2015 we had completed the majority of the work on fixing and validating the PPVL rooms. We were also beginning to plan the restarting of paediatric bone marrow transplantation. The planning and rectification of the adult BMT unit was still ongoing.

143. Document Reference A32221764, Minutes of the NHS Greater Glasgow and Clyde Board Infection Control Committee held on 30 November 2015, **(A32221784 – Minutes of the NHS Greater Glasgow and Clyde Board Infection Control Committee held on 30 November 2015, Scottish Hospitals Inquiry - Hearing Commencing 19 August 2024 - Bundle 13 - Additional Minutes Bundle (AICC/BICC etc), Document 38)** under the heading 4.5 (new build project) there is reference to the adult BMT service moving back. I don't think at this point we were anywhere near being able to return the patients from the Beatson.

144. I was not involved in the discussions about returning patients to the unit in November or December 2015. I was not aware that there were ambitions to return patients during this time. There were no realistic discussions about patients being transferred back during this time period.

145. I have been asked about a document with reference **A33680939, titled SBAR, Queen Elizabeth University Hospital (NHSGCC) Bone Marrow Transplant Unit – December 2015, Bundle 3- NHS National Services Scotland: SBAR Documentation, Document 4**. This is a situation, background, assessment, recommendation document with the title Queen Elizabeth University Hospital (NHSGGC) Bone Marrow Transplant Unit. This document was requested by Teresa Inkster, I assume at the time the problems were identified on the adult BMT. The document sought to provide an external assurance of the conditions that needed to be met to safely return BMT patients to the QEUH site. This document was prepared by Annette Rankin, who was HPS at the time. HPS were asked to look at the evidence and make a recommendation. The report notes that there is no single piece of guidance relevant to this situation and re-iterates the engineering requirements for a BMT unit. The SBAR document would go to the infection control teams and would be used to inform the final decision on returning patients form the Beatson to the QEUH.

146. I have been asked about a document with reference **A32221927, titled Minutes of the NHS Greater Glasgow and Clyde Board Infection Control Committee held on 25 January 2016, Scottish Hospitals Inquiry - Hearing Commencing 19 August 2024 - Bundle 13 - Additional Minutes Bundle (AICC/BICC etc), Document 36**. The minutes contain reference to ventilation issues. This confirms that the work to rectify and validate the PPVL rooms across the site and in the paediatric BMT unit were complete. The other point in the discussion is whether the specification, still being developed for the adult BMT unit, should include HEPA filters throughout the whole unit, not just the cubicles. This issue is addressed in the HPS document as “ideally provided in purpose-built units but less important if the rooms are appropriately ventilated and achieve positive pressure in comparison to the , corridor”.

147. In the minutes of meetings with the NHS GGC Board Infection Control Committee, **(A32221707 titled Minutes of the NHS Greater Glasgow and Clyde Board Infection Control Committee held on 25 January 2016, Scottish Hospitals Inquiry - Hearing Commencing 19 August 2024 - Bundle 13 - Additional Minutes Bundle (AICC/BICC etc), Document 28; A32221766 Bundle 27, volume 3; A32221628 - Bundle 13 - Additional Minutes Bundle (AICC/BICC etc), Document 30; A32221627 - Bundle 13 - Additional Minutes Bundle (AICC/BICC etc), Document 31, A32222054 Bundle 27, volume 3, A32222109- Bundle 13 - Additional Minutes Bundle (AICC/BICC etc), Document 34, A32221764 - Bundle 13 - Additional Minutes Bundle (AICC/BICC etc), Document 35, A32221927 - Bundle 13 - Additional Minutes Bundle (AICC/BICC etc), Document 36)** there is evidence of ongoing discussions between clinicians, estates colleagues and the new build process. Prior to the hospital being handed over they relate mainly to requests for validation information and concerns about whether the specifications of the build provided were appropriate for their use clinically, especially after the decision was made to include the Infectious disease unit onto the QEUH site. After the handover of the hospital the minutes relate to the problems identified and progress being made to rectify the problems. Throughout this there was clear visibility to clinical colleagues and senior

managers of events as they unfolded. It was my priority to protect patient safety and resolve the issues as they arose.

148. The document titled **A36372647 – DRAFT - Queen Elizabeth and Royal Hospital for Children, Action Plan for BMT and Theatre Operations Dated 21 January 2016 (Version 2 at 27 January 2016), Bundle 27, volume 3** was prepared and signed by David Louden. This notes that Currie and Brown have confirmed that the Isolation rooms, Theatres and Schiehallion room designs are compliant with building regulations and the relevant SHTM's and SHPN 04 supplement 1. In my opinion this suggests that the designs provided to the builders were correct but that the facilities were not built or validated correctly

149. There was a lot of discussion during the rectification process for both the paediatric and adult hospitals. The discussions immediately after the problems were identified with the adult BMT unit are in document reference **A40241741 - email chain between Professor Craig Williams, Dr Teresa Inkster, Dr Christine Peters, Gary Jenkins, Professor John Hood and Professor Brian Jones, "Subject: BMT SGUH. " dated 7 July 2015, Bundle 27, volume 3**. There was wide involvement from the clinical teams, estates colleagues and senior management and the process was clearly visible throughout the Health Board. This was a very time-consuming process. In addition to the work of identification, rectification and validation of the problems found in the new hospital build the remaining estate on the SGH site and the other major hospital sites in Glasgow were still operating throughout this period with the need to maintain patient safety in terms of infection control on all of the sites. A lot of my involvement was in coordinating the infection control input, details of the engineering specifications and physical validation was shouldered by my colleagues in the estates and facilities department.

INFECTION CONTROL GGC

150. The QEUH site had a large number of beds and diverse specialities. This included some of the most potentially infectious patients in Scotland, such as Viral Haemorrhagic fever patients but also some of the most vulnerable patients such as bone marrow transplant patients. Due to the size and complexity of the site it was difficult to manage from an infection control perspective as the usual site/sector-based model did not work well for this site.

151. There was a Lead ICN and an ICD for each sector. For example, John Higgins was the Lead ICN for Clyde and Linda Bagrade was the ICD for Clyde. There were also other Infection Control nurses in their team. The Infection Control nurses are specialist nurses and work full time in infection control so provided most of the infection control support to the clinical teams. The ICD'S would support all of the team in specific areas such as advice on the interpretation of microbiology tests and ensure that the microbiology laboratory support to the sector IC team met the needs of infection control.

Infection Control Governance

152. The work of the infection control team was led by the senior management team and governed by the GGC IPC Work Plan 2015. **(A32331798 – NHS Greater Glasgow and Clyde Infection Prevention and Control Work Plan 2014/2015 – updated November 2014, Bundle 27, volume 3)** The infection control programme was created by the senior team, Tom, Sandra and I. We then discussed this at the Infection Control SMT to ensure that everyone was happy with the roles and responsibilities. The work plan also includes the mandatory requirements of the Scottish Government and how we were going to deliver these as an infection control team.

153. Under the heading 'Healthcare Hygiene, Cleaning Services and the Built Environment', there is a topic titled 'to ensure that NHS GGC premises are designed and built to facilitate the prevention and control of infection.' The first action under this heading is listed as 'coordinating ICD jointly with GM facilities and NHS GGC Water Group'. I am listed as the lead there along with

Mary Ann Kane who is the Facilities lead. This related to ensuring that the activities across NHSGGC were undertaken in a safe environment and ensuring relevant legislation such as that covering the management of legionella in healthcare premises was complied with which was overseen by the water group. Under the action titled ‘ensure that all advice in relation to new builds complies with HFS building notes and guidance documents.’ The IPCTs (Infection Prevention Control Teams) are recorded as the lead. This relates mainly to ensuring that the HAI Scribe process was followed across NHSGGC

154. The last action that is recorded is to ‘ensure that PPM and validation of theatre is ongoing.’ I am named as the lead for that as well as S & A (Surgery and Anaesthetics). This related to the requirement that operating theatres needed to have annual validation to make sure that the air flows and ventilation are correct.

155. To ensure that this guidance was complied with and to ensure close collaboration between operating theatre users and estates teams to achieve this I set up a ventilation group specific for GGC, the theatre Validation Group. This group was chaired by a senior manager from surgery and anaesthetics. The group also consisted of representatives from Estates and the Infection Control team. This group ensured that validation was completed appropriately and on time and ensured that works that needed to be undertaken by the estates teams in operating theatres were closely co-ordinated with the users of the theatres.

<u>Senior Management Team (SMT) meetings</u>

156. The Infection control Senior Management team was the main meeting for discussion and governance within the Infection Control Team. The meetings were held once a month and the Infection Control Senior management team and lead ICN’s/ICD’s from each sector would attend. There are a number of minutes in the bundle. You will see from those minutes that there were sector reports from Lead ICNs and ICD’s in addition to discussion of overarching

infection control problems across NHSGGC and progress with the infection control plan and other targets.

157. The ICNs and ICDs also had their own meetings. The ICD meetings were designed to share information and good practice but were initially informal, and no minutes were taken. The route for escalation of concerns was the IC senior management team. There was continual liaison, almost daily, at sector level within the teams between the sector ICNs and ICDs.

158. The route for formal escalation of any concerns via the IC senior management team (ICSMT) was to the Acute and ultimately the Board Infection Control Committees via the sector reports presented at each ICSMT meeting. Anything that may have been of interest or concern was raised by each sector at these meetings.

159. The ICSMT would also monitor progress against the annual infection control plan. and produced actions should there be any problems with the implementation of the plan. Infection control policies were also discussed at ICSMT before they went forward for approval. The approval path was to AICC then up to the BICC for agreement.

160. The Infection Control Senior Management Team Meeting Minutes Dated 27 August 2014 **(A40247718 – Infection Control Senior Management Team Meeting Minutes dated 27 August 2014, Bundle 13, Document 65)** give an overview of who was present at the SMT meetings. The Infection Control Manager (Tom Walsh) chaired the meeting, Sandra McNamee along with myself formed the senior team, and the rest of the invitees represent the Infection Control teams based in each acute sector and the community.

<u>AICC (Acute Infection Control Committee)</u>

161. The AICC was mainly focused on hospital aspects of infection control. The policy ratification was via the AICC to BICC. The escalation route for any

concerns that could not be resolved by AICC was the Board Infection Control Committee meeting.

162. The main role of the AICC was to oversee infection control as it related to the acute hospital care. It was focused mainly on infection control problems resulting from hospital-based care within the acute sector. The AICC also monitored a number of Scottish Government targets relating to infection control in acute hospitals such as the rate of blood stream infection with *Staphylococcus aureus* and rates of *Clostridium difficile* infection. Aspects of antibiotic prescribing as they related to the incidence of *C. difficile* infection were also discussed.

163. There are meeting minutes titled NHS Greater Glasgow and Clyde, Acute Services Division and Dated 06 July 2015 **(A32220263 – DRAFT – Minutes of the NHS Greater Glasgow and Clyde Board Infection Control Committee held on 6 July 2015, Bundle 27, volume 3)** The notes relate to problems found on the adult BMT unit and refer to a meeting which was due to be held late on 6th July to understand what the original design specification was and how the adult BMT build was performing against that design specification.

<u>Board Infection Control Committee (BICC)</u>

164. The BICC received the minutes from the AICC, but also received reports from community care and public health, so had a broader overview of both hospital and public health aspects of Infection Control. Jennifer Armstrong took a report from the BICC to the meeting of the NHSGGC Board monthly to ensure visibility of infection control problems from “Ward to Board”. She would report any exceptions raised at BICC to the board in this report.

165. The Scottish Government aspired to have a Board to Ward reporting structure. This involved the ward staff reporting through the sector teams via the ICSMT to the AICC, the BICC and ultimately to the Board. There is always a judgment involved in what to escalate, for example reporting numerous outbreaks of Norovirus directly to the NHSGGC board would probably have had little

benefit. The infection control structures and reporting mechanisms were regularly reviewed by the Healthcare Environment Inspectorate against the Scottish Government standards and they reported no concerns at any time with the committee or reporting structure.

166. In addition to the IC senior management team there was a Lead Nurse who oversaw the surveillance function, monitoring surgical site infection rates, and two data specialists who extracted data from a number of computer systems for all of our routine reports. The lead nurse also attended the Infection Control SMT meetings. We also had admin support within the infection control team.

Water Safety Group

167. The Water Safety Group is a statutory group which monitored Water safety. Under national guidance each organisation needed to have a water safety group. The NHSGGC group was led by Estates and co-chaired by Estates and Infection Control. The Director of Estates nominated his deputy, Mary Ann Kane, Tom Walsh was the chair from the infection control side, and I deputised for him.

168. I have been asked what the functions of the Water Safety Group were. The Water Safety Group members are brought together to share responsibility and take collective ownership for ensuring that all foreseeable water-related risks are identified and assessed, that appropriate control measures and monitoring strategies are implemented and that robust incident control plans are developed. The water safety group should ensure that each hospital has a legionella risk assessment. Legionella can multiply in the hospital water system if there is a lack of flow of water or temperatures reach a level which allows the bacteria to multiply. The legionella risk assessment details where the risks may occur in the hospital water system and the steps that should be taken to mitigate this risk. There is Health and Safety Executive (HSE) documentation that details the engineering precautions that should be in place.

169. In addition to engineering controls maintaining the flow of water also reduces the risk of Legionella and other water borne infections. In high risk areas such as the neonatal units and intensive care units where Pseudomonas is considered a risk a member of the domestic staff would run the taps and other water outlets in the wards to everyday to ensure a regular flow of water through each part of the system. The domestic staff would then note in a document that they had done this.

170. In NHSGGC we also took the view that the water group would consider any pseudomonas isolates found in blood cultures. This could potentially identify any areas in addition to the “High risk” areas where pseudomonas may have become a problem. If a blood culture was found to be positive outside the usual high risk areas then the area would be added to the “High risk” list for additional water testing and flushing.

171. I have been asked how often I liaised with the Project Team on water. I never had any liaison with them. When the hospital was handed over from the builders to NHSGGC Ian Powrie, one of the Estates leaders arranged the first round of water testing which was performed by an outside contractor. He advised that, under the guidance, the Infection Control Doctor was required to observe the contractor taking the samples which I did and the correct process was followed. Any abnormal results from the testing would be dealt with by the estates department in liaison with the sector Infection Control Doctor for example in the document reference **A40241741, titled Email chain between Professor Craig Williams, Dr Teresa Inkster, Dr Christine Peters, Gary Jenkins, Professor John Hood ad Professor Brian Jone, “Subject: BMT SGUH” dated 7 July 2015, Bundle 27, volume 3** . Christine Peters refers to action on legionella testing, this would relate to legionella testing in her areas of responsibility which was the QEUH site excluding paediatrics and regional services.

172. In answer to the question, I cannot recall how often I liaised with Ian Powrie but it was often and would have been more frequently around the ventilation

problems after they had been identified across the adult and paediatric sites than any water problems.

173. My recollection of the first round of water testing is that some of the samples had raised total counts. However, there was no suggestion that there was any systematic problem in the water supply.

174. Any samples with high counts would have been dealt with by the estates teams who would have cleaned, disinfected or replaced taps as necessary and arranged subsequent retesting.

175. There is a document reference **A33795345 - Document titled "Tom WQ.doc" possibly dated around June 2018, Bundle 27, volume 3,** where I am asked questions and I provide responses. The first question is 'were you involved in the design of the water system at QEUH/RHC in your role as lead ICD'. These were questions posed by HPS to me regarding the water system after I had left NHSGGC Tom Walsh had contacted me and asked that I provided replies to these questions. I do not know what happened to this document or for what purposes it was used after I returned it to Tom.

Compliance of Taps provided in the new build

176. During the building of the hospital the guidance around taps in hospitals changed. Due to this Sandra McNamee raised this with Health Protection Scotland and it was agreed that risk assessments would be completed and if this risk assessment was put in place then the taps already fitted in the new build would not need to be replaced.

Cleanliness

177. Cleanliness in hospitals is known to be important in preventing hospital cross infection. As part of the regular general Infection Control training to hospital staff the importance of cleanliness and hand hygiene is reinforced. As part of the focus to reduce the incidence of MRSA (Methicillin Resistant

Staphylococcus Aureus) the role of Hand Hygiene Co-ordinator was established. This post supported the infection control nurses in undertaking education on hand hygiene and performing hand hygiene audits in all clinical areas. There was also a hand hygiene audit programme, based upon self-audit or peer audit, to make sure that hand hygiene was being undertaken appropriately in all clinical areas.

178. In addition, regular cleaning of the environment around the patient reduces the risk of bacteria being picked up on staff hands and transmitted between patients. The level of cleanliness was monitored by the facilities department in NHSGGC using a nationally implemented system and regularly reported to the board and the Scottish Government.

Ventilation

179. Subsequent to the rectification of the ventilation in the children's hospital and in the PPVL rooms across the site I was involved in reviewing the air sampling and checking with Ian Powrie regarding the validation reports. As I mentioned earlier in my statement, these are extensive documents compiled by expert engineers so my main role would have been to ensure that the validation had been successfully completed. Ian and other estates colleagues had more specialist knowledge about the engineering aspects of the document which is why the documents were reviewed and discussed jointly.

180. It seems that the specialist ventilation across the adult and paediatric sites was not provided to the specifications needed. In addition, the new RHC site imposed constraints on the implementation of Infection Control compared with the original Yorkhill site. On the Yorkhill site there was sufficient ward space to geographically separate groups of patients on specialist wards such as the Cystic Fibrosis wards. The design of the new hospital made it more difficult because there were less beds and less geographical separation.

Surveillance of Hospital Acquired Infection.

181. The infection control team was supported by a computer system called IC NET. This would capture the outbreaks and alert the ICNs that there was a possible issue with cross infection on the ward. There was a centralised data team that produced reports on the standard organisms we were looking for such as MRSA and *C difficile*. For standard organisms this system worked well but for more unusual organisms or one-off infections the computer system was less useful and still relied on teams to recognise links between infections. This was made more difficult in the paediatric setting with the amalgamation of the microbiology laboratories from Yorkhill into the larger South Sector Laboratories. In a smaller laboratory it is easier for a small team to have oversight of the results from the whole hospital. This is much more difficult to achieve in a much larger lab with a bigger team of Consultants and BMS staff.

Resignation of ICDs

182. I have been asked about the resignation of Christine Peters, Teresa Inkster and Pauline Wright. In July 2015, I received an email late in the day, but I cannot recall exactly when, from Brian Jones informing me that, Christine Peters, Teresa Inkster and Pauline Wright wished to resign as ICDs effective immediately. I telephoned Brian to ask why. He said that he was unable to comment or discuss this with me any further as a process would be put in place to identify and resolve any concerns that they had raised. To my knowledge a process was not implemented, or if it was it did not include me. No concerns were raised with me either by the Doctors involved, medical or general managers and I still have not been told know why they resigned.

183. Pauline Wright was due to finish her time as Infection Control Doctor two days after she resigned and a successor had apparently been identified but I had not been informed who it would be. I met the next day with Tom Walsh, Sandra McNamee and Dr Linda Bagrade and Dr Alison Balfour who were the other ICD's in NHSGGC. As I had not been informed by Brian Jones who Pauline Wright's successor would be I was unable to invite then to the meeting. At that meeting we all agreed on a way forward to cover the service

in a comprehensive way pending any problems being resolved. We were all confident that could continue to deliver the service for the long term.

184. Tom Walsh and I took this proposal to Jennifer Armstrong, the Medical Director. Her view was that she did not wish the doctors concerned to be allowed to resign their ICD sessions and wished Dr Inkster and Dr Peters to honour their 2 session commitment to Infection Control despite my clear preference that if they wished to resign that they should be allowed to and the process mentioned by Dr Brian Jones to be allowed to take its course.

185. Dr Armstrong did not mention that she was aware of any of the reasons for the resignation at that meeting or subsequently. I was therefore left to try and co-ordinate the ongoing provision of an effective ICD service in very difficult circumstances. Dr Inkster and Dr Peters in particular took any opportunity to undermine my position both in infection control and in my role as Consultant Microbiologist in the management of paediatric patients. An area where she had much less experience than I.

186. When I raised my concerns about this with Anne Cruickshank, the clinical director for Laboratory Medicine and Infection Control, I was told “that’s just Christine”. It was the lack of support from senior medical managers and the difficulty of working effectively with Drs Inkster and Peters that played a part in my decision to leave NHSGGC.

187. Dr Peters and Dr Inkster continued in their ICD roles. Dr Inkster covered the Beatson and regional services including those provided on the QEUH site. Dr Peters continued to cover the rest of the QEUH site. Their line of reporting was to Brian Jones, Clinical lead for Microbiology. I was having to co-ordinate this service and report to Brian Jones so was trying to manage a team that I did not have responsibility for, and a team who had stated that they did not wish to be ICD’s anymore but were told to continue by Jennifer Armstrong.

188. Dr Inkster and Dr Peters seem to have formed a view that Tom Walsh and I had access to large amounts of information that we were withholding from

them and had a major role in the design and commissioning of the new hospitals that we were not willing to share. Nothing could have been further from the truth. We had repeatedly, as a Senior Management Team, requested information on the validation of the new hospitals which we were unable to obtain, and we communicated this regularly at the Infection Control Senior Management teams. Drs Inkster and Peters were also at complete liberty, as ICD's for areas within the QEUH, to request this information for themselves. At no point were they asked not to do this. In terms of the actions taken around the adult BMT I fully endorsed the action taken by the Incident management meeting to move the patients back to the Beatson and although there was a wish to get the unit back in action as soon as possible there was never at any time pressure put on me to agree to an action that would in any way compromise patient care.

Managing an Outbreak

189. If there was an outbreak in one of the hospital sectors it was managed by the team in that hospital sector. The incident management team was usually chaired by the sector ICD. If there were outbreaks that were out of the ordinary, they would be brought back to the SMT as part of the sector report. Common seasonal outbreaks such as Norovirus would be managed entirely within the sector. The HIATT process picked up outbreaks such as Norovirus and usually they were scored as green which meant that no further escalation was needed. They would not be noted on the sector reports but, were aggregated together by the data team who kept records of outbreaks and incidents. If the HIATT score was amber or red the incident would be escalated internally and a report would be sent to HPS. If there were any outbreaks or incidents of unusual infection, in addition to immediate escalation, they would be reported at the ICSMT.

190. Once an outbreak was identified there was an outbreak team chaired by the ICD who would make a plan on how to deal with the outbreak. The objective was to stop patient harm and to prevent further spread or occurrence of subsequent outbreaks.

191. I did not see any indication or evidence of an increased number of infections or types of unusual infections within the patient population at the QEUH. I did not have any concerns about infections being caused by the built environment because we were rectifying ventilation in the paediatric wards and we did not undertake bone marrow transplantation there until we were happy that the ventilation was performing to the required standard. We had also at this stage transferred the adult bone marrow transplant patients back to the Beatson.

Patterns in Infection

192. NHSGGC use Statistical Process Charts (SPC) to assess the ongoing rate of infections. This involves looking at historical trends and setting limits on whether the numbers are higher or lower than would be expected. The disadvantage of these charts is that they require a relatively large number of infections over significant periods of time to generate useful charts and this system would not have been useful and in fact were not used for unusual infections.

193. In looking for patterns in infections, infection control teams rely on both the results generated by the microbiology laboratory but also on the symptoms with which the patient presents to hospital.

Cross Infection

194. I was asked how I would convince myself from a bacteriology point of view that two infections were definitely linked. This is done in a series of steps. The first is to ensure that the bacteria are the same species. The second step is to determine if the organisms are identical in terms of their typing. If two bacteria were of the same species and type then I would be confident that it is exactly the same organism. For example, if you have six pseudomonas isolates from patients on a ward with cystic fibrosis, they could all look the same on a culture plate, but when typed, using a comparison of the nucleic acids that they contain they're all different. Despite all the patients having pseudomonas

aeruginosa, they're not the same pseudomonas aeruginosa. This means that there hasn't been any cross infection. You need to be very precise before you can be absolutely certain that it's the same organism. The names of organisms also change over time due to changes in taxonomy but also in laboratory technology, for example MALDI-ToF lab identification systems identify a broader range of bacteria than biochemical systems.

195. I do not know whether genome sequencing would help in all bacteria. For some organisms, for example MRSA, it is possible to perform typing using whole genome sequencing, but for other organisms there is not enough known about their genome and it's variability to say whether it's reliable or not. It's not really may area of expertise but there are a number of specialist reference labs where you can send isolates to be typed and discuss with them the significance of their typing results in the clinical context. It's then possible to understand the overall relevance of the typing. The IC NET system allows you to put a record of the typing. This enables you to derive patterns of infection not only from the names of the organism but also from the typing.

196. IC Net needs sufficient data to be input into it to make the links. Effectively it is a database but it needs a human to decide what to look for. We centralised the data team for NHSGGC so that there were three or four people who continuously looked at the data. This has the advantage that they gain expertise and get used to seeing the data and as such might be better at recognising patterns.

Infection Control Manual

197. The National Infection Control Manual is mandated to be applied in all healthcare premises in community and acute settings. As the Infection Control Manual became broader, the specialist units found it more difficult to comply. As an example there was a recommendation National Infection Control Manual that FFP3 masks should be worn in case of respiratory infection. From November through to March a large number of patients coming in through the paediatric emergency department have respiratory infections.

198. This meant that if the manual was applied as written, consultant paediatricians along with all paediatric staff would be wearing FFP3 masks continuously from November until March. This raised significant concerns from the paediatric staff in terms of communication amongst other things especially as the majority of these infections in children do not cause serious illnesses in adults. The role of the Infection Control Team includes trying to balance the concerns of the clinicians in this case in paediatrics and mental health with the requirements of the National Infection Control Manual and seeking additional external advice. In this case for example the HSE advised that vaccination doesn't prevent the requirement for wearing masks. In any case where a health board deviates from any recommendation within the NICM the infection control team had to provide a risk assessment for each deviation from the manual.

HIIAT Review

199. In the document reference **A32222109 - Minutes of the NHS Greater Glasgow and Clyde Board Infection Control Committee held on 5 October 2015, Bundle 13, Document 34**, dated Monday 5th October 2015. Under the Heading 5.5 Recent Outbreaks/Incidents there is mention of the *Serratia marcescens.* This is an organism that is known to cause cross-infections in vulnerable neonates, particularly in surgical units and in neonatal units.

200. This problem with *Serratia marcescens* occurred in the neonatal intensive care unit on the QEUH site which was not part of the new build but was housed in the existing maternity block on the Southern General Hospital site. The neonatal unit from Yorkhill had moved to the Southern General Unit when Yorkhill closed. The isolates of Serratia were not causing clinical illness in the neonates but were identified as part of a screening process. There was no national policy for screening neonates for Serratia and there were historical

differences in practice between the two sites. At Yorkhill, babies were routinely screened for *Serratia marcescens*, this was not the case the Southern General unit. As the Yorkhill protocol was adopted on the new combined unit this meant that we were screening larger numbers of babies for Serratia so this was one possible explanation for the apparent increase in the numbers that we were finding. However, we also needed to look into the other possible causes such as clinical practice around line care, disinfection of equipment and hand hygiene.

201. This is an example of where the HIIAT process is less useful. In this case we were discovering colonisation and not infection so while finding the Serratia was useful to point out a potential problem with infection control in the unit it was not leading to illness in any of the babies involved. Sadly, when [redacted] colonised with Serratia died the clinical team were certain that the cause of death was entirely unrelated to *Serratia marcescens* but fact of the death escalated the HIATT score from green to red resulting in a referral to HPS/Scottish Government. This made little sense to the clinical staff involved in the care of [redacted] at the time who were satisfied that the presence of Serratia on [redacted] did not contribute to the death. The investigation of the cases of Serratia on the unit was performed in collaboration with HPS who did not identify any deficiencies in NHSGGC's handling of the incident.

202. The HIATT system is supposed to enable HPS to look back and see patterns of hospital cross infection and share learning. However, in this case the discovery of Serratia depended upon on screening practices in the unit which were up to each individual health board to determine. So there was no reliable national data about the incidence of this organism, found as a result of screening not clinical illness, in neonatal units in Scotland

FINAL COMMENTS

203. I think I have now covered everything that I have been asked. I would however like to add in addition my major concerns as to how events that

unfolded at the QEUH were, interpreted and reported by a previous inquiry set up by the Scottish Government Chief Medical officer Department, I cannot recall the name of that inquiry. Their assumption that increased input from an individual ICD would have significantly changed the outcome of the building works at the QEUH was not based upon any evidence that was presented to me. In addition, there were several inferences in that report that I found personally offensive especially one implying that I left employment with NHSGGC before I was pushed. This was not the case. After giving a statement to assist that Inquiry I was not furnished with a copy of my statement or the report and was not given any opportunity to comment upon the final report before it was published.

DECLARATION

204. I believe that the facts stated in this witness statement are true, that this statement may form part of the evidence before the Inquiry and be published on the Inquiry's website.

Curriculum vitae

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Qualifications:
1982: M.B. Ch.B. Liverpool University
1986: M.R.C.P.(U.K.) Edinburgh (Fellow 1998)
1991: M.R.C.Path.(Fellow 1999)
2000: M.D. Liverpool University

Present appointment:

2018- Consultant Microbiologist University Hospitals of Morecambe Bay

Previous appointments:

2011-19 Professor of Healthcare Acquired Infection, University of West of Scotland.
One day a week within the institute of Healthcare associated infection at the University of West of Scotland.

- The Patient Journey – optimising the management of patients through the hospital, to ensure that the prevalence of HAI is reduced - for example, measures to minimise impact of isolation on patients with reduced mental capacity.
- The Patient Environment – investigating how the healthcare environment contributes to the spread of HAI - for example, reducing patient harm and resource burden from hospital outbreaks of norovirus.
- Understanding HAI – using information about their biology to predict or prevent HAI

2016- 2018 Consultant Microbiologist , Dorset County Hospital, Dorchester
Infection Control Doctor, Dorset County Hospital, Dorchester
Clinical Director Pathology, Pharmacy and Medical Physics

Dorset County Hospital provides a range of adult and paediatric services to the population of West Dorset. The microbiology department provides a full range of Bacteriology, Virology and Mycology services processing 214,000 samples annually.

2002-2016 Consultant Microbiologist Royal Hospital for Sick Children Glasgow

Yorkhill Hospitals comprised a 370 bed Paediatric Hospital and the Queen Mothers Maternity Hospital. The Paediatric Hospital provides General Paediatric Services to Glasgow and in addition provides Tertiary services in Bone marrow and Renal Transplantation, Cardiothoracic surgery and Burns. I attended regular rounds on the paediatric intensive care unit, cystic fibrosis unit and bone marrow transplant unit and gave advice on treatment of bacterial, viral and fungal infection and infection control. The paediatric laboratory moved to collocate with adult services in 2013, since then I have also provided weekend and out of hours for the adult hospital and set up MDT's for adult orthopaedic joint replacement services

2009-2016 Lead/Co-ordinating Infection Control Doctor NHS Greater Glasgow and Clyde

NHS Greater Glasgow and Clyde has a total population of 1 million with 3 large acute hospitals along with 9 other sites covering mental health and health care partnerships. The role of the Lead ICD is to provide leadership for the medical staff in the 3 sector Infection Control teams and co-ordinate the available Infection Control Doctor sessions and to work closely with the Infection Control Manager and the other members of the senior infection control team to develop the service and implement change.

2010-2103 Head of Service Microbiology and from 2012 Acting Clinical Director Laboratory Medicine Greater Glasgow and Clyde University Hospitals Division.

2005 – 2008 Clinical Director Laboratory Medicine
Greater Glasgow and Clyde University Hospitals Division.

2001-2002 Consultant Microbiologist
Infection Control Doctor Hull and East Yorkshire Hospitals

1995-2001 Consultant Microbiologist, Infection Control Doctor Royal Alexandra Hospital, Paisley.

1997-2001 Clinical Director Diagnostic Services, Royal Alexandra Hospital,

1993-1995: Consultant Microbiologist, Scunthorpe General Hospital.
Honorary Lecturer, University of Leeds.

1989-1993: Senior Registrar in Bacteriology, Western Infirmary, Glasgow. Honorary Clinical Lecturer, University of Glasgow.

1987-1989: Rotational registrar appointment with West Midlands Regional Health Authority.

1985-1987: Pathology Senior House Officer Rotation, Royal Liverpool Hospital.

1983-1985 Medical Senior House Officer Rotation, Liverpool

1982-1983: Pre-registration House Officer, Liverpool

Teaching experience

I am currently co-supervising 1 PhD student at Lancaster University. The projects is the use of vibrational spectroscopy in the diagnosis of bacterial and viral infections and biofilms. I have successfully supervised 10 previous PhD students to completion I am involved in lecturing to undergraduate 2nd 3rd and 4th year medical students at Lancaster University Medical School. I also undertake ward based teaching to 3rd and 4th year medical students at Lancaster University Medical School at both Royal Lancaster Infirmary and Furness General Hospital. I was previously involved in undergraduate teaching at the University of Glasgow where I lectured and support practical demonstrations for undergraduate medical students and was also a clinical tutor at the Royal Hospital for Sick Children.

Professional and External Standing

- Scientific expert developing European wide EQA scheme for molecular diagnosis of Aspergillus, Candida and other Hospital pathogens with Quality Control in Molecular Diagnostics (QCMD) *(*2010-present)
- Expert Adviser for the NICE Centre for Guidelines (2016-present)
- Invited speaker ECCMID Portugal (2022)
- Invited Speaker Danish National Biofilms Copenhagen (2022)
- Invited speaker " Don't Panic" Hospital Infection Society Infection Control update Manchester (2022)
- Member of Hospital Infection Society Guideline development group, safe use of endoscopes 2021-2022
- Co-organiser, session chair and presenter, Federation of Infection Societies(FIS) meeting Edinburgh
- Sept 2019(2018-2019)
- Co-organiser, session chair and presenter, Eurobiofilms 2018 meeting Glasgow Sept 2018. (2017-2018)
- Invited speaker ECCMID Madrid (2018)
- Treasurer European Study Group on Biofilms an ESCMID group with the objective of ESGB to promote and disseminate studies and knowledge about methods and results of biofilm studies with relevance for infections in humans.(2012-2018)
- Invited speaker American Society of Microbiology New Orleans(2017)

- Topic Expert for production of NICE UTI in Children (CG54) review (2016-2017)
- Invited speaker Microbiology Asia Singapore (2016)
- Invited speaker 16th Scientific Meeting 2016 Mukoviszidose-Institut,Mainz (2016)
- Member of Hospital Infection Society Working Party- Final Rinse water for Endoscope Washer Disinfectors(2014-2017)
- Chair of HAI reusable medical device decontamination expert advisory steering group Health Protection Scotland(2013-2016)
- Member of Scottish Antimicrobial Prescribing Group (SAPG) (2010-2016)
- Invited speaker EU-China symposium on Biofilms Chongqing China (2015)
- Invited speaker and session chair, Eurobiofilms, Brno, Czech Republic.(2015)
- Invited Speaker Hospital Infection Society, Middle East Infection Summit, Dubai (2015)
- Member of Working group and invited presentation ISHAM Working group Fibrosis Angers, France. (2014)
- Invited Speaker Antimicrobial Therapy in Immunocompromised and Critically Ill Patients (*ATCIP*). Lausanne, Switzerland. (2014)
- Member of National Healthcare Associated Infection Steering group and Programme Board (2010-2013)
- External Advisor for the development of NICE Guideline, Management of acute diarrhoea and vomiting due to gastro-enteritis in children under 5 [CG84] (2008-2009)
- Member of NICE Guideline development group, UTI in Children(2005-2007)
- Member of topic group for Health Technology Assessment; Clinical and cost effectiveness of screening for MRSA(2005-2007)
- Member of EAPCRI. (European Aspergillus PCR Initiative) (2006-2010)

Research

My research is of multidisciplinary and applied nature which is reflected in my publications. My research strategy has been to publish in three areas of research in biofilms, microbiology diagnostics and infection control. I have a strong clinical background in these areas and have managed to develop effective collaborations with scientific colleagues in both biological and physical sciences.

Current research funding

Title	**Funding Body**	**Amount**
CORMIR: Cost-effective Portable Mid-InfraRed (MIR) Very Rapid Screening for COVID-19 in upper respiratory tract samples or saliva on naso-pharyngeal swabs.[Co-I]	Innovate UK	[redacted]
Plasma-activated antimicrobial hydrogel therapy (PAHT) for combatting infections in diabetic foot ulcers[Co-I]	EPSRC	[redacted]
Plasma activated hydrogel therapy for combatting antimicrobial resistance in chronic wounds[Co-I]	National Health and Medical Research Council (NHMRC)	[redacted]

Publications:

Peer reviewed papers

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Comparison of the lung microbiome in chronic obstructive pulmonary disease and in health: an in silico study. Short B, Delaney C, Butcher MC, Litherland G, **Williams C**, Martin L, Thornbury K, Mackay WG, Ramage G. Thorax 76 (Suppl 2), A58-A58.

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Procalcitonin for patient stratification and identification of bacterial co-infection in COVID-19. Han J, Gatheral T, **Williams C**. Med (Lond). 2020 May;20(3):e47

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Development and characterisation of a multi-species COPD biofilm. Short B, **Williams C**, Litherland G, Lundy F, Mackay W, Ramage G. *European Respiratory Journal* 2020,56: 2053

Influence of delivery system on the efficacy of low concentrations of hydrogen peroxide in the disinfection of common healthcare-associated infection pathogens. Amaeze NJ, Shareef MU, Henriquez FL, **Williams C,** Mackay WG. *Journal of Hospital Infection* 2020,106 ;1: 189-195

Artificial intelligence-assisted loop mediated isothermal amplification (AI-LAMP) for rapid detection of SARS-CoV-2. Rohaim MA, Clayton E, Sahin I, Vilela J, Khalifa ME, Al-Natour MQ, Bayoumi M, Poirier AC, Tharmakulasingam MBM, Chaudhry NS, Sodi R, Brown A, Burkhart P, Hacking W, Botham J, Boyce J, Wilkinson H, **Williams C**, Whittingham-Dowd J, Shaw E, Hodges M, Butler L, Bates MD, La Ragione R, Balachandran W, Fernando A, Munir M. *Viruses* 2020, 12; 9: 972

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