SCOTTISH HOSPITALS INQUIRY

Hearings Commencing
26 February 2024

Day 6
Tuesday, 5 March 2024
Dr Donald Inverarity

C O N T E N T S

10:04

THE CHAIR: Good morning. Now, Mr MacGregor, I think we are able to begin?

MR MACGREGOR: Yes, my Lord. The next witness would be Dr Donald Inverarity.

THE CHAIR: One small technical problem – I have not brought my notebook. (After a pause) Thanks very much Drew. Right, well, I think we have managed to address this technical problem. Is Margot bringing in Dr Inverarity?

MR MACGREGOR: Yes.

THE CHAIR: Okay. Good morning, Dr Inverarity.

THE WITNESS: Good morning.

THE CHAIR: As you will understand, you are about to be asked questions by Mr MacGregor, sitting opposite, but first, I understand you are agreeable to take the oath?

THE WITNESS: Yes, I am.

THE CHAIR: Sitting where you are, can I ask you to raise your right hand and repeat these words after me?

Dr Donald James Inverarity
Sworn

THE CHAIR: Thank you, Dr Inverarity. Now, as has probably been explained to you, we will be sitting between ten and one o'clock, and we will take a lunch break. We usually break for coffee about half past eleven, but if for any reason you want to take a break during your evidence, just give me an indication and we will take that break. Please feel that you are in control of the position. The other thing I would like to say is that it is quite a big space and I have a hearing problem, I wear hearing aids, and I am very conscious that I sometimes miss things. So, can I ask you to speak a little bit more slowly and a little bit more clearly than you would in normal conversation? I mean, I appreciate it is rather difficult, but as I say, everyone wants to hear you, and I certainly do. Thank you. Mr MacGregor?

MR MACGREGOR: Thank you.

Questioned by Mr MacGregor

Q You are Dr Donald James Inverarity. Is that correct?

A That is correct.

Q You have provided a witness statement to the Inquiry which, for the benefit of core participants, is available at pages 84 to 207 of bundle 3 of the witness statement bundles. The content of your statement is going

to form part of your evidence to the Inquiry, but you are also going to be asked some questions by me today. If at any point you want to refer to your statement, please just do let me know. There should be a copy available for you. In relation to any documents I want you to look at, those should come up on the screen in front of you. If for any reason you cannot see them, if you can just let me know.

A Okay.

Q So, before we begin, I understand that there is one correction that you would like to make to your statement. Is that correct?

A Yes. It's in paragraph 9 in relation to guidance that was in place when I----

Q It is probably easiest if we just bring it up and then you can let us know just exactly what you want to change. So, I think if we could bring your statement up, which is in bundle 3 of the witness statements, look to page 99 and to paragraph 9. Sorry, I think it is page 87. Was there a correction you wish to make within paragraph 9?

A It was in relation to the guidance that was in place when I was undertaking training in healthcare ventilation. In England, the guidance was HTM 03-01, and in Scotland it was still SHTM 2025.

Q Okay. So, at the time that you were undertaking training in relation to the built environment, the relevant guidance was HTM 03-01 in England and Wales, and SHTM 2025 in Scotland. Is that right?

A That's correct.

Q Thank you. If I could just begin by asking you some questions about your qualifications and career. You set that out within your statement, but you have been employed by NHS Lothian since 2014. Is that correct?

A That is correct, yes.

Q You are a consultant medical microbiologist and lead infection prevention and control doctor. Is that right?

A That is correct.

Q And you have held that role since 2015?

A That is correct.

Q Having undertaken similar roles with other health boards including NHS Lanarkshire?

A That is correct.

Q You tell us, within your statement, that your areas of expertise include infection prevention and control, particularly in relation to healthcare associated infections arising from water and ventilation. Is that right?

A That's right.

Q We will come into the detail in a moment, but could you just explain in general terms what expertise you have in these aspects of the built environment?

A So, it's expertise that's come from dealing with a number of incidents in various healthcare buildings where there have been water contamination events with Legionella, with Pseudomonas aeruginosa, that are two bacteria that commonly affect water systems. I have experience of being involved in design of refurbishment projects and also new build projects.

So, in NHS Lanarkshire, around 2010, I was involved in the design and then the build of a refurbishment of an Adult Haematology Unit, and also involved in the design of a new Intensive Care Unit for the hospital and a plan to refurbish operating theatres. More laterally, in NHS Lothian, I was involved in the children's hospital and since then, I've been involved in design stages for a new eye hospital and treatment centre, but have been involved in various refurbishment projects as well.

Q Okay. So, in addition to your – we will come on and talk about what your day-to-day role involves – you have also been involved in some major new build hospital projects during your career?

A Yes, I have.

Q Is that usual for an infection prevention and control doctor, or is this just happenstance that, during your career, certain health boards have been doing these major projects?

A For myself, it's really been driven by where I was working and plans that were in place for those particular facilities. It is becoming, I think, more common for infection control doctors to be able to function with those skills.

Q The Inquiry has heard evidence that often, during the career of an infection prevention control doctor, a new-build hospital might either be a once-in-a-career or perhaps never-in-a-career event. Speaking to colleagues, has that been their experience until relatively recently?

A Yes, I would agree with that. It does really depend on the health board that you're working in and the age of the estate that's present. Larger health boards generally tend to have more building projects than the smaller health boards.

Q I think you had mentioned that your view was that

infection prevention and control-- is that teams, as opposed to simply the infection prevention control doctors, were becoming more involved in the design of projects.

A Yes, it's----

Q Did I pick you up correctly?

A It's not just limited to the infection control doctor role. It's the entire team that are involved.

Q Just think through your career from the 1990s onwards. Is this something that has been developing gradually over time?

A Yes, my career in microbiology really began around 2002 and, although there was, within that training, a limited amount of expectation of understanding of the healthcare built environment, it was limited, really, to operating theatres or isolation rooms, and a little bit about water systems and risk from Legionella.

There were reports around that time from microbiologists who were horizon scanning as to what the infection control doctor role would entail in the future, and it was very much more around about incident management, dealing with outbreaks of infection, resolving those surveillance of infections that were causing significant harm like Clostridium difficile, Staph aureus bacteremias.

The built environment was not really on the horizon at that stage. I think by around 2010, there was more of an awareness of the built environment being an issue that infection control practitioners would need to have an input into, but that often was more in the context of being able to ensure that the area could be kept clean and maintained, and that infection risk could be engineered out of fixtures and fittings rather than dealing with integral systems within the building, critical systems like the ventilation system.

There has been an awareness of that over the years and various people within the field have focused on that, but for the generalist, it was less of an issue.

Q So, you obviously had a particular interest, as you tell us from your statement, and you had the practical experience from working at NHS Lanarkshire, but should the Inquiry understand, really, the idea of infection prevention and control and the built environment throughout the early 2000s up to, I think, about 2010, you said there is a general awareness, but not, perhaps, a specific focus on

that from the infection prevention control angle. Is that correct?

A Yes. It was more of a niche area that some people would explore more and develop skills in, but it wasn't mandatory, and it was by personal choice.

Q From 2010 onwards, developing discipline, is—really, the science and understanding around about infection prevention control in the built environment, is that still an emerging area of science and discussion amongst professionals?

A Yes, absolutely at the moment, and the pandemic has had a lot to do with that. I think understanding of how infection travels by air and the role of ventilation systems has accelerated a lot because of the pandemic, but research has been going on since the mid-20th century regarding designs for operating theatres, for instance.

Q Mm-hmm, and again, we will come on and perhaps look at some more specific documents, but you identified the fact that there had been some research, particularly in relation to operating theatres. The Inquiry has heard evidence that, for example, in the 1970s, Dr Lidwell was doing certain modelling based, effectively, on scientific probability in relation to air changes in operating theatres. Is that the type of analysis that you were aware of?

A Yes. That work is fundamental to the design still today of conventional operating theatres, and through the 70s, there was work on design of ultra-clean operating theatres as well by different people.

Q Mm-hmm, and again, we will come on and look at some of the documents, but certainly the Inquiry has seen documents suggesting that, really, right through the early 2000s up until 2019, there was a view amongst a number of professionals working in infection prevention and control in the wider NHS that, really, there just was not enough research and robust evidence around about issues relating to ventilation in healthcare. Was that your understanding?

A I think there was robust evidence. I think the application of it was changing as healthcare developed and patient risk profiles were changing. Interventions were changing. The way surgery was being performed was changing. So, it's never a static landscape, but a lot of the principles were fairly well established.

Q And then you mentioned, obviously, the COVID-19 pandemic.

Has that almost shone more of a spotlight onto the area and the need, perhaps, for more research and understanding in this area?

A Absolutely. I think the potential consequences of suboptimal ventilation are much clearer, and also general understanding of the role of ventilation is much more widespread from the general public and also through staff in healthcare. Having a conversation about ventilation systems pre-pandemic was a very different conversation to having a conversation post-pandemic.

Q Some of the issues the Inquiry is interested in are air changes per hour and pressure regimes. Are you aware in the period, let us talk post-2019, of ongoing research and analysis in relation to those types of issues in the built environment for hospitals?

A Yes, particularly in the application of what's referred to as fallow times, which was during the pandemic trying to identify how long you would have to leave a room empty before staff could safely re-enter, particularly either cleaning staff or the next patient, if you're in a dental surgery, for instance. So, there was work that's now referenced in the National Infection Control Manual

undertaken in conjunction with Leeds University to really determine in a clear table how long you would need to leave a room fallow, or empty, for a virus to settle based on time and the air change rate per hour.

Q So, now there is some guidance, you are telling us, in terms of how long a room would have to be left, how many air changes per hour would be required. Obviously, one of the issues the Inquiry is interested in is critical care spaces. In broad terms, what does that research tell us?

A So, the parameters for critical care really haven't changed for a long time; really; 2007 and HTM 03-01 in terms of air changes and pressure cascades. I think what has changed is an awareness that not all critical care areas deliver that if they were built during the 20th century and through the pandemic, there would've been attempts to try and augment ventilation within those spaces to improve or to minimise the risk of transmission of COVID, particularly, with the use of devices that are referred to sometimes as air scrubbers.

Q And again, we will come on and look at this in more detail, but obviously, the current published guidance in both Scotland and

England says that for critical care areas, the standard in the guidance is positive pressure and 10 air changes per hour. In your view, is that best practice guidance, or is that really the cut-off point that you need for a space to be safe within critical care?

A So, I consider it as best practice guidance. I think it's difficult to be certain about safety because safety is a destination that is difficult to reach in healthcare, and what may be considered safe for one patient may not be safe for another even though they're in the same area. So, in critical care, maybe if I can illustrate that, if I had a room with four beds and a patient is admitted say, for instance, unconscious from an overdose and then develops a fever and is found to have influenza, the three other patients in that room will have exposure to influenza.

If, for the sake of argument, one of those patients is on drugs for treatment of something like rheumatoid arthritis and immunosuppressed, they have a greater probability of that exposure turning into influenza, incubating and then manifesting as a new case of influenza. If, for instance, another patient in the room has a head injury and is on a ventilator – so they're breathing through a tube down

their windpipe connected to a machine – they're not actually breathing the room air, they're breathing piped gases from elsewhere in tanks in the hospital, so their risk of acquisition may be less, and if, for instance, the fourth patient in the room has a bacterial pneumonia as a consequence of having had the same strain of flu, then their risk is negligible because they can't have flu again from the same strain that quickly. It's immunologically not what happens. So, you've got four patients with different safety profiles based on the infection risk, although they're all in the same room and all have had the same exposure.

Q Just to make sure I am understanding you correctly then, would it really have to be a multifactorial assessment that takes place in relation to what is and is not safe?

A Yes. Safety is a constellation of events and infection risk is only one parameter in that. There are a whole number of other things, like fire safety, safe staffing levels, even for some patients the colour of the walls can be an issue if there's cognitive impairment – it may exacerbate confusion – or there may be ergonomic issues like a trip hazard.

So, safety is quite a nebulous term that's got many things that factor into it and not just infection.

Q So, if you have a package that is set out within the guidance, for example, SHTM 03-01, should the Inquiry understand that, if that is known to be safe and best practice, if you are stepping away from that, it is actually quite a difficult assessment for an infection prevention control professional to make in terms of whether anything that departs from that package is going to be safe in and of itself?

A Yes. It's not a binary decision between it's safe and unsafe. It's a spectrum, I suppose, of probability and safety, and it's difficult to anticipate where you may be on that until harm happens.

Q Your colleague, Lindsay Guthrie, described it as effectively a continuing-- or more a sliding scale. We will come on and look at this in more detail, but you take the old hospital at Sciennes, it had no mechanical ventilation and no air changes, but it was generally accepted by clinicians to be safe because of the other package of measures that was put in place. Was that your understanding?

A Yes. So, although it

didn't have mechanical ventilation as such, there were features of the architecture that provided elements of safety. There were cubicles that had doors that shut that only had one patient in them, and that provides a degree of physical containment. I think the largest area that had a shared bay had three patients, so the highest number of people that could be affected in transmission events would be, well, two, really, from somebody who's infectious.

Q Mm-hmm. So, on that scale, you would have perhaps an old Victorian hospital like Sciennes, no air changes per hour, no mechanical ventilation – it could be safe, but it would not be as safe as a hospital at the other end of the scale that complied with all of the guidance set out in SHTM 03-01, positive pressure, 10 air changes per hour, for example?

A Yes. I think that's a fair assessment.

Q So, again, just to think about the hospital as built at Little France, four air changes per hour in balance to negative pressure. On that continuum, it could still be safe in the sense of being safer than Sciennes, but not as safe as the best practice guidance. Is that how the Inquiry should understand matters?

A Yes, I think so.

Q Thank you. If I can perhaps just take a step back and ask for your views on the role of infection prevention and control. So, the Inquiry obviously has your statement where you talk about the role of an infection prevention control doctor. The Inquiry has heard from Lindsay Guthrie and Sarah Jane Sutherland in relation to the role of an infection prevention control nurse, but could you just explain in your own words, really, how the infection prevention and control team would mesh together between the doctors, nurses and other professionals working in the discipline?

A Yes. So, since the events of the Vale of Leven, the infection control team leadership has really consisted of an experienced infection control nurse, an infection control doctor and an infection control manager. Now, in larger boards, there may be more than one person fulfilling those roles or there may be deputies, just because the workload is too great for any one individual, but in the best examples, that team will function together as a leadership team for folk within the infection control department who may be training and not yet fully qualified in the discipline, or working with administration staff or clinical

scientists.

The roles that we would be expected to deliver are quite wide, and no one discipline, really, has all the skill mix to fulfil that remit. Infection control nurses generally come from quite a senior nursing background and come with a skill set that really understands the day-to-day provision of care for patients with infection, how to get things organised on a ward and the logistics of running a ward, be that for repairs or cleaning, which is a skill set that, generally, I wouldn't have as an infection control doctor. The infection control doctor often brings more of a skill set from a laboratory background and certainly from an infection management background, so more a potential understanding of what the pathogens are, how they behave in particular areas of the hospital or how they manifest as disease, and more ability to interpret laboratory data, understand its context, its limitations, liaise with other reference laboratories.

There's definitely overlap in the skill set as well in terms of understanding how infection is transmitted, how to identify how transmission events are taking place, how to break those transmission events with interventions, how to remove the hazard or mitigate against

the hazard, and generally, the key skill that we're usually called upon to deliver is outbreak management and incident management, which both involves understanding how infection transmits in a healthcare environment, but also involves other skills like diplomacy and negotiation.

Q Thank you. If we then think of how those skills would be utilised on a new-build hospital project, is there a clear job specification for an infection prevention and control doctor as to exactly what would be expected of them on one of those projects?

A No, and I think that's been recognised among the infection control doctors as a concern for us.

Q Okay, and can you just explain why is that a concern?

A I think it becomes easier for there to be misunderstandings about what the role of the infection control doctor is and what it isn't. Clearly, for those of us that are in the role, we're more aware of the limitations of our training and that isn't necessarily always clear to people in other disciplines. I think sometimes there can be misconceptions that we can perform roles that we're not actually qualified or trained to perform.

Q Your colleagues from the nursing side of infection prevention and control, both Sarah Jane Sutherland and Lindsay Guthrie, they said that they had real concerns that infection prevention control professionals were effectively being made to be quality control officers for new-build projects, and they did not think they had the skills, training or experience to do that. Is that a concern that you share?

A Yes. I think there are certain parts of construction projects where I think having a doctor has no added value. Having a doctor attend a building site, really, has very limited added value. Having a doctor inspect an air handling unit to see if there's dust in it really has no added value than an estates officer. So I think, yes, there are examples where the expectations now really don't align with what we trained to do.

Q We will come on and look at this in a bit more detail slightly later today, but you will be aware of the concept of a ventilation safety group that has been created under the latest iteration of the guidance whereby a whole range of disciplines are going to be involved in making key decisions. Do you think that is going to be an improvement, or is that simply going to add an extra burden on to Infection Prevention and Control

professionals if they feel they are effectively being made to be the quality control officers?

A No, I think it is an improvement. I don't think it's additional burden. If anything, it can provide a forum to correct those misconceptions and bring staff who have the correct skill mix to answer the questions being asked. So, in particular, authorising engineers in ventilation systems, their function, their role is very much compliance, and not just in relation to infection risk, but in relation to the manufacturing process, the suitability of components, the function of the design, the appropriateness to healthcare, and those are skills that the Infection Control team just simply don't have, but the need for them is sometimes projected onto the Infection Control team. So, having an authorising engineer present to speak to those issues is a distinct advantage.

Q So, you mentioned in your evidence there is a lack of clarity in terms of what is expected of you as an Infection Prevention and Control doctor, perhaps a misunderstanding in relation to other members of project teams as to what Infection Prevention and Control professionals can and cannot do. Just at a practical level,

what would be helpful to Infection Prevention and Control professionals to try to provide that clarity? What could be done to improve the situation?

A I think being clearer as to what is in scope and what is out of scope with regard to specific stages of a building project, and when it's out of scope, being clearer whose job best aligns with that task.

Q Thank you. I would just like to ask you a few further questions, really, about the training that Infection Prevention and Control professionals would receive in relation to the built environment. Lindsay Guthrie gave evidence to say that, effectively, if you want to become an Infection Prevention and Control nurse, there is further training that you would have to do, but none of that training involved the built environment in terms of ventilation systems, water systems. Is there any mandatory requirement for training in the built environment to become an Infection Prevention and Control doctor?

A So, the training really begins before you become a consultant. The curriculum for the FRCPath exams includes an expectation that, as you complete that training in microbiology/virology, you

will have a skill set, a generic skill set, in infection control principles, and that, as I said earlier, includes things like operating theatre design and water systems, but it is a generic skill set. Passing those exams is necessary to become a consultant in the UK and to appear on the GMC Specialist Register as a medical microbiologist, so having got to that stage, you already have some basic knowledge.

It's within the grounds of possibility that you move from, "I've just completed training, I'm a new consultant, I get my consultant post, and suddenly I'm in the Infection Control doctor post and have no additional qualification or training or experience in issues in the health care environment," so, may understand some of the basic principles, but never had to have applied them in a real world setting, unless during training you've had the benefit of shadowing people who are involved in that activity. So, there are limitations, and there's no obligation to partake in specialist training at consultant level as a medical microbiologist. For those of us who are Infection Control doctors, I think the only expectation on us is that, when we have our annual appraisal, we demonstrate that we've been active in continuing professional development

in the field of infection control, but it's that vague. There's nothing specifically about the built environment. That would be a personal option.

Q So, there could be a scenario whereby there is someone who is newly qualified as an Infection Prevention and Control doctor, it just so happens straight after that basic training that they are the Infection Prevention and Control doctor for a major new build hospital, but that individual would not be required to undergo any specific mandatory training in relation to specialist ventilation systems or specialist water systems before they worked on that project?

A That's a potential scenario. Yes.

Q Do you think that's a potential problem in the system? A skills gap that-- if someone could be put in that position of taking on that role without some form of specialist training?

A Absolutely, yes.

Q So, again, just-- I would be interested in your views, Dr Inverarity. How how could that be improved? Just in terms of suggestions or recommendations as to how that could be made better, what

specific training do you think an Infection Prevention and Control doctor would benefit from if they were working, not just in one of the small generic refurbishment projects, but one of these large major hospital new build projects? What would they benefit from?

A So, there are courses run within the UK that would cover that knowledge gap. They are expensive and residential, usually, but they do exist, and so participation in such a training, or equivalent training, that's hands-on rather than theoretical or online, I think, is beneficial, but also there's not a lot that studying in a kind of simulated theoretical environment-- There's limitations to what that can teach you compared to being involved in the actual process and more of an apprenticeship model of shadowing folks that are already involved in projects with more experience.

Q Again, just so I am understanding you correctly, it is almost unrealistic, even if someone had the academic training, to expect someone simply to go from having sat in a classroom to have all of the skills and knowledge that would be required for one of these large healthcare projects? Really, the type of training someone would need would have to

have been from working on these types of projects?

A Yes. I don't think it's a necessity, but it would certainly be beneficial and make the process much less daunting.

Q Thank you. I would now like to just look at some guidance with you that has been published in relation to Infection Prevention and Control. If we could begin with Scottish Health Facilities Note 30, please, which is at bundle 13, volume 3, at page 464. So, bundle 13, volume 3, page 464, and that should be the October 2014 version. Do you see that?

A Yes. I do.

Q I just noticed-- sorry, we are having some difficulty with the documents being displayed on the screens. I am not sure if that is a problem for any core participants that are following, but it is certainly not coming up on the large screen there.

THE CHAIR: Right. We do not have it on the screen at the moment.

MR MACGREGOR: I have it on my screen, but I cannot see it on the large screen in the room.

THE CHAIR: Right. Drew, what is the-- Are we planning to display documents on the screen?

ANDREW FOX: (Inaudible).

THE CHAIR: Okay. I mean,

certainly, this should be on screen.

MR MACGREGOR: Perhaps, while we are just waiting for the technical issues to be resolved, could you just explain, in your own words, what is this document we are looking at, and what is its purpose?

A So, SHFN 30 is more commonly referred to as HAI-SCRIBE, the Healthcare Associated Infection System for Control of Risk in the Built Environment. It's essentially a way of making sure that people think before performing activities that might cause harm in healthcare settings with regard to refurbishments or other aspects of building. It sets out to identify whether what's intended to be performed is fairly minor, such as replacing a sink, or fairly major, like demolishing a building, and also look at the risk profile of the patients that might be affected, whether they're fairly well in, for instance, a mental health setting, in an outpatient setting, or whether they're very susceptible to infection, such as in a bone marrow transplant unit.

Q Thank you.

THE CHAIR: My understanding, Mr MacGregor, is that, this morning, core participants will be able to access on their own laptops. The witness and I have access to the screen, as I hope you do.

MR MACGREGOR: I do, my Lord.

THE CHAIR: Right, but we are not using the large screens this morning.

MR MACGREGOR: Okay. Thank you, my Lord. I think you were just explaining that, really, this would be-- I think you said it was an introduction to HAI-SCRIBE, and that is effectively a tool that would be used in relation to projects involving the built environment and hospitals. Is that right?

A Yes. It's mandatory in Scotland.

Q Thank you. If you could just look on to page 468, please. It is just the first full paragraph below the box. You will see the wording beginning, "Scrutiny of this guidance…" Do you see that?

A Yes, I do.

Q It says:

> "Scrutiny of this guidance will highlight the frequent use of the word 'Partnership.' Successful use of HAI-SCRIBE requires participation and cooperation particularly between Estates & Facilities staff and Infection Prevention and Control Teams."

Do you see that?

A Yes, I do.

Q Just explain in your own words, what is your understanding of this requirement for partnership working?

A So, in a building project, no particular discipline has all the skillsets necessary for a successful outcome, and it really seeks to facilitate bringing those disciplines together using a common tool to assess risk together because what may be identified from a clinician or from somebody working in Infection Control may not be immediately apparent to somebody with an Estates background, whereas other risks would be immediately apparent to the Estates team and not necessarily apparent to clinical teams. So, it's just a means of bringing people to work to a common goal.

Q Do you think that was well understood in the period up to 2019? That, really, this was not just an Infection Prevention and Control document, this was aimed at a much wider audience, Estates and other disciplines?

A Yes. I think it did depend a little on where you were working and how it had been adopted and-- but generally, it had been enforced

through various chief executive letters since about 2007 that this was a mandatory process that must be followed.

Q So, it certainly should have been understood within the wider NHS?

A Yes.

Q Thank you. If we could look on to page 470, please, to paragraph 1.4. If you look around four lines down, you will see a sentence beginning, "For HAIs to be reduced…" Do you see that? So, it's page 470, paragraph 1.4, four lines down, "For HAIs to be reduced…"

A Yes.

Q

"For HAIs to be reduced, it is imperative that Infection Prevention and Control (IPC) measures are 'designed-in' and IPC risks are 'designed-out' at the very outset of the planning and design stages of a healthcare facility and that input continues up to, into and beyond the final building stage."

Do you see that?

A Yes.

Q So, again, should the Inquiry understand that if a health board was setting its brief for what it wanted for various spaces within the

hospital, Infection Prevention and Control should be involved in those types of discussions?

A Yes.

Q And if a health board was changing its brief for certain areas within the hospital midway through a project, is that the type of discussion that all these disciplines, including infection prevention and control, should be involved in?

A Optimally, yes.

Q Whenever you say "optimally," what are the risks that you would be taking? Just say you start a project, you get halfway through, and you decide that you are going to change your brief for certain spaces within the hospital. If you do not involve all of the disciplines set out within SHFN 30, what risks are you taking?

A Well, there's more opportunity for misconceptions. I think having the clinical team, infection control team, and the building team, estates team, in the same room or, certainly, in the same discussions, breaks down misconceptions. Certainly, experienced myself where my perception of where-- of what would happen in a room doesn't actually align with the clinical teams and, therefore, there would have been a potential risk that something unsuitable would be built. Whether unsuitable would lead to being unsafe is a different matter.

Q So, an opportunity to ventilate what is and is not suitable and what is and is not safe. Is that fair?

A Yes.

Q If I ask you to look on, still within this document, bundle 13, volume 3 to page 471 and at paragraph 1.6. We will see the various stages of the SCRIBE process and you see there, fourth bullet point, "Development Stage 4 - Pre-handover check, ongoing maintenance and feedback." Do you see that?

A Yes.

Q So, again, should we understand, from the literal reading of the wording there, that there should be a check done in terms of the process before the hospital is formally handed over from the contractor and accepted by health board.

A That's what I take from "Pre-handover check."

Q And again, just looking at matters from your perspective as an Infection Prevention and Control doctor, if there was a new build hospital and this stage 4 was simply skipped, the health board just

accepted the hospital before it did the stage 4 HAI-SCRIBE check, what would be the types of risks that the board would be undertaking by that course of action?

A So, there would certainly be a potential infection risk, but there may be other risks, such as fire risks. Essentially, that stage 4 in the HAI-SCRIBE is related to infection risk because it's a healthcare-associated infection that it's really tailored to, but that is the final safety check, really, before being assured that it's an appropriate environment for delivery of health care and before allowing patients and staff to be exposed in that area. I think without it, you run the risk of not picking up snagging issues and those may or may not lead to infection issues over time. It may not be that they're immediately apparent at the time of handover, but may develop over the lifetime of a malfunctioning critical system.

Q In simple terms, if you did not do the stage 4 check before you accepted the hospital, would you be accepting a hospital not knowing whether it was or was not safe for patients?

A With relation to the HAI-SCRIBE, again, it's really intended for infection risk, but you would be

accepting somewhere without knowing where there may be hazard.

Q If a health board that you were working for came to you for advice and said, "We're thinking of just skipping the stage 4 HAI-SCRIBE process and just accepting the hospital without going through that procedure." Is that something you would recommend?

A Absolutely not.

Q And again, you say, "Absolutely not," so you seem very clear in your thinking. Again, just in simple terms, why not?

A Because it's potentially missing your last chance of being assured that the area is safe.

Q Thank you. The next document I ask you to have in front of you, please, is bundle 13, volume 3 at page 553. If we look onto page 554, you will see that this is an earlier iteration of SHFN 30, this time from June 2007. Do you see that?

A Yes, I do.

Q And during the course of your career, have you had cause to look at this document at any point?

A Yes. It was the current guidance when I worked at Monklands Hospital.

Q And again, I will not take you through it, but again, it is in very

similar terms in many respects to the guidance that we looked at talking about a multidisciplinary approach. Is that correct?

A Yes. In terms of multidisciplinary approach, yes.

Q If I could ask you to look on to page 573, please. You see section 5 is headed up "Risk management," and if we look to paragraph 5.3 you see it says:

> "To avoid mistakes and pitfalls the Project Team must consider issues including:
>
> - How will the product, equipment, room or clinic be used?"

Do you see that?

A Yes.

Q Again, so the Inquiry understand, this concept of risk, it is not as simple as saying, "It is the same risks for every space and every patient." You really need to know the specific room, and the specific clinical use that it is going to be put to, to be able to try to calibrate the risk profile.

A Yes because that may be different for different people, or it may be different depending on how the room is used through the course of a day.

Q Thank you, and then if we look at the second last bullet point, you will see that it says, "What are the standards and guidelines from architectural and engineering bodies, government departments and accrediting agencies?" Do you see that?

A Yes.

Q So, again, so the Inquiry understand, what this guidance is telling you, from at least 2007, is that the multi-discipline project team are being told, "You need to have on your radar published guidance from engineering bodies, government departments and accrediting agencies if you are working on a new-build hospital project?"

A Yes.

Q If you look over the page onto page 574, you will see that there is a bold heading:

> "**Common errors**
>
> 5.5 Common errors in design and construction (adapted from Carter and Barr, 1997) due to inept or non-existent risk management include…"

And then if we look to the second bullet point, "…incorrect air turnover and airflow patterns…" Do you see that?

A Yes.

Q So, if you just think back to whenever you were working on the

Monklands project, would you be aware, at that time, that a common error could be incorrect air turnovers and airflow patterns if you are not following the published guidance?

A Yes.

Q We do not see these common errors listed in the 2014 iteration of the guidance. As someone that worked in this space, had those types of common errors-- had they really been ironed out by 2014? Is that why we do not see it mentioned in the later iteration of the guidance?

A I don't know why they're not mentioned in the later guidance, but they certainly hadn't been ironed out.

Q So, from your understanding as someone who worked in this space, certainly if you are working on a project from 2014 onwards, it would still be a common error that you could trip up on air turnover, air flow patterns, if you did not have appropriate risk management procedures in place?

A Yes, and those risks are highlighted in other papers and documents from that time. There was a paper produced by the Association of Medical Microbiologists in 2006 that lists a much wider range of common errors in building projects, by Jane

Stockley in 2006 on building hospitals, and the CDC in the USA, the Centre for Disease Control, in 2003 published a very comprehensive guidance document on infection control in the built environment and many of these issues are featured in that document.

Q We will come on and look at this in more detail in relation to the project, but while we are just looking at this at the minute, if it is a known common error that you could potentially get air turnover and airflow patterns wrong, the Inquiry has heard evidence that, effectively, on the project for the Royal Hospital for Children and Young People, that the health boards brief effectively started off life that it was going to be positive pressure for critical care rooms. There was then a decision taken on behalf of NHS Lothian that, really, what it wanted was balanced or negative pressure and four air changes per hour, and then, as we all know, that has then changed back to positive pressure and 10 air changes per hour. How did that come to pass on the project?

A So, I wasn't consulted in that decision making in the run-up to the decision-- well, during the decisions of the change from positive to balanced or negative. I was

involved in the decision to return to a positive pressure environment, and part of the driver behind that was the direction that we'd been given by Scottish Government that the hospital wouldn't open without being a compliant design.

Q You say that, obviously, you are acting in the capacity of the lead Infection Prevention and Control doctor. You are not involved in the decision in relation to balanced and negative pressure and four air changes per hour in critical care rooms?

A Not directly, no. I wasn't involved in the project as part of the project team. One of my colleagues was accessible for discussions about infection control matters as the site Infection Control doctor and we had an Infection Control nurse dedicated to the project as well, so not every decision would come to me.

Q Lindsay Guthrie, in her evidence, described as feeling that Infection Prevention and Control were, perhaps, on the periphery of some decisions that were being made in relation to the project for the Royal Hospital for Children and Young People. Was that your perception as well?

A So, I was one step

removed because we had a nurse and a consultant microbiologist working more closely with the project team. I think I would be consulted and involved when there were issues which either a second opinion or another perspective may be being sought, but that was usually at the request of the project team rather than me knowing that there might be an issue in intervening.

Q Because obviously, if you are not being consulted, you do not know what decisions are being made. I think what I would really be interested in, in terms of your observations, is in terms of the problems that arose on the project for the Royal Hospital for Children and Young People and the Department for Clinical Neurosciences, do you think that arose because on the part of NHS Lothian, they had inept or non-existent risk management because they had not involved you in some of the key decisions?

A No. I wouldn't say there was ineptitude. I think appropriate disciplines were involved in decision-making. I think there was potential issues that guidance was changing through the lifespan of the project. Within critical care, for instance, the original design brief had been

discussed with colleagues and was complete by the beginning of 2013.

Q So, is the real problem from your perspective just the complexity and difficulty of applying the guidance that was in place at the relevant times?

A Certainly, there's complexity in the application, but the application can also be influenced by what the priority is at the time. So, the driver behind asking for that change in ventilation parameters was being driven by a wish to be able to contain respiratory viral infection and the principles to do that were sound, and that has been borne out during the COVID pandemic. So, yes, I would disagree that there was ineptitude.

Q So, again, we will come on and look at this in a bit more detail in relation to the project itself, but if you had been consulted in relation to what the ventilation parameters were for critical care rooms within the Royal Hospital for Children and Young People, would that have been a simple easy decision that you would have said, "It is absolutely obvious. It is positive pressure and it is 10 air changes per hour," or actually, is it a difficult, nuanced decision as to whether it should be balanced and negative and a lower number of air changes per hour?

A I think it's a complex conversation to have because you can look at this from the perspective of compliance with a guidance document that's considered best practice, and you can look at it potentially from the perspective of the case mix of patients that you're anticipating using the area, and those two things may not align.

I think the key to getting a successful outcome is involving people with the appropriate skills to guide through that process. Infection control has some of that skill, but not the whole skill set. The clinical team has some of the skill, but not the whole skill set, but more importantly, a key participant would be an authorising engineer who will undoubtedly have experience of the potential consequences of deviating from guidance.

Q Again, just so I am understanding correctly, although there is guidance, that is not a hermetically sealed black box that if you comply with the guidance, it will always be safe. It is actually a much more nuanced, individualised consideration as to whether something will be safe or unsafe?

A Yes because, as we spoke earlier, safety is on a spectrum

and can vary depending on the needs of or the state of the patient.

Q That is a conversation that needs to take place, as I understand your evidence, between clinicians, Infection Prevention and Control and engineers to get the right package for any individual space within a hospital?

A I would consider that the best model.

Q Thank you. If I could ask you to look on, still within the 2007 version of SHFN, to page 576 please, and to paragraph 5.19 beginning, "The integration of prevention…" Do you see that?

A Yes.

Q It states:

> "The integration of prevention and control of infection risk management and construction is in its infancy. It represents a significant change in the management of healthcare facilities design and planning which will take time to develop to a level at which the greatest benefits can be achieved. Just as important then is the need to carry out research in the area of risk management, prevention and control of infection and the built environment to produce sound irrefutable evidence on which to base further risk management strategies."

Do you see that?

A Yes.

Q Is that, effectively, just encapsulating in the guidance what you told us in evidence earlier today, that this was really an emerging discipline through the 2000s? There was the 1970s research by Dr Lidwell, but there was still a need, certainly at this point in time, for further research to be done so that there could be the robust, irrefutable evidence upon which to base clinical risk decisions?

A Yes. It's a journey that's influenced by changes in how healthcare is delivered as much as the facilities that it's delivered in.

Q Thank you. Again, just to assist the Chair in terms of where matters stood in relation to that research, if I could ask you to look to bundle 3, please, and to page 142. Bundle 3, page 142.

THE CHAIR: Thank you.

MR MACGREGOR: It is just for your observations on the board. This is not a meeting that you were at, but it is a meeting of the Oversight Board which, you will see on the second line, was held on 29 August 2019. There is a range of individuals attend. So, Dr

Calderwood the Chief Medical Officer from the Scottish Government. You see that she is listed as present. Present by telephone is Professor McMahon, the Nurse Director at NHSL, Dr Gregor Smith, the Chief Medical Officer of the Scottish Government. In attendance is Mr James, the director of Health Facilities Scotland, and in attendance by telephone is Professor Riley, the Lead Consultant Infection Prevention and Control for Health Protection in Scotland. Do you see that?

A Yes.

Q So, a range of individuals with a range of skill sets. Then, if we look on to page 144, you see that there is a summary of a discussion that took place on ventilation specific points. Do you see that?

A Yes.

Q So, 1 states:

"Literature review now complete - demonstrated limited and sub optimal evidence around air changes and clinical outcomes. Most evidence had been expert opinion, modelling and outbreak reports."

Do you see that?

A Yes.

Q Again, just thinking back to 2019, so pre the COVID pandemic, was that your understanding of, effectively, the evidence base, that the evidence base around air changes and clinical outcomes, that was what is described here as "sub optimal"? Is that a statement that you would agree with?

A To a degree, yes. It's a very difficult area to research because there's so many other factors that influence outcome. There were some key individuals who are certainly closer to the literature than I am regarding that, but a lot of infection control literature and guidance does, unfortunately, get based on expert opinion and anecdotal experience during outbreaks.

Q Again, the Inquiry has heard evidence that there is, perhaps, good reason for that, ethical reasons why. If you know 10 air changes is safe, there could be ethical issues in terms of testing that on individual patients at 9, 8, 7, 6----

A Yes.

Q -- to try and work out what is and is not safe. Is that your understanding of one of the difficulties around about the research in this area?

A Well, that's one of the difficulties, but it's very difficult to control for other factors such as

immunosuppression, or susceptibility of the patients, and case mix, whether you're dealing with adults or children or neonates.

Q Thank you. Then, if we could return to the minute, bundle 3, page 144, you see paragraph 4, which states:

> "Air changes is not a specific hurdle to get over but is the level generally found to be suitable in the majority of developed countries."

Do you see that?

A Yes.

Q So, I am assuming this is reference to the guidance in terms of the table with various criteria, and it is saying that air changes in and of itself is just one hurdle, but these are generally accepted parameters throughout the developed world. Is that your understanding from the literature reviews that you have done?

A Yes. There is guidance similar to UK guidance and the USA and Australia, and the numbers aren't necessarily exactly the same for different ward areas, but generally they're on a par with each other.

Q Thank you, and then just point 6, I would be interested in your observations. It states, "Air changes are covered by guidance not standards." Do you see that?

A Yes.

Q Do you think, in terms of ventilation parameters for hospitals, that it is really good enough just simply to have this loose guidance that should generally be followed, but there is no particular consequences if you do not? Do you think there should actually be a hard-edged standard that should be achieved for new build hospital buildings? I am not talking about refurbishing old buildings, but I am talking about new builds. Should there actually be a minimum legal standard that requires to be met for these systems as opposed to a looser concept of guidance?

A That may be one way of improving the current situation. I think it would be, perhaps, stricter than would be necessary in all scenarios. I think if you had areas that were served by critical ventilation systems it would, perhaps, be more useful than areas that don't really have much requirement for such a level of ventilation delivery. So, laboratories, for instance, being very different to an outpatient department.

Q Thank you, and then just while we are on this chapter of your evidence, there is just two more documents I would like to look at. The

first is bundle 7, volume 1 at page 342. So, bundle 7, volume 1, page 342. This is a minute of a meeting held on 15 July 2019. A range of individuals from NHS Lothian are present, you will see, including yourself listed as being present.

If we could look on to page 343, you will see that there is a bold heading, "**Critical Care Design**." Do you see that?

A Yes.

Q Then if we look over the page on to page 344, you will see the penultimate paragraph begins, "Tim Davison…" Do you see that?

A Yes.

Q If we could look four lines down, you will see there is a sentence beginning, "HFS were still considering…" Do you see that?

A Yes.

Q So, the minute says:

> "HFS were still considering their position and how they could make a pronouncement in respect of whether the facility was safe for occupation or not. Lyndsay (sic) Guthrie provided an update on discussions with UK experts in ventilation. This discussion had focused on the science around the determination of the number of air changes required pe hour with it being noted that as previously discussed these decisions were not scientifically based."

Do you see that?

A Yes.

Q So, again, as someone working in this space, you are obviously having to make difficult decisions, but these are judgments that you are making as opposed to making decisions based on clear, crisp scientific data. Is that correct?

A For ourselves in Edinburgh, we certainly weren't experts in healthcare ventilation, although we'd had some training. So, Lindsay, fortuitously, had opportunity to undergo that training the week before with UK experts, Malcolm Thomas and Peter Hoffman, and was relaying that fresh training into the conversation locally, whereas my training was a few years earlier. So, hers was more contemporary, but yes, it was a complex discussion and seeking the opinion of folk who are more familiar with those discussions and more experience in other healthcare buildings.

Q Thank you. If we just read on in the minute, we will see what some of that guidance was. It says:

> "A discussion was held in

respect of pressure cascades and air flows in terms of providing a comfortable environment as well as the control of infection. In conclusion it was agreed that the specification of 4-6 air changes per hour was an arbitery number."

Do you see that?

A Yes.

Q So, again, and I would just be interested in your views. In terms of the numbers that we see within the guidance, should the Inquiry understand that they are really arbitrary numbers, they are best practice and a judgment, but there is not really any crisp, scientific underpinning to the figures that we see within the guidance?

A I am perhaps not the best person to ask that question to. I think somebody who wrote the guidance may be able to answer it more completely.

Q But certainly, if we look to this minute, this is a discussion that is taking place----

A Yes.

Q -- so this would be the understanding----

A Yes.

Q -- from a discussion with those experts. I think you mentioned

Peter Hoffman of Public Health England. Is that correct?

A Yes.

Q And Malcolm Thomas, an engineer?

A Yes.

Q Just to complete the minute, it says:

"Other aspects had to be considered like requirements in respect of protecting staff where the statutory position was 3 air changes per hour. It was noted that the Roodlands Endoscopy Unit operated on a 15 air changes per hour basis. Iain Graham advised that work was underway to check the regime that was in place and there would be a need to come back on this."

Do you see that?

A Yes.

Q So, again, obviously, it seems like there is difficult, complex discussions taking place. Again, a difficult judgment, if you are going to depart from the guidance, how far you can depart from it before matters would become unsafe in any specific clinical space for any specific patient.

A Yes, and at that time, it was very much a hypothetical discussion,

whereas within a year or so, with the

pandemic and the first wave, there was much more experiential learning, I guess, of what can happen if you do try to deliver healthcare with three air changes per hour.

Q And again, it would just perhaps be helpful if you could draw on that experience and explain to the Inquiry, what were some of the things that professionals working during the pandemic found out could happen if you do depart from the guidance?

A So, I think the key concern was secondary cases of COVID occurring amongst patients and staff in areas that had low ventilation. So, areas that were naturally ventilated and generally, areas that had less than six air changes per hour were deemed to be suboptimal to prevent COVID transmission. Through the pandemic, the concept of aerosol generating procedures became much more crystallised as a key parameter to consider. So, an aerosol generating procedure, there was a list generated nationally by a group, NERVTAG, and there was a lot of debate as to what was and what wasn't aerosol generating, but a lot of the theory that we've discussed already about air changes is based on a simulation where you have a finite release of

aerosol in an empty room.

So, there's a start point, there's an end point; there's a starting concentration and an ending concentration, but what became very quickly apparent was that a number of procedures during delivery of critical care don't fit into that scenario because you have a continuous release of aerosol from interventions that are potentially life-sustaining. So, high-flow nasal oxygen, which along with continuous positive airway pressure are preferred ways of trying to ventilate patients rather than put endotracheal tubes down into their lungs, if you're doing that on somebody who's excreting virus in their throat, you will aerosolise that virus into the room, and if there are multiple people, multiple patients doing that at the same time, you will generate a very hazardous environment for staff to work in with accumulation, potentially, of virus over time.

So, if the ventilation air change rates are low, what you create is an environment where the staff are entirely dependent on personal protective equipment, whereas if the air change rates were much higher, then you can protect your staff by nature of engineering out that potential

hazard. It's not a hazard to the patients because, generally, you will have predetermined everybody has COVID, and if you've already got COVID you can't catch it from the person in the bed next to you who's got COVID because you've already got it, but the risk very much was more of a staff safety issue.

Q And in terms of air changes per hour----

A Yes.

Q -- is it the higher the number, the quicker that you are removing the contaminant from the space? Or how does that work?

A So, it's not linear in that each air change removes about-- I think it's 63 per cent of suspended particles, droplets, aerosols, but the more frequently you do that, the more virus you remove, essentially, but if you're producing aerosols at a faster rate than you're removing them, then inevitably, you'll get build-up of a virus in that space because generally there's nowhere else for it to go other than the extract ventilation and a little bit of leakage at the door.

Q So, it is not as simple as saying you would get to a point, if you just kept increasing the air changes, that you would get more and more and more benefit from it. There is a limit to how much benefit will be achieved after a certain number of air changes. Is that correct?

A I don't know the physics of it, to be honest, to explain that, but there would be other practical considerations in that you may not be able to deliver that through an air handling unit. There'll be a limitation as to what the capacity of the air handling unit can deliver, the ductwork, what it can deliver.

Q Thank you, and then just the final document to look at in terms of the scientific knowledge as around 2019. If I could ask you to look to bundle 3, please, at page 185. So, bundle 3, page185. You see this is a report by NHS National Services Scotland, and it is a review of water ventilation, draining and plumbing systems relating to the Royal Hospital for Children and Young People and the Department of Clinical Neurosciences. If I can ask you to look on, please, to page 199 and to paragraph 4.2.6. Do you see that?

A Yes.

Q Which states:

"From an infection prevention and control perspective, there is low-quality to no evidence from outbreak reports and current guidance,

respectively, to support minimum ventilation requirements. Therefore, it is not possible to make conclusive statements regarding the individual minimum ventilation parameters for inpatient care areas. A rapid review of the literature found limited clinical evidence to directly implicate air change rates alone in having a direct impact on the development of an outbreak or incidence of infection. Therefore, it is reasonable that, in the absence of evidence, healthcare design teams should continue to adhere to current national guidance. In the event of a deviation from the current recommended ventilation parameters, design teams should ensure that air changes per hour are maintained as close as possible to the recommended air changes per hour without compromising other aspects of the ventilation system requirements. In addition a full assessment of the services and patient population should be carried out and mechanisms for monitoring established. Caution is advised in relying on air change rates alone to provide adequate protection from infection; this is only one part of a multifactorial process involved in creating the appropriate airflow patterns with appropriate mixing and dilution of contaminants. Nationally, further research is required to look beyond air change rates to examine the effects that other factors such as supply and exhaust location, door position and motion, spatial orientation, surface composition, temperature, humidity, and air distribution patterns have on particle migration in clinical areas."

Do you see that?

A Yes.

Q Now, we will come on and look at some of the decision making in relation to the Royal Hospital for Children and Young people and some of the potential difficulties, but is that quite a crisp summary of the scientific foundation and some of the difficulties that anyone working in Infection Prevention and Control would have if you are looking to depart from what is published best practice for ventilation requirements?

A Yes. I would agree with that.

Q Thank you. Now, we have talked a little about the old Royal Hospital for Children at Sciennes and again, as I picked you up, you said that your understanding was it did not comply with the published guidance, did not have any mechanical ventilation, but it was still safe. You did not have any concerns about children being treated within that hospital. Is that correct?

A Yes. So, I didn't work at Sciennes during my time at Lothian, although I had spent time there as a medical student, but there were systems in place to monitor outcomes and nationally, in paediatric intensive care, there is a group called Paediatric Intensive Care Audit Network who look at outcomes across all paediatric ITUs, look for evidence of harm, mortality, unexpected extubation incidents, and the Sciennes' department was not an outlier. Locally, within the department, they had looked to use the Scottish Patient Safety Programme to monitor and perform surveillance on possible acquired infection rates for things like ventilator-associated pneumonia or intravenous line infections. So, locally, there was some work going on there and they were not causing concern that they were seeing greater than they would expect to see. So, it was

determined safe from those parameters.

Q Okay. So, again, this will be relevant when we come on and look at the pause in the project, from your perspective as an Infection Prevention and Control doctor, albeit not working directly at Sciennes, your understanding was that there was not a safety issue around about children being treated within the critical care department at Sciennes?

A Yes. That was my understanding. The department was certainly not optimally designed for the delivery of intensive care treatment because it was a Victorian building, but the outcomes were not of any concern.

Q Thank you. So, that is, if you like, the children's hospital. What about the Department for Clinical Neurosciences? If we think back to 2019, was it completely safe?

A No.

Q What, from your perspective, were some of the problems with the Department for Clinical Neurosciences?

A So, from around February 2019, I was alerted by colleagues who'd been working over the weekend that there'd been cases of Pseudomonas aeruginosa infection in patients who had undergone

neurosurgical procedures, which was unusual. We wouldn't normally see that organism in that context. That led to us performing a water quality assessment in the building, as directed by draft guidance from Health Protection Scotland at the time, and we began to uncover that the water system in that building was quite heavily contaminated with Pseudomonas aeruginosa.

Q And for those of us that do not work in that space, how significant an issue is that?

A So, in this particular patient group, our concern was that it was leading to post-operative brain infection.

Q So, should the Inquiry understand that the water system at the old Department for Clinical Neurosciences, was that adversely impacting on patient safety and care?

A Yes.

Q So, how urgent was it for the Department for Clinical Neurosciences to move from that unsafe hospital to a new safe hospital?

A So, the incident management team for that incident was attempting to mitigate the hazard presented by putting filters on water outlets throughout the building and stripping out plumbing, essentially, that

was heavily contaminated and replacing it with new plumbing. So, there was substantial building work going on in the building. One of the issues with a contaminated water system with this type of organism is that it's not a stable system. It's dynamic and the organisms can move around the building by means of the pipework, and we would find that as soon as we managed to get areas clear, it would crop up elsewhere in the building. One of the areas that was significantly affected was the High Dependency Unit, and we reached a stage where, really, apart from the operating theatres, the three wards in that building were affected. We had to take showers out of use, toilet areas out of use; it was an inconvenience for patients and, ultimately, we were looking towards moving the department as a control measure because we didn't feel that we had anything other than short-term measures in place and there was every possibility that harm could still occur.

Q Okay. So, we will come on and look at this, but there is obviously a period where the new hospital does not open, including the Department for Clinical Neurosciences, and there is quite a

period before the move takes place. Can you just explain, in your own words, some of the real life critical issues that that is creating from an infection prevention and control perspective?

A So, at that stage the issue at the Western had become public knowledge. There was media interest, it was being reported in the BBC. There was the day-to-day issues of, "Where do we consider safe? If it was safe last week, is it still safe?" There was a great deal of water testing going on and the results of that would be coming back from an external water safety laboratory, so that would require time to assimilate and contextualise and identify which outlets were still a problem that might not have risk mitigation. There was a lot of administration related to incidents like this to maintain minutes and record-keeping and escalation to Health Protection Scotland, as it was, and at that time, I was in the role of the site Infection Control doctor for the Western General, as well as the lead Infection Control doctor in the Health Board, so a lot of my time was required addressing that issue on the Western side. The executive directors were incredibly helpful and, in fact, given the gravity of what was

happening, they took over the chairmanship of the incident in order to free myself and Lindsay up to deal more with the operational management of the incident.

Q What impact, if any, did that have on things like clinical capacity and the amount of treatment that could take place within the facility?

A I would have to look back at the minutes of the incident to refresh my memory of it. There were, as I say, limits on access to toilet facilities and shower facilities. I don't recall if we'd had to limit surgery. If we did, we would have tried to minimise that as much as possible. By the summer of 2019, prior to July 2019, we started to discover a similar issue in the Western General Intensive Care unit, which is a different building with a different water system, but that Intensive Care unit would often manage the post-operative neurosurgical patients who require intensive care, and that started to impact on number of bed spaces available in one of our main adult Intensive Care units, so it did start to create operational impact.

Q So, should the Inquiry understand, certainly from the perspective of the Department for Clinical Neurosciences, there are incredibly serious issues with the built

environment and there is a real pressing need for the new hospital to be open and operational?

A Yes. We were, as I say, working towards being able to move the department, which would have improved safety for the patients on the assumption that the new area was free of that organism and the water system was a fully functional water system. It would have also helped because the plan had always been that the neurosurgical adult patients would go to the Royal Infirmary Intensive Care unit for management so, by moving, it would free up large capacity in the adult Intensive Care unit at the Western General to allow some radical replumbing and removal of pipe work.

Q Thank you. Lord Brodie, I am conscious that we are slightly after half eleven. Now might be an appropriate time to take a break.

THE CHAIR: As I said at the beginning of the morning, we usually take a coffee break. So, if we could be back for ten to twelve?

MR MACGREGOR: Sure.

THE CHAIR: Drew, do you want to (inaudible)?

(Short break)

12:02

THE CHAIR: Mr MacGregor.

MR MACGREGOR: Thank you. If I could ask you to have in front of you, please, bundle 1, page 2263. So, bundle 1, page 2263----

THE CHAIR: Thank you.

MR MACGREGOR: -- which should be STHM 03-01, and it is the interim version, the February 2002 (sic) version. Do you see that?

A Yes.

Q Sorry, 2022 version. If we just look on, please, to page 2431, you see there is “Appendix 2”-- So, page 2431, do you see that there is, “Appendix 2: Summary of design conditions”? Do you see that?

A Yes.

Q Now, there are some changes to this table from the old table A1 within the 2014 guidance. If we just look to the left-hand side, the application, you will see that there is, “General ward (level 0 and 1 care).” Do you see that?

A Sorry, could you repeat that?

Q So, if we look to Appendix 2, you will see in the far left-hand corner it says, “Application,” and then below that, there is, for example, “General ward (level 0 and 1 care).” Do you see that?

A Yes.

Q Then, if we look three or four entries down, we will see there are entries for, “Infectious diseases isolation room,” “Neutropaenic patient ward,” and we also have, “Critical care areas (Level 2 and 3 care).” Do you see that?

A Yes.

Q So, effectively, the general ward now has level 0 and 1 care specified, and then Critical Care has levels 2 and 3 care specified, and if we look on to page 2487, those concepts are designed. So, page 2487, at the very bottom, you will see the final entries there are “Level 0 care,” and “Level 1 care.”

A Yes.

Q Then, over the page, on to page 2488, we have got the definitions of “Level 2 care,” and “Level 3 care.” Do you see that?

A Yes.

Q So, “Level 2 care” being:

> “Patients requiring more detailed observation or intervention, including support for a single failing organ system or post-operative care, and those stepping down from higher levels of care.”

“Level 3”:

> “Patients requiring advanced respiratory support alone or monitoring and support for two or more organ systems. This level includes all complex patients requiring support for multi-organ failure.”

Although we see more specification there, in terms of the general wards are just “Level 0” and “Level 1,” Critical Care being “Level 2” and “Level 3,” is that really an innovation from an Infection Prevention and Control perspective? Or would the patients that were residing and being treated in Critical Care always be patients that are receiving “Level 2” and “Level 3” care?

A Yes. So, I don’t think it’s an innovation for Infection Control. I think-- Patient management hasn’t changed. These are distinctions that are fairly familiar to folk working in medicine and surgery. I think it’s difficult-- Well, you wouldn’t-- If you were working in a general ward, you wouldn’t confuse it with a Critical Care unit. There’s different skill mix, there’s different training, there’s different equipment and, generally, they’re located in different parts of the hospital.

Q So, perhaps from a clinician’s perspective in Infection Prevention and Control, that is not an innovation, but perhaps if you were an

engineer or an Estates person, it may be-- it may do no harm to have that extra level of clarity?

A Yes. May be additional information that's helpful.

Q Certainly, from your perspective, the Inquiry should understand that, yes, there is more specification, but you are not reading that as any material change from the 2014 guidance to the 2022 guidance?

A Not specifically. No.

Q Okay. Thank you. Now, I will not come to it at the moment, but within the 2022 guidance, there is the concept of the Ventilation Safety Group. If you are derogating from guidance, that is the type of decision that would be made by the Ventilation Safety Group. In either the 2014 guidance or the 2022 guidance, are you aware of any specific standard procedure or standard form that would be completed if there was a derogation taking place from the guidance?

A Not in relation to the guidance. No.

Q Okay. From your perspective, working as an Infection Prevention and Control doctor, is that problematic in that the NHS, as an organisation, has not provided a standard form template in terms of exactly what would be expected of you

if you were thinking of derogating from guidance?

A It's an impediment. Yes. I think, with any system, if there isn't a standard way of doing it, then you risk different outcomes at the end of the process. I think, from an Infection Control perspective, what is useful is having some kind of compendium of what all the derogations are and the content of them, what's actually been decided. The process of how you get to the agreement is more, really, the project team's remit.

Q Again, should the Inquiry understand, from your perspective, if there was a standard set procedure, standard expectations, standard form, that is an innovation that you would welcome?

A Yes. It helps in the determination of what the infection risk is.

Q Thank you. I want to move on now from looking at the-- effectively, guidance and general concepts, and now look at the specific involvement that you had on the Royal Hospital for Children and Young People and the Department for Clinical Neuroscience. I will just refer to that as "the project," but any time I am referring to "the project," that is what I am referring to. You tell us within your

statement that you joined NHS Lothian in 2014, and the project is already well-established at that point. Janette Rayer-Richards is the Infection Prevention and Control nurse that is providing day-to-day help to the project team. At this point, really, are you arm's length-- available if required, but really arm's length from the day-to-day project?

A Only after October 2015. The first year that I was in NHS Lothian I had no remit for Infection Control.

Q Okay. So, 2014 to 2015 no remit. 2015 onwards, you are available, but not involved in in the day-to-day activities. Is that correct?

A Yes.

Q Then, at what point do you come into the project and it really becomes almost a full-time job for you?

A So, that is around about February/March 2019.

Q Okay. So, if we think of the period where you are available to be called upon, so the period from 2015 to 2019, were you aware of potential emerging issues relating to the Queen Elizabeth University Hospital?

A Yes.

Q So, you can just explain

in your own terms-- We will come on and look at some specific emails that you have in relation to that, but just as a matter of generality, when does that come onto your radar, and how does it come onto your radar?

A So, I think, looking back, the initial signals that there were issues was around about 2016 from Infection Control doctor colleagues in Glasgow reaching out to colleagues and other health boards for advice. It wasn't immediately clear why they were asking those questions, but as time went on, it became more apparent that there were issues with the water systems-- or, I guess, alleged issues with the water systems, and that was more around 2018 where, within the microbiology community, word had kind of got out that there were issues with an organism, Cupriavidus, that people really weren't that familiar with. So, there was an interest into what was the issue, where's it coming from?

I also had some insight because of work that I was doing as part of the Scottish Mycobacteria Reference Laboratory. I had sessions covering that laboratory and there were isolates of a mycobacterium being sent to us from the Queen Elizabeth from patient cases that were unusual. So, there

were some signals coming professionally as well as through the Infection Control community. I think it wasn't really until December 2018/January 2019, when the media was reporting on cases of Cryptococcus, that there was really a release of information about the water systems and the types of organisms that had been seen and that provided a bit more information about context. Up until that point, I really hadn't had much direct contact with people working in Glasgow. I knew them because I'd trained in Glasgow, but there wasn't really any-- there hadn't been any forum really to speak to them.

Q So, water issues that you're aware of loosely in the period 2016 to 2018. Is that correct?

A And ventilation. There had been questions asked about isolation room design to the ICDs in Scotland from colleagues in Glasgow so, yes. Ventilation and water.

Q So, 2016 to 2018, issues being raised by colleagues that you know working at the Queen Elizabeth Hospital with yourself, and I think I picked you up as saying other members of the Infection Prevention and Control community. Was that correct?

A Yes.

Q So, at that point, when individuals working in Infection Prevention and Control are raising these concerns and issues with you, is there any formalised procedures whereby those types of issues that are being raised by your colleagues are being formally raised with either yourself or NHS Lothian-- and I am thinking particularly Health Facilities Scotland, Health Protection Scotland. Is there any formalised knowledge-sharing forum that is happening?

A As I say, not until probably December 2018 when there was a Health Protection Scotland report on water contamination at Queen Elizabeth. I don't recall anything earlier than that, officially.

Q So, in the period up to 2018, in relation to ventilation, is there any formal communications coming out from Health Facilities Scotland, Health Protection Scotland or any other central NHS body?

A Not that I recall.

Q And you say you do not recall anything similar for water, I think, until late 2018, early 2019. Is that correct?

A Yes.

Q And is that a report that is being made available to you

specifically through a set forum? Or is that simply a report that's published that you become aware of?

A It had been published on a website – I can't remember which website – and we downloaded it from there. It didn't become circulated around the Scottish Microbiology and Virology Network until August, is my recollection.

Q To an outsider who doesn't work in the space, it might seem somewhat strange that you have a hospital being built in Glasgow with clinicians that think there are emerging issues, and you have got another hospital being built an hour along the motorway, and that there is not any joined up forum, or centralised provision, for knowledge sharing between the two. Is that your understanding of the position? That there was not any sort of formalised mechanism for sharing and learning from each of the two projects?

A Not centrally, but sometimes that's the case in infection control, that incidents, even if they're unrelated to the built environment, information isn't easily shared between health boards.

Q Do you think it is problematic that there was not some form of formalised structure for sharing

knowledge and, perhaps, learning lessons?

A Yes. It's an impediment. It would help to have some kind of repository of being able to say, "Has anybody else dealt with this?" and what context it was dealt with. At that time, there was the ability to do that informally amongst colleagues. There was an informal email group of Infection Control doctors in Scotland, and we would often contact each other about odd things that we were seeing or stuff that we wouldn't normally have to deal with, but knew that somebody else had dealt with it.

Q So, the informal group exists, which is no doubt incredibly helpful, but you describe the lack of a centralised formalised process as being an impediment. If that impediment was being removed, what system should there be there to try and improve matters in the future?

A I think that's difficult to answer. I think some kind of repository or database, but a lot of the information I would imagine would need to be redacted, but some way of communicating, I guess, what's corporate memory for NHS Scotland with regard to incidents.

Q So, some form of formalised procedure whereby issues

that are being spotted by particular Infection Prevention and Control doctors could be logged and recorded so that, if there are other Infection Prevention and Control doctors within other health boards experiencing similar issues, they could access that knowledge bank.

A Yes.

Q Thank you, and just in relation, I think, to the knowledge that you had on the Queen Elizabeth University Hospital, if I could just ask you to turn to bundle 13, please, volume 3 and to page 462, and it is the email just over halfway down the page dated 27 March 2019. You see that is an email from yourself, Donald Inverarity to Sarah Jane Sutherland, copying in Lindsay Guthrie. Do you see that?

A Yes.

Q So, this is an email dated 27 March 2019 and, actually, the final paragraph there, you say, "I had been speaking to some of the ID consultants at the QEUH." Can you recall, who were the ID consultants of the QEUH that you were speaking to?

A So, on the previous day there'd been a meeting of the Scottish Health Protection Network High Consequence Infectious Disease Preparedness Group which met at

Stirling University, and I was attending that representing the Infection Control doctors in Scotland and also microbiology laboratories for the SMVN. There were representatives from various health boards, the ambulance service, who would deal with-- I suppose the reason for the day was scoping out how is Scotland prepared if there was something like Ebola imported? The chair of that group is Professor Tom Evans, who is an infectious disease physician in Glasgow. I don't recall whether it was Tom or other ID consultants that I'd spoken with, but they had-- just over sandwiches, we had ended up discussing about isolation rooms because it was relevant to the day, and it had come to light that there had been problems with the isolation rooms in the new QEUH.

Q Okay. So, you tell us in the emails:

> "I had been speaking to some of the ID consultants at QEUH and the Glasgow children's hospital yesterday and they explained that all their isolation rooms were being refitted as the original design didn't seem to provide appropriate pressures and air flows when the rooms were

occupied."

Do you see that?

A Yes.

Q Again, so the Inquiry understand, first quarter of 2019, you are aware that certainly colleagues are telling you that there is problems with the pressures and air flows in certain rooms within the Queen Elizabeth University Hospital.

A Yes, it was second-hand verbal information.

Q Okay, and just in relation to the chronology of the project and your involvement, the Inquiry has heard evidence that, during 2017, there was effectively a dispute that arose between NHS Lothian on one side and the project company IHSL and their contractor Multiplex on the other in relation to what pressure regime and, potentially, air changes should be taking place within certain rooms within the hospital, and it transpired that some of those rooms were within the Critical Care Department. Should the Inquiry understand that, really, 2017 through 2018, that is not an issue you are aware of, or you are specifically advising the project team on?

A I had some awareness of it from Janette about the fact that the four-bedded rooms in general wards were designed at positive pressure. There'd been email correspondence with Ronnie Henderson and the project team trying to establish what would be the best pressure cascade for those rooms, but it was in the context of general wards that I had an awareness. I had no knowledge of the dispute.

Q So, you were having a discussion with a colleague who is telling you there is a dispute over certain ventilation requirements for four-bedded rooms, but as you understood it, that is a discussion about general wards as opposed to any area of the hospital that would require specialised ventilation, such as critical care rooms.

A Yes. That's correct.

Q Thank you, and perhaps just to put that in context, if I could ask you to have in front of you, please, bundle 13, volume 7, page 37. So, bundle 13, volume 7, page 37.

THE CHAIR: Thank you.

MR MACGREGOR: These are not email exchanges that you are involved in, but I think they might reference the discussion that you said you were having with Janette Richards. So, the first one—well, perhaps if we just pick up the penultimate email on that page from

Ronnie Henderson to Janette Richards on 20 January 2017 at 12.53. Do you see that?

A Yes.

Q It says:

"Hi Janette,

That's just it, it doesn't. There's some dubiety over a couple of things:

1. Can a 4 bed bay be described as a general ward.

2. If so what is the pressure relationship to the corridor as there's just the dash in the box on the table you attach.

I'm looking for infection controls' take on a scenario such as if 4 patients with infection status unknown are in the room what way do you want the air to go - To the room from the corridor or to the corridor from the room."

Do you see that?

A Yes.

Q And then the response comes in the email above, from Janette Richards to Ronnie Henderson on the 23 January 2017, where she says, "The 4 bedded rooms are considered to be the general ward." Do you see that?

A Yes.

Q And she continues, "As you are aware each 4 bedded bay has an en-suite toilet- neg extract and an ensuite shower- neg extract." Do you see that?

A Yes.

Q Now, from an Infection-- or clinicians and/or an Infection Prevention and Control perspective, the references to the en suite bathrooms, is that of any relevance if we are talking between a general ward and critical care?

A Yes.

Q And can you just explain, why is that significant?

A Well, in a general ward, patients are what would be termed ambulatory. They can walk, they can get to the toilet themselves and perform personal hygiene themselves, so there's a need to provide a toilet and, usually, a shower within walking distance of that room, if not within the room itself. Nowadays, it's generally within the room.

In Critical Care, the patients are often either unconscious or sedated, or connected to so many machines that they wouldn't leave the bed. So, there's entirely-- There are very, very few scenarios where a patient in Critical Care would be using a toilet.

Q Thank you. If we just look back to bundle 13, volume 7, page 37, it continues:

"Should we get to that scenario that all sing cubicles are full and we have 4 co-horted patients in a 4 bedded bay then yes we would want to ensure all infectious organisms are maintained in the room which yes shows that neg pressures in the 4 bedded area is of benefit.

Our contact at Mott MacDonald will probably be able to advise as will Ian Storrar at HFS if this communication is not clear enough."

Do you see that?

A Yes.

Q So, in terms of the advice Janette Richards is giving – four-bedded bay, general ward, negative pressure – is that fully in compliance with the guidance set out within in SHTM 03-01 2014?

A So, I think, as is being discussed here, there isn't a clear parameter in the general ward for the pressure cascade. In other examples in that column, it would have a plus or positive or negative, but there's just a hyphen for general ward. So, from the table, I think there's ambiguity.

I think though there's sometimes a danger that folk get fixated on the how to build it and forget why you're building it. In a four-bedded general ward area, it's fairly common every winter to have folk with norovirus suddenly vomit in a ward. You would want to have an environment that tries to contain that in the room, not just from an infection perspective, but also from an odour perspective, because if there's vomiting happening in one bedroom, you don't want that, really, drifting down the corridor into other bedrooms.

So, there's a rationale from infection containment perspective, but just also patient satisfaction, patient comfort and odour control, in having it negative or balanced, but certainly, it would be a little bit odd to be positive.

Q Thank you, and we see there Janette Richards saying very clearly that if Mr Henderson needed any further information, that he could contact Mott MacDonald who, as the Inquiry has heard, were the lead technical advisors for the project, or Mr Storrar at HFS.

A Yes.

Q Do you see that? Again, the Inquiry has heard evidence from two Infection Prevention and Control nurses who have said very clearly to the Inquiry they are not engineers, and they would not know the specific engineering parameters that were required for any particular space.

They can tell you about the clinical issues, they can tell you about Infection Prevention and Control, but if you need the specifics of what you actually do to meet those clinical requirements, that is an issue for the engineers. Is that your understanding of how the demarcation works in the project team?

A Yes. So, I guess the boundaries are a little bit blurred, but I wouldn't be expecting my nursing colleagues to be providing advice on engineering.

Q Right.

A They're not trained to do it.

Q Thank you. So, there is this issue which ultimately comes to dispute between NHS Lothian and IHSL and the project company. Were you aware, or advised, that there was the potential for litigation to take place between the two parties that were in dispute?

A I have no recollection of that.

Q Okay. So, in terms of court documents that were drafted, specifics of requirements that had to be met, that is not something in your position as an Infection Prevention and Control doctor that the project team were asking you for any advice or

input on that?

A No.

Q The Inquiry has heard evidence that there was a principles meeting that took place in early 2018 to try to resolve this dispute as to whether the space should be balanced or negative or positive pressure, and a discussion around about associated issues. Were you invited to that principles meeting to provide Infection Prevention and Control advice?

A I don't recall being invited.

Q Thank you. Those discussions ultimately led to a Settlement Agreement being put in place, agreement in 2018 on what would be done, with the formal document being signed in February of 2019. Did you have any involvement in the drafting or approval of the technical schedule that went in that document, that Settlement Agreement?

A No, but that wouldn't be my role.

Q So, whose role would that be?

A Well, I would imagine it would be the project team.

Q Again, just to pick up on your lack of knowledge of the Settlement Agreement, if I could ask

you to have in front of you, please, bundle 7, volume 2, page 364. So, bundle 7, volume 2, page 364. That is just the email at the very bottom of the page from Lindsay Guthrie on 7 August 2019, copying in a number of people, including yourself.

THE CHAIR: Thank you.

MR MACGREGOR: Then if we look over the page, going to page 365, Ms Guthrie says:

> "Hi Ian
>
> Can I clarify what you would like provided for…"

Then, if we look to the second bullet point, three lines up from the bottom of that paragraph, she states:

> "As discussed, we were not involved in the Settlement Agreement or handover. Part 4 of HAI Scribe was begun in May 2019, but not completed pending receipt of satisfactory water and ventilation functionality/sampling from commissioning".

Do you see that?

A Yes.

Q Again, your colleague Lindsay Guthrie, as I understand it, I would welcome your views, effectively saying that Infection Prevention and Control had not been involved in the negotiation or signing of the Settlement Agreement, or in completing a Part 4 HAI-SCRIBE before May 2019?

A That's correct.

Q So, the Inquiry has heard evidence that the building was formally handed over to NHS Lothian on 27 February 2019 and that no Stage 4 HAI-SCRIBE had been completed. You obviously did not know about any of this at the time, but did you subsequently discover that that was what happened?

A So, my awareness that there'd been handover of the building was through an all-staff email that was to everyone in the organisation.

Q So, you found out through an all-staff communication that the building had been handed over. Can you just tell us, in your own words, what was going through your head at that point, when you found that out?

A So, surprise. It came before I took a week of annual leave, so there wasn't a lot that I was able to do in terms of supporting colleagues and infection control in raising concerns until I got back, but we were concerned that due process wasn't being followed.

Q Again, we covered some of this at a general level earlier in terms of some of the risks of not

completing a Stage 4 HAI-SCRIBE before accepting a new-build hospital. Can you just try and explain, when you find out that the new hospital has been accepted, no Stage 4 HAI-SCRIBE, what concerns do you have at the forefront of your mind?

A That there was potential risks that had been accepted and we didn't know what it was.

Q Potentially how serious could those risks be?

A Well, at the time, this was along the lines of when we were having the water problems in the Western General, and we also had a complex IMT on one of the other hospital sites as well that we were looking into ventilation systems as a potential factor, and we didn't have assurance that the water system and the ventilation systems were optimised.

Q You tell us within your statement that you would have expected to see an independent validation report for the ventilation system in particular. Is that correct?

A Certainly, the operating theatres, the isolation rooms, were key areas that I needed to know were functioning optimally. In the validation stage for operating theatres, there is a microbiological assessment of air

quality as well as an assessment of the performance of the engineering. So, I would have expected to have been involved at least in that assessment as the microbiologist.

Q So, albeit due process had not been followed, did you have all of the information you needed as a microbiologist to be able to make an assessment of whether this new hospital was safe?

A No.

Q If I could ask you to look, please, to bundle 5, page 35. So, bundle 5, page 35. You see that the first email is from Alex McMahon to Jim Crombie. Do you see that?

A Yes.

Q Who is Alex McMahon?

A Alex McMahon was the director of nursing in NHS Lothian and, at the time, was the Executive Lead for Healthcare Acquired Infection.

Q We see the email states:

"All

I caught up with Donald after the DCN IMT. He said he would send me this email and I have his permission to forward on. For transparency I have copied Donald in.

The content gives me some cause for concern."

Do you see that?

A Yes.

Q Then, if we look to the content, your email is below that. So, this is an email from yourself to Alex McMahon on 13 March 2019 where you say:

"Dear Alex,

Following our discussion after the DCN IMT today, I'd like to raise a further issue that relates to water quality and ventilation in the new hospital site.

Please see the (confidential) e-mail dialogue attached which was sent to me by the commissioning team in the week before the building was handed over to NHS Lothian. It was highlighted that there were concerns about Pseudomonas… and more concerningly Legionella in the water. Despite replying expressing concern particularly over the findings of Legionella, there was no further communication with me about [this] issue."

Do you see that?

A Yes.

Q So, you have raised an issue about water quality, and should the Inquiry understand that you had not had any form of formal response to that?

A So, the issue had been raised with me by Ronnie Henderson, if I recall correctly, who had shared with me letters between (inaudible) and IHSL. Within that, there was a discussion about-- that there was an outlet in the building where Legionella had been detected and that there were other outlets where Pseudomonas aeruginosa had been detected, but it wasn't clear where the outlet with Legionella was in the building, and it wasn't clear to me whether that had been addressed or how it had been addressed.

So, that statement about having no further communication about the issue was in relation to seeking more information about where the Legionella was and what had been done to resolve it.

Q This is in the period after late 2018 whereby there were at least emerging issues around potential water quality issues at the Queen Elizabeth University Hospital with-- I think you said you had seen a published report in relation to those issues.

A Yes.

Q So, were those issues factoring into your thinking in this email?

A Yes, but more so was

our present experience with the Pseudomonas in the Western General in the DCN building, and finding Legionella in water and health care should be a never event.

Q Thank you. Then if we look over the page, on to page 36. We look at approximately four lines up from the bottom of that that top paragraph, you will see the wording, "I've never seen any of these validation reports…" Do you see that?

A That's correct.

Q "I've never seen any of these validation reports and neither have any of my consultant microbiologist colleagues albeit we were given a tour of the ventilation system and theatres as they were being built."

Do you see that?

A Yes.

Q So, you had been for a tour of the hospital, but in terms of the validation reports that you would be expecting to see to comply with the requirements of SHTM 03-01, you still have not seen those as at 13 March 2019?

A That's correct.

Q Can I ask you to have in front of you, please, bundle 13, volume 8 at page 158. So, bundle 13, volume 8, page 158, and it is the email just over halfway down the page from George Curley to Donald Inverarity on 25 February 2019. Do you see that?

A Yes.

Q And it is headed up, "RE: Glasgow report on water incident at QEUH," and it says:

"Hi Donald, yes I have and again many of our proposals in the paper I sent you are based on the Glasgow experience. I was a little hesitant in the paper to sight Glasgow directly but I guess you can assume it is strongly inferred. However good that Brian can review this report more fully rather than the potted summary I could share."

Do you see that?

A Yes.

Q So, that is referring to the publication of the report. Is that the water quality report that you referred to being published in late 2018, early 2019?

A Yes.

Q So, up until that document, that water report got published on the website and you managed to download it, was there effectively just inferences being made on the part of individuals working within NHS Lothian that you knew there were potential issues at the

Queen Elizabeth University Hospital, but there had not been any formal communication from any other NHS bodies in relation to exactly what those issues were?

A That's my recollection. Yes.

Q If I could ask you to have in front of you, please, bundle 4, page 8, please. If we look at bundle 4, page 8, there is a letter from the Scottish Government addressed to NHS Chief Executives on 25 January 2019. Do you see that?

A Yes.

Q And it states:

> "Following my call with you on Tuesday 22 January about the ongoing incident at the Queen Elizabeth University Hospital, I said I would write to you with a set of actions following the meeting of the Strategic Facilities Group on Wednesday 23 January …".

Do you see that?

A Yes.

Q Then if we skip to the next paragraph, it says, just above the bullet points, "… I would like you to confirm are in place and working effectively," and then there is the final bullet point. It says:

> "All critical ventilation systems should be inspected and maintained in line with 'Scottish Health Technical Memorandum 03-01: Ventilation for healthcare premises'."

Do you see that?

A Yes.

Q Did you have any awareness of this letter, or these types of communications as at January 2019?

A Not at the time that they were issued. I was aware of this letter because George Curley, as the Director of Facilities, shared it with me as part of that earlier email trail, where he shared the paper that he was going to present to the Healthcare Governance Committee, I think it was.

Q Mm-hmm. Thank you. So, just again, so that the Inquiry understands the timeline correct, and there is no dispute that the Settlement Agreement in relation to the RHCYP, that is signed in February of 2019. NHS Lothian, in January 2019, is having it raised by the Scottish Government that there are concerns about the Queen Elizabeth University Hospital and a need to make sure that all critical systems are complying with published guidance, including SHTM 03-01, known risks about and potential issues relating to Cryptococcus, yet as

lead Infection Prevention and Control doctor, you are still not involved in any of the discussions prior to that Settlement Agreement being signed?

A Not that I recall.

Q Now, albeit the Stage 4 HAI-SCRIBE had not been completed before handover, the Inquiry has heard evidence that some of your colleagues within Infection Prevention and Control tried, albeit retrospectively, to carry out that Stage 4 HAI-SCRIBE. Are you aware of that?

A Yes.

Q And again, we will come on and look at some of the documentation, but can you just explain your understanding of whether they were able to successfully complete that Stage 4 HAI-SCRIBE?

A No. They weren't because-- Well, not all questions in the Stage 4 apply to every project, but there are two areas which are very explicit about ventilation and water, and I can't off the top of my head remember the exact wording of the statements, but one of them asks whether the water system is compliant with SHTM 04-01 and whether the ventilation system as designed and built is compliant with SHTM 03-01, and we couldn't answer those questions because we didn't have

anything to evidence them.

Q So, perhaps if we just look to bundle 5, please, page 95. So, bundle 5, page 95. This is the HAI-SCRIBE form. You are not involved in the team that is actually going out and doing the assessment, but it is really just to try and help jog your memory as to----

A Yes.

Q -- what those questions may have asked, and if we could look on, please, to bundle 5, page 98, and to look, for example, to question 4.26. So, 4.26, "Is the ventilation system designed in accordance with the requirements of SHTM 03-01 'Ventilation in Healthcare Premises'?" Do you see that?

A Yes.

Q Again, is that something without an independent validation report that an Infection Prevention and Control specialist could make a determination of?

A Not in its entirety, but I think there's aspects where we can give an opinion, but the determination of whether it's designed in accordance with 03-01 is best performed by an authorising engineer.

Q Thank you.

A It involves understanding the engineering in a way that we aren't

trained in.

Q Thank you, and then we see other questions continue, such as 4.27, "Is the ventilation system designed so that it does not contribute to the spread of infection within the healthcare facility?" Do you see that?

A Yes.

Q And your colleagues were unable to complete the Stage 4 HAI-SCRIBE?

A Yes.

Q And did they discuss that matter with you?

A Yes. I was on a day off the day that they initially started this process, but Lindsay Guthrie very quickly got in touch to discuss her concerns, and it was a collective decision. I agreed.

Q So, what concerns does she have?

A That there wasn't evidence to be able to truthfully complete that statement.

Q So, Infection Prevention and Control were not able to sign off the Stage 4 HAI-SCRIBE, were not able to say from an Infection Prevention and Control perspective that the hospital was safe?

A Was compliant with 03-01 and by inference, yes.

Q Thank you. So, if we could look to bundle 13, volume 7, page 110. So, bundle 13, volume 7, page 110, and this is an email from Lindsay Guthrie to yourself on 29 April 2019, whereby she states:

> "Can we have a quick chat about this please? Sarah and I attended a site visit to complete Stage 4 of the SCRIBE on Friday I wasn't happy to sign off the ventilation or water given the recent discussions at PLICC or concerns raised without discussion with you first?"
>
> Do you see that?

A Yes.

Q And what is she referring to by PLICC? Were you aware of any discussions that took place at that?

A So, that stands for the Pan Lothian Infection Control Committee, which is a committee of disciplines with NHS Lothian that have input into maintaining prevention of infection. The Estates Team is one such discipline. My recollection is that she was referring to a meeting where it had been relayed in that committee that there had been a number of snagging issues and non-conformances identified already in the new hospital, but the nature of which wasn't very clear.

Q Okay. Thank you, and

you said that you had discussed matters and you agreed with Lindsay Guthrie. What did you collectively agree?

A That we would not complete the Stage 4 HAI-SCRIBE.

Q Okay, and we see that recorded, if we look to bundle 13, volume 7, page 96. Do you see this is an email, in the middle of the page, from Lindsay Guthrie to Janice Mackenzie and others, you were copied in, on 13 May 2019? The final two paragraphs. So, page 96, final two paragraphs:

> "We are also awaiting for more information on approx 86 issues/non conformances ahead of a meeting with George Curley & others on 5th June? We've been advised that many of these issues have been resolved, but currently have no detail in relation to this.
>
> I think until we have more information, and as discussed, the IPCT would not be able to provide 'sign off' and assurance for the Board that the building is ready to be occupied by vulnerable patients."

Do you see that?

A Yes.

Q So, is that effectively just recording what we have already discussed, that the building was not fit to be occupied by vulnerable patients given the lack of documentation?

A Yes.

Q So, if we move forward, perhaps, to the period in May. By the time we get to May, had you and your IPC colleagues received all of the information and documentation that you were expecting?

A No.

Q Can you just explain what is happening in that period, then, up to May 2019? Why are you not in a position to complete the Stage 4 HAI-SCRIBE?

A So, we – we being Sarah Sutherland, myself and Alex McMahon – had arranged to physically view the building and during that walk round, we visited areas where there was already concern. Some of that related to a flood that had happened the previous summer; some of it related to concerns about the functioning of the operating theatres and isolation rooms; and some of it related to the concerns about the water quality. During that walk round, it became very evident, particularly in the theatre rooms, that they were not in a state where you could perform validation.

Q If I could just ask you to

look to bundle 6, please, page 6. You see the email exchange beginning at the top from yourself on 10 May 2019, where you say:

> "For information. I'm keen that you are aware of this as I don't think I solely represent NHS Lothian with regards to the potential "risk" associated with this situation."

Do you see that?

A Yes.

Q So, you are saying that there is potential risk here, but how concerned are you at this point in May 2019 that you still cannot complete the HAI-SCRIBE process?

A I was very concerned because we were aware that the building may be open to patients in July.

Q So, very close to opening for patients, and you were going round looking at operating theatres and, from the evidence you have given, you are thinking, "This is a long way from being able to open safely for patients"?

A Correct.

Q So, if we look on bundle 6, page 6, to the next email in that chain, which is an email from yourself to Ronnie Henderson on 10 May, you state:

> "The Multiplex document doesn't indicate what size the theatres are, what the air pressures are in the theatre areas (anaesthetic room, prep area, theatre, etc) or what number of air changes per hour are achieved and neither does it mention what, if any, microbiological assessment of air quality has been performed (that box is blank so I'm presuming none has been performed). Although you are being assured that it 'conforms,' it isn't explicitly stated what standard it 'conforms' to – presumably SHTM 03-01?"

Do you see that?

A That's correct.

Q So, is that you highlighting-- you have received some documentation from the project team, but you do not consider it sufficient to allow you to complete the HAI-SCRIBE?

A Yes. What Ronnie had shared was a checklist that had a Multiplex logo on it, which I had seen a few months earlier from Jackie Sansbury. If I recall correctly, it was dated October 2018, so it wasn't contemporary, and it was a checklist. It didn't give me data that would tell me how an operating theatre was functioning, and it wasn't really aligned

to what SHTM 03-01 said about a validation report being clear and indicating that the system was fit for purpose.

Q So, we see the bold text there, so you quote a statement from the information you had had and you continue just below the bold text, you say that:

> "…might be factually correct but there is nothing to back it up and it tells us absolutely nothing about how the theatre performs at baseline. It is essentially asking us to taking everything on trust that its all okay."

Do you see that?

A Yes.

Q So, were you prepared to just take it on trust and assume that everything was going to be okay?

A No.

Q Then, if we look within that paragraph, three lines up from the bottom of that paragraph, beginning, "But in my role…" Do you see that?

A Yes.

Q You state:

> "But in my role as infection control doctor I shouldn't need to go to source documents and extract that information to interrogate and interpret it myself, it should be clearly and explicitly included in the validation report."

Do you see that?

A Yes.

Q So, what you had really wanted was a clear, crisp statement in a validation report of just exactly the levels that the system was performing at?

A Yes.

Q If we look, still within bundle 6, page 7, to the final paragraph on that page, final paragraph at the bottom, so bundle 6, page-- Sorry, we are still in bundle 6, page 6, it is the final paragraph that trips over onto page 7, beginning, "Personally I don't think..." So, if we could go back to page 6, and it is right at the bottom. You state:

> "Personally I don't think we are being provided with a 'full report' detailing the validation findings and there is not enough detail for me to know if the theater is, 'fit for purpose and will only require routine maintenance in order to remain so for its projected life.'"

Then, if we look onto page 7, first full paragraph, you say:

> "I'm happy to be over-ruled but, for me, I'm not assured by this checklist that theatre 30 is fit for purpose because the

information I would be looking for to allow me to have that assurance is not provided and not accessible by me."

Do you see that?

A Yes.

Q Was there further independent testing that the project team agreed to undertake?

A Pardon? Could you repeat that, please?

Q Was there further testing, then, in the period that follows, from 10 May 2019, that the project team agreed to undertake?

A I think they agreed that they would need to undertake independent validation, but the date of when that began, I believe, wasn't until June.

Q Was that something that the project team were willing to do, or was it something that they were initially resistant to doing?

A I think, ultimately, they were willing to do it, but I think, initially, there was a bit of uncertainty as to why I was not accepting that checklist.

Q Because if we just look down, bundle 6, page 11, this is an email of 13 May 2019 from Ronnie Henderson to Donald Inverarity. Do you see that?

A Yes.

Q Mr Henderson states:

"As you know through our previous discussions it is neither our desire nor intention to provide something you are not 100% happy to accept as a suitable record or report."

Do you see that?

A Yes.

Q The email goes on to say, "If you need this to be done, then it can be done at a cost." It would just be helpful if you could outline the discussions that you were having with Mr Henderson, and really, what I would like to try and understand is whether this is a genuine collaborative discussion, or whether you are trying to be talked out of NHS Lothian having this full independent report that you wanted?

A So, I think, from Ronnie's perspective, he may have been frustrated that I wasn't prepared to look at this system called Zutec to see the actual source information. From my perspective, I, at that time, did not have any capability or margin to learn how to use a new software system to find data, and I think that's where we're coming at different perspectives. I don't think it's evidence of us not working collaboratively, because Ronnie and I had been working

collaboratively on this-- not necessarily on the ventilation issue, but the issue with compliance of the ventilation system in the Haematology ward, and some design issues there as well, since late 2018. So, I think this reflects, perhaps, frustration that was borne out of this being very close to the line and the implications of having to organise that.

Q Thank you. So, discussions around whether there has to be the independent testing, ultimate agreement from Mr Henderson that the testing would take place, albeit, given how close you are to the hospital opening, perhaps some frustrations with that on the part of the project team?

A Yes.

Q I would be interested in your views-- If yourself and your colleagues had not persisted and said, "We really do need this independent report," do you think the hospital would have opened?

A I think that's a possibility.

Q The Inquiry has heard evidence that an entity called IOM Limited, they come in and do the testing to try and produce the report, and what they find is that the ventilation system for certain Critical Care spaces does not, in their view, fully comply with the requirements of SHTM 03-01 because certain of the rooms in Critical Care do not have positive pressure and 10 air changes per hour. Is that your understanding?

A That is correct. Initially, though, they had identified issues with the operating theatres rather than Critical Care.

Q So, it is an ongoing process with IOM? There are certain issues identified at one stage, more testing and more issues, but eventually, there are these issues identified with the Critical Care department?

A Yes.

Q Thank you. What happens at that point? So, whenever IOM bring back those test results, just talk us through your understanding of what is happening in the project at this point, and what is your involvement in general terms. We will come on and look at all the detail of the emails, but just try and explain to the Chair what is happening at this point whenever the IOM report lands.

A The IOM report about Critical Care?

Q I think-- Just talk us through from the reports in relation to the theatres right through to Critical Care.

A So, with-- Initially, the IOM reporting was with regard to the operating theatres and, in the children's hospital, the operating theatres are for Paediatric surgery and for Neurosurgery. The initial theatre results were indicating that there was not a functional operating theatre in the building that was balanced in the way that we would expect to be able to operate safely. Some of the theatres, there were internal design issues also being identified, such as where the air extract vents were. They'd been built with air extract at high level, and in the theatre it should be at low level, so there were design issues as well as performance issues that were being uncovered.

Rectification of those was going to be very difficult to achieve in the time frame permissible for all the theatres, so at executive level, and by this time there was regular meetings with the executive directors and chief executive, there was a plan to try and achieve at least four theatres to be in a working state before 9 July. That was two Paediatric surgery theatres and two Neurosurgery theatres to allow for capacity for emergency surgery only. That work was commencing while further validation work was happening elsewhere in the building.

So, there were engineers working on trying to rectify these issues while more new verification data was coming in, and it was about-- 1 July was when the executives and myself and Lindsay Guthrie first saw the data coming in for the Critical Care unit, which indicated that the four PPVL isolation rooms were close to achieving what they were supposed to, but weren't quite. The four single rooms did not fit the specification for Critical Care and the four-bedded rooms didn't fit the specification for Critical Care, so we were then left with the scenario of, if the hospital opened, there may be no Critical Care unit and only four functioning operating theatres with trauma patients or accident emergency patients coming in the front door potentially needing surgery and potentially needing life-prolonging, lifesaving treatments and Critical Care.

Q So, at that period, 1 July, whenever you realise there are these problems in critical care, the hospital is due to open in a matter of days. Is that correct?

A Yes.

Q Did you think there was any possibility the hospital was going to open?

A It seemed unlikely given the scale of what was being

uncovered.

Q Thank you. Lord Brodie, I am conscious that it is one o'clock now. It might be an appropriate time, just before I go through the detailed timeline and all the various communications, to break for lunch.

THE CHAIR: Very well. We will take a lunch break now, so if you could be back for two o'clock.

A Yes

THE CHAIR: Thank you.

(Adjourned for a short time)

14:03

THE CHAIR: Good afternoon, Doctor.

THE WITNESS: Good afternoon.

THE CHAIR: Mr McGregor.

MR MACGREGOR: Thank you, Lord Brodie. I was just going to move on and look at a timeline, really, of some of the key events that take place from 1 July onwards to try to understand some of the decision-making process and some of the material that lies below that. So, if we could just begin, please, by looking to bundle 13, volume 8 and to page 2224. So, bundle 13 volume 8, page 2224. You see the first full email there is an email from yourself to Ian Graham, Tracey Gillies, and a range of

people adding some edits to an email that we see lower in the chain. Do you see that?

A Yes.

Q And then if we look down just at the bottom of page 2224, there is an email from Tracey Gillies dated 1 July, whereby she sets out some text with the green being changes that you have suggested. Do you see that?

A Yes.

Q And then if we look over the page onto page 2225, first bullet point states:

> "The required standard as per SHTM 03-01 Appendix 1 (version 2 February 2014) for Critical Care areas is 10 air changes and less than 10 air changes per hour may facilitate airborne spread of viruses more than if 10 was achieved."

Do you see that?

A Yes.

Q So, again, is that back to really the discussion we had this morning that 10 is the guidance and any departure you have from the guidance is going to create more risk than if you have 10?

A Yes.

Q And then if we look to the final three bullet points, and do you see Ms Gillies states that, "This leads

us to the question whether the space is fit for purpose." Do you see that?

A Yes.

Q So, is that the type of discussion that you are involved in with other colleagues from NHS Lothian at this time? The critical care rooms do not comply with the published guidance, but are the spaces really fit for purpose? Does the departure from guidance really matter from an Infection Prevention and Control perspective?

A Yes. So, by this stage, myself and Lindsay Guthrie had really been invited to be advisors to the executive directors in matters relating to infection risk. So, yes, that is in relation to whether we felt that this would pose too great a risk.

Q And then if we look to the next bullet point, it says, "If occupied now, there is risk to patients, visitors and staff of airborne virus transmission." Do you see that?

A Yes.

Q So, again, presumably you would agree with that. If you are departing from the guidance at 10, you are increasing the risk, albeit that is a difficult assessment to make.

A Yes.

Q But it is really-- I would be interested in your views in the text

at the end of the question mark: "?how much." Do you see that?

A Yes.

Q Is that really what everyone involved in this email chain is trying to work out? When not complying with the guidance, how risky is it not complying with the guidance?

A Yes because, ultimately, the decision really was around, "Can the hospital open?"

Q And it continues, "…and difficulties in correcting (would probably require a decant*.)" Do you see that?

A Yes.

Q It is again-- so, the Inquiry understand that the discussion that is taking place is, effectively, if you open and then you want to do remedial works to comply with the published guidance, that is going to be incredibly difficult to do if you have opened the hospital and you have patients in situ.

A Yes. It creates another different set of infection risks.

Q Now, entirely understandably, from an Infection Prevention and Control perspective, presumably your view would be the more air changes there are, the better, effectively.

A Yes.

Q But in terms of that

question of the increase in risk, the risk to patients, how much risk is there if it is four air changes and balanced or negative as opposed to 10 air changes and positive pressure? Did you ever come to a definitive view on how much risk there was going to be?

A Not at that stage in July because there isn't a formula to be able to calculate that.

Q And again, we are just starting the chain, and it is obviously an ongoing process, but was there a point where you felt that you could make that assessment of how much risk there was and whether, from an Infection Prevention and Control perspective, that was an acceptable risk?

A In that week in July, I think, as we were exploring that as a question, the decision was made for us.

Q So, effectively-- and again, you are obviously providing advice, as I understand it. You are not the decision maker in terms of what should or should not happen with the ventilation system. Is that right?

A Absolutely not, no.

Q So, you are grappling with this incredibly difficult question, and then are you effectively told the guidance must be complied with?

A Yes.

Q And who tells you the guidance must be complied with?

A That was an instruction from Scottish Government.

Q Okay, and should the Inquiry understand, then, from what you have just said, that is an instruction given by Scottish Government, but without you having provided an expert opinion in terms of whether the risk of departing from the guidance was an acceptable risk to you as an Infection Prevention and Control doctor?

A I didn't give any assurance about risk.

Q In simple terms, you just simply were not asked to address that question?

A I don't recall specifically being asked that question.

Q Thank you. If I could ask you, just within that chain, to look up, please, to page 2223.

and if we could start with the email from Tracey Gillies on the 1 July-- 2223. Do you see that?

A Yes.

Q And it is really the three lines up from the bottom starting, "It would be helpful…" Do you see that?

A Yes.

Q So, it states:

"It would be helpful to have some sense of what the 10 air changes an hour is based on- How much is science, how much is received wisdom, and how much because that's what the SHTM says. So would be 8 ok??"

Do you see that?

A Yes.

Q So, again, Tracey Gillies, what is her role at this stage?

A So, Tracey Gillies is the Executive Medical Director in NHS Lothian.

Q And she is asking you, 10 air changes, where is that coming from? Is it science? Is it wisdom? Or is it just that is what the guidance says?

A Yes.

Q And what was your view on that, how much of the guidance is science, how much of it is wisdom, and how much of it is just that is what the guidance says?

A So, some of it is based in science from simulated environments, as we've discussed earlier, and some of it is received wisdom from using that guidance over a number of years and not having adverse outcomes, and some of it is application of infection control principles, rather than

necessarily the guidance says it, therefore it's the guidance and we do it.

Q Thank you. Then if we look to your response, just the email above, dated same date, 1 July, 22:48, beginning, "After you had left the meeting…"

A Yes.

Q You say:

"After you had left the meeting, Ronnie and I had some discussion about the 10 air changes per hour for critical care that features in HTM 03-01 and SHTM 03-01 and he is going to contact the author of the document, Malcolm Thomas, to get more understanding on how that figure of 10 was decided. Malcolm is possibly the most informed hospital ventilation engineer in the UK and works now as a freelance ventilation consultant. He also designed the negative pressure isolation rooms that feature in the new building and Ronnie has consulted with him before during [the] project. If Malcolm can't answer that point I'd be very surprised."

Do you see that?

A Yes.

Q Do you recall if there were

any-- We will come on and deal with the discussions that take place with your colleagues around the Falfield course slightly later, but do you remember at this point, 1 July, if there were any direct contact that is made by Ronnie Henderson, yourself or anyone else, with Malcolm Thomas to say, "What is the magic about the 10 air changes per hour?"

A There certainly wasn't direct contact between myself and Mr Thomas. I can't speak for Ronnie.

Q Thank you. So, from this period onward, really, 1 July, how frequent are the meetings that you are having with colleagues from NHS Lothian, and what is being discussed?

A At this stage, they were daily and sometimes twice daily.

Q Okay. So, if we look perhaps just on to bundle 7, volume 1, page 33, please. So, bundle 7, volume 1, page 33. So, this is an email from a Jacquie Campbell to Iain Graham and a number of other people, including Tracey Gillies on 2 July. You are not copied into that email, but it is really just for your observations on what is stated over the page on page 34.

The email chain starts on page 33, and then over the page onto page 34, please, which states:

"Donald Inverarity advised that all air change rates are currently better than what we have today, therefore will be in an improved position, but would wish external advise from HFS/HPS. He felt there were best people to advise of risk running with less than 10."

Do you see that?

A Yes.

Q Again, this might be a very simplistic view, but one view of analysing things might be to say, "There is no air changes per hour, no mechanical ventilation at Sciennes. If there is four air changes per hour in the new hospital, as built, albeit it does not comply with the guidance, that is better than what you already had." Is that part of the process that is running through your head?

A Yes, in terms of there's a spectrum of risk, but there are different infection risks that need to be balanced in a Critical Care bed space, and it's not necessarily all about preventing respiratory viral infection spreading.

Q Again, it is perhaps back to that issue about it is a multi-factorial assessment that needs to be made, but you could have no air changes per hour and still have a safe hospital. Is

part of your thought process that, well, if we had four mechanical air changes and we did everything the same way as at Sciennes, we might be able to have a hospital that had an acceptable level of risk, albeit you did not reach any definitive view on that?

A To a degree, yes, but you would have to be mindful about things like the patients that you accepted into the unit and what was wrong with them, where you put them in the unit, and other risk mitigation factors. That would be from the perspective of patient risk, but there would also be, potentially, staff risk, as we discussed earlier.

Q Mm-hmm, and is part of your thought process, if one looked at the table in Table A1 of the 2014 guidance, that if you have got four air changes per hour in a Critical Care space, that is lower than the recommendation simply for a general ward or a general space in the hospital?

A That's true. Yes.

Q So, if we look on, this time to bundle 13, volume 8, at page 2212. You see the second email there sent by you to Tracey Gillies at 9:22 on 2 July----

THE CHAIR: Thank you.

MR MACGREGOR: -- whereby you say, "4 air changes per hour is less than the minimum for any clinical area…" Do you see that?

A Yes.

Q So, again, is that what you were communicating to Tracey Gillies and other members of the team that are involved in the decision making?

A Yes.

Q You tell us within your statement on 2 July that you had contact with a Dr Inkster at the Queen Elizabeth University Hospital. Is that correct?

A Yes.

Q Can you just explain, Dr Inkster, who is she, how do you know her and what role did she have at the Queen Elizabeth University Hospital?

A So, Teresa Inkster is a consultant microbiologist, medical microbiologist. We had trained at the same time in Glasgow. I had trained at Glasgow Royal Infirmary and Teresa had trained at the Western Infirmary. So, we had known each other for a number of years.

Teresa was still based in Glasgow and had been working at the Queen Elizabeth University Hospital in the capacity of Infection Control doctor. So, we had kept in touch. We met each other at meetings

occasionally. We were part of the Infection Control doctors' informal network.

By this stage, clearly, we now knew that there were issues with the performance of the ventilation system and the Queen Elizabeth Hospital had similar problems. So, Teresa was an obvious person to contact, peer-to-peer, to understand from a microbiologist and Infection Control doctor perspective, what had she faced, what were the hazards, so that we could factor that into our assessment of risk and figure out if we had any of the same design issues.

Q Okay. So, on 2 July, do you contact Dr Inkster, or does she contact you?

A I contacted her.

Q Okay, and can you just explain, in your own words, what were you discussing in terms of the ventilation system and the issues that you were having on the RHCYP project?

A So, initially, if I remember correctly, it was a telephone call followed up by email conversation, but it may be in the other way around. I can't remember. Really, it was a very focused discussion on, "What are the issues that you've had in Glasgow at the Queen Elizabeth that are

presenting risk of hospital-acquired infection? Because it seems now that we're in the same boat."

Q In terms of those issues that you allude to, the Queen Elizabeth University Hospital, what is Dr Inkster telling you? What issues is she telling you had arisen in relation to the ventilation system?

A So, in relation to the ventilation system, she was able to point out issues of design with regard to new technologies like chilled beams and thermal wheels, which I had been unaware of prior to that conversation, and was also able to confirm that they had had issues with the design of their isolation rooms and the number of air changes that were being delivered in clinical areas.

Q Okay, so Queen Elizabeth University Hospital, you were being told by Dr Inkster that there had been a range of issues, including with the air change rates?

A Yes.

Q What was her view in relation to the problems with the ventilation system at the Queen Elizabeth University Hospital, particularly in relation to the air change rates? Did she think that they had the potential for an adverse impact on patient safety and care?

A From her perspective, they had experienced harm to patients, and it was plausible that some of that may link back to the low air changes in ventilation.

Q Okay, and were you aware at this time whether the ventilation system at the Queen Elizabeth University Hospital was identical to the one at the RHCYP, or whether there were material differences between the two?

A Not in that level of detail. There are significant differences between the two buildings in the way that they're designed and constructed---

Q Okay.

A -- but at that point in time, I didn't have any understanding of what had been built into the Queen Elizabeth.

Q Thank you. Should the Inquiry understand then, really summarising this discussion that you are having with Dr Inkster, you have contacted a respected colleague league for a view in relation to ventilation issues. Is that correct?

A Yes.

Q And you are having a discussion about a system at the Queen Elizabeth University Hospital that she considers has a range of problems, including not having the recommended number of air changes set out in SHTM 03-01. Is that right?

A Yes.

Q And she considers that that is one factor relating to the potential for adverse impacts on patient safety and care at the Queen Elizabeth University Hospital?

A Yes.

Q So, after you have that discussion with Dr Inkster on 2 July, how concerned are you about the issues that have been identified at the Royal Hospital for Children and Young People?

A So, many of the issues that Teresa had identified and raised didn't apply to our building. We were able to establish with the project team that there were no chilled beams installed in our hospital. We did, however, identify that there were thermal wheels installed, and that was in regard to the ventilation to operating theatres. So, that focused some attention on how are they performing, are they safe, is there an alternative method of heat exchange recovery rather than using thermal wheels? It also drew attention to the functioning of the positive pressure ventilated lobby isolation rooms because we had-- I think it's 19 in the building.

Q Thank you. If I could ask you to have in front of you, please, bundle 13, volume 3, page 693. So, bundle 13, volume 3, page 693. This is an email exchange, mainly among Scottish Government individuals. It is really just to see if this is characteristic of the types of discussions that you were also having internally at NHS Lothian.

So, it is the email from Alan Morrison, and if we could pick matters up approximately three quarters of the way down the page. You will see that there is wording saying, "There is still a lot unknown factors including…" Do you see that?

A Yes.

Q So, it says:

"There is still a lot unknown factors including:

- The safety implications of running the facility with 4 air changes rather than 10."

Do you see that?

A Yes.

Q "- Risks of modifying the building whilst occupied.

- The [risk] of the environment in which the patients are currently occupied ie is the new facility with 4 changes an hour still safer than the current site."

Do you see that?

A Yes.

Q Then if we look just over the page, onto page 694:

"… the safety of patients would be better served by delaying the move and modifying the ventilation in the new building, before moving patients."

Do you see that?

A Yes.

Q So, that is the type of discussions that are taking place on the Scottish Government side. Are you having similar internal discussions on the NHS Lothian side after your discussion with Dr Inkster?

A Yes.

Q At this point in time, the project company and their contractor, they come up with some alternative solutions to see if there is a way that the system could be modified to make it slightly better. Is that correct?

A Yes.

Q We will come on and look at the detail of what they were suggesting and what your views were, but again, just thinking back to this period around about 3 July, can you tell the Inquiry what discussions are taking place with the contractors and what are they coming up with in terms of potential alternative proposals?

A So, there was a

spreadsheet that was issued to the meetings that were happening at lunchtime and at four o'clock. I don't recall off the top of my head what day it was presented, but there had been some work on the part of the contractors to see if they can redirect air by starving a four-bedded room and a single room of its air supply and redirecting that air to the other bedrooms to try and improve the air change rates and increase them closer to 10.

Q Okay. So, if we could look to bundle 13, volume 9, please, firstly, at page 281. So, bundle 13, volume 9, page 281. There is an email from Wallace Weir to Matthew Templeton on 3 July 2019, and if we could look on, we will see the spreadsheet that has been produced. It is on page 284, and if we could perhaps just zoom in. It is really the "Option A" boxes that I would be interested in looking at because on the left-hand side, the various rooms are listed with the room number, B1 being for Critical Care, but if we look at Option A, you see that there is the potential for seven air changes with single beds. Do you see that?

A My screen's blank at the moment.

Q So, bundle 13, volume 9, page 284, and if we could try to zoom in on the green boxes. So, you see:

"Option A
7 ACH within Single Beds
High velocity at Grille – Potential Noise Issue above 6 ACH"

Do you see that?

A Yes.

Q And if we look down, there are a variety of air changes per hour, some being increased to five, some being increased to seven. Do you see that?

A Yes.

Q So, in terms of that proposal, a potential workaround whereby some rooms are increased to five air changes per hour, albeit not 10, some are increased to seven, albeit not 10, was that a solution that you gave detailed consideration to, or were you, quite quickly, simply told, "The hospital must comply with guidance and that is a decision that comes from the Scottish Government"?

A No. We did consider these. I think this was about a day before the directive from Scottish Government.

Q Okay, and did you think that these would be potential workable solutions, to have a system that is above four, so you get to five for some

rooms and seven for some other rooms?

A No.

Q Why did you think that that was not a workable solution?

A So, from a from a practical point of view in an Intensive Care Unit, all the bed spaces really should perform the same. By having some bed spaces that perform better than others, there would be variation in the level of safety at those bed spaces rather than uniformity. The levels of air change rate being below 10, it would create potential harm or risk of infection after performing procedures. So, it's not all about containment of respiratory viruses, but in an Intensive Care bed space on any particular day, you may have to perform invasive procedures on the patient. So, things like citing intravenous catheters, or chest drains, or intubation or extubation, and those activities, ideally, going to Table A1 in SHTM 03-01, should be in a treatment room or an operating theatre, and those areas require 10 air changes per hour and positive pressure to try and minimise the risk of post-procedure infection.

So, these alternatives were going to both provide suboptimal environment for the delivery of invasive procedures, which is a regular occurrence if not a daily occurrence in an intensive care unit, as well as creating potential hazard to respiratory viruses if it was a time of the year where respiratory viruses were common.

Q So, to a layperson, you might think, well, if you had four air changes and you simply managed to somehow crank that up and get five or seven, that would automatically be better, but should the Inquiry understand your evidence is, effectively, it is not really as simple as that, and actually, having five or seven could be as bad, if not worse, than simply having the four?

A So, I think whether it's five or seven, it's still not ideal. It's not an optimal environment for the activities that will take place at that bed space.

Q And again, I understand in your head, looking at things from an Infection Prevention and Control perspective, if you have guidance that is internationally accepted, it is never going to be ideal; it is always going to be suboptimal if you move away from that. So, whether the number was five, six, seven or eight, it is not going to be as good as complying with the whole package set out in the guidance?

A Yes, but there were also operational issues and the hospital or the unit would have five less beds.

Q Thank you. If we could perhaps just move on in the chronology to 5 July 2019, and if I can ask you to look to bundle 13, volume 8 and to page 2226, and if we could look to the email at the bottom of that page, that is from you to Alex McMahon and Tracy Gillies on 5 July 2019 at 1:28 p.m. Do you see that?

A Yes.

Q So, what you say is:

"Dear All,

Please see the reply I received this morning from my equivalent, Dr Teresa Inkster, in NHS GG&C based at QEUH and issues there she has had to deal with from an HAI risk which we need to be aware of. She is happy for this information to be shared with NHS Lothian."

Do you see that?

A Yes.

Q And then we see the text of the email, "Hi Donald …" I will not read it all out, but if we look to the final paragraph on page 2226, the email states:

"As part of the investigation we asked for an external review view of the ventilation system. What we found was air changes of < 3 (due to chilled beams), rooms at slightly negative pressure to corridor, thermal wheel technology and ductwork configuration issues."

Do you see that?

A Yes.

Q So, in terms of areas of potential crossover, you said that there were differences for the ventilation system at the Queen Elizabeth University Hospital, but presumably things that would have been particular interest to you as you have less than three air changes per hour. There was four at the RHCYP. Is that correct?

A Pardon, can you repeat that?

Q So, in terms of issues that you would be interested in, she mentions air changes. Do you see that?

A Yes.

Q And she is saying that in the QEUH it was less than three, and am I right in thinking at the RHCYP it was four?

A In Critical Care it was designed as four, but it was delivering between three and four.

Q Between three and four. Okay. Thank you.

A And then she also

mentions “slightly negative pressure to corridor” and again, some of the Critical Care rooms at the RHCYP, they had negative pressure. Is that correct?

A One of the four-bedded rooms, yes, was slightly negative to the corridor.

Q Okay, so some differences to the QEUH, but some similarities?

A Yes.

Q Then if we look over the page on to page 2227, Dr Inkster continues:

> “All of this combined was felt to be a factor in these outbreaks as mixing of dirty and clean air was occurring. HPS were asked to investigate and the conclusion of their report was that our outbreaks were not due to practice or IC issues but to the environment. Difficult to prove that retrospectively but it makes sense…”

Do you see that?

A Yes.

Q So, again, can you perhaps explain? You have had the discussion on 2 July. We now see the email that Dr Inkster sent you on 5 July. How concerned are you about the ventilation system at the RHCYP that does not comply with published guidance?

A Increasingly concerned because there are so many similarities.

Q So, if we note that email, which is on 5 July 2019 at 1.28 p.m., and then if we look within bundle 7, volume 1, to page 125. So, we are now looking at an email from you at approximately one hour later on 5 July. Do you see that?

A Yes.

Q So, around an hour after the email we have just looked at, you say:

> “Thanks. Looks measured and addresses the points we covered. One typo spotted and highlighted below in green.
> All the best
> Donald.”

Do you see that?

A Yes.

Q So, this is you commenting on an email from Tracey Gillies, and if we look at that email, which you approved subject to the typo that you highlight in green, and do you see the text beginning, “You are aware…”?

A Yes.

Q You say:

> “You are aware of the

material concern we raised to you on Tuesday 2nd July regarding the shortfall in the standard of air changes provided in paediatric critical care areas and that this was the reason why we did not believe we could provide safe patient care in this environment, even with an interim solution."

Do you see that?

A Yes.

Q So, the dialogue seems to have moved from everything is unknown to now being stated in this email that it was not going to be possible to provide safe patient care at the RHCYP. Do you see that?

A Yes.

Q So, was that your view, that the ventilation system that had been installed in Critical Care, four air changes per hour, balanced or negative pressure, you just simply could not provide a safe environment for patient care with that system?

A Yes, in that although we were discovering that the performance in air changes and pressure was low, IOM had also been uncovering other aberrations in the design at the air handling level, at ductwork level, which would require significant disturbance in the unit to fix, such as removing ceilings.

Q And again, just so I am understanding matters, whenever we are looking at this email and it says that safe patient care cannot be provided, are we talking just about the issues with the ventilation system in Critical Care, or are we talking about a wider number of issues that have emerged in the intervening period?

A So, the overall assessment for the hospital was featuring Critical Care because it was such a key area for other services running in the hospital, but we were still dealing with the operating theatre issue and trying to optimise that side of things. We were uncovering other areas of non-conformance, but they were more manageable because there was a bit more resilience with them, but the Critical Care unit, if we lost that, other services that are heavily dependent on Critical Care wouldn't be able to run.

Q And again, just so I am understanding you, my understanding is that you had not, at this stage, been asked to or done an individualised risk assessment as to whether you could take a system that had four air changes per hour and balanced or negative pressure and put another package in place to make that safe. Really, what you are talking about in

this email is that, as a totality, you were not satisfied, at that point in time, that the hospital could provide a safe environment for patients because of all of the other issues that are emerging as well. Is that right?

A Yes.

Q Thank you. If I could ask you to look to your statement, please, so that is in bundle 3 of the witness statements, and if we could bring that up on page 168 at paragraph 188, where you state:

> "The air changes per hour at all bedspaces (except the PPVL isolation rooms) was lower than what would be optimal for performing many of the invasive procedures involved on a daily basis in an intensive care unit …"

Do you see that?

A Yes.

Q And that is effectively what you just told us in your evidence today, is it not?

A Yes.

Q And you continue:

> "… and could have compromised patients undergoing the procedures and increased their risk of infection, e.g. device infections, blood stream infections, nosocomial pneumonia, all of which could have fatal consequences for children already critically ill for other reasons."

Do you see that?

A Yes.

Q So, those are all of the types of risks that are at the forefront of your mind. Is that fair?

A Yes.

Q Then, if we look onto paragraph 189 at the bottom, still on page 168, you say:

> "Likewise, the low air change rates would have hampered dilution and removal of airborne pathogens such as respiratory viruses, which are a predictable microbiological hazard in ITU and would risk staff and other patients catching infections like influenza from ill patients."

Do you see that?

A Yes.

Q So, again, is that the types of risks that you are concerned with if you are stepping away from the package in the published guidance?

A Yes.

Q If we could look on, please, within your statement to page 198, and it is paragraph 271. If we could look four lines up from the bottom, starting, "I believe it was…"

Do you see that?

A Yes.

Q So, what you say is-- you say:

> "I believe it was the reduction in air change rate from 10 to 4 ac/hr that was the key deviation that was making the clinical environment unsafe in critical care but other design deviations like the installation of opening windows were also a concern."

Do you see that?

A Yes.

Q So, did there come a point in time where, in your head, you formed the view that four air changes, rather than 10, was actually a solution that meant the space was unsafe, as opposed to being simply less safe than 10 air changes per hour?

A So, that conclusion is borne out more from experience of the years of COVID in Critical Care than necessarily at the time of July 2019.

Q Okay. So, you were not asked that question in July 2019? If someone asked you that today-- just imagine a scenario where there is a new-build hospital, everything is fine in the hospital apart from the air changes and Critical Care, and it has got four air changes rather than 10. Is that

space going to be unsafe for patients to go into?

A It potentially would be unsafe. Again, it is more for staff safety than patient safety because if you have put patients who have the same infection in that area, they can't catch that infection from each other, they already have it, but staff may be put at risk of acquiring the infection through working in an area that has low ventilation rates.

Q Again, is that because there is any magic to 10, or is that simply back to the scientific plausibility that the more air changes you have, the more ventilation you have, the better and the lower the risk?

A So, I think there is scientific plausibility in that the calculations that have been discussed earlier regarding a simulated environment would suggest that if you have less than six air changes, you will not be able to remove 99.9 per cent of contaminants in a room in an hour, and that's based on a finite release of hazard aerosol virus, for example, but if you have-- In a live Critical Care unit during a pandemic or a flu season or an RSV season, you will have patients who are generating aerosols continually, and so six air changes and less will never achieve removal of that

hazard. There will always be some residual virus and that can be unpredictable, but it will create an environment that is hazardous, which could easily be engineered out by having more air changes.

Q So, again, just so I am understanding, in the post-COVID period, is there a school of thought moving towards the view that really--10 is still the guidance, but if you are deviating below six, you are getting into what, from an Infection Prevention and Control perspective, would be unacceptable risk?

A In the context of aerosol generating procedures being performed in that that area, I'm not sure that there's any gauge that says whether something's acceptable or unacceptable. It would be more "hazardous."

Q More hazardous rather than less, but again, we would be back to this multifactorial discussion about--it would depend about the individual patient, the specific treatment they were receiving, other factors like spacing of beds, pressure regimes, it is all a package that has to be considered together. Is that fair?

A Yes.

Q Because again, just while we are on this, it may be helpful just to look to the report that the Inquiry obtained from Professor Hilary Humphreys, who is an individual working in clinical microbiology. If we could perhaps just look to his report, which is in bundle 12 at page 15. So, bundle 12, page 15, it is paragraph 4.4.3. Approximately eight lines down, you will see there is a sentence beginning, "There is no precise science that I am aware of…" So, it is bundle 12, page 15----

A Sorry, I am not seeing that.

Q Sorry. Bundle 13, volume 12, page 15. That is my mistake. So, bundle 13, volume 12, page 15. Too many bundles, Dr Inverarity. Apologies. So, 4.4.3, approximately eight lines down, there is a sentence beginning, "There is no precise science…"

A Yes, I see that now.

Q What Professor Humphrey says is:

> "There is no precise science that I am aware of that sets the ACH for a critical care unit at 10 and whether this is significantly better than 12 or even 15 ACH, but the important principle is that the ACH are higher than a normally ventilated room (about 6

ACH) per hour and the air pressures, air flows and filters are also designed to achieve the purpose of the ventilated facility. These guidelines, when implemented in terms of construction, commissioning and monitoring would help minimise infections acquired in operating theatres and in units with vulnerable patients, when combined with other measures such as good professional practice. Minor variations in parameters can occur over time, and especially as plant ages. Hence, while it is difficult to be definitive, ACH of 7, 8, and 9 might still give significant protection, but those at 5 or less would probably not as it would be similar to what you would see in a non-mechanically ventilated area."

Do you see that?

A Yes.

Q Does that effectively tie in with some of the studies and information that you have indicated post-COVID? It might now be six as opposed to five, but if you are getting to that level of five or six, is that an area where you would be concerned, from an Infection Prevention and Control perspective, for a Critical Care space?

A Yes, because of the activities that happen in Critical Care. It may be acceptable in a general ward where you are not performing aerosol generating procedures.

Q Just on that, aerosol generated procedures, if I could ask you to look on-- this time it is within Professor Humphreys' oral evidence he gave previously to the Inquiry, so bundle 12, page 53, and it is the question and answer on page 53 towards the bottom right-hand corner. You see there is a question beginning, "So, for example…" So, the question was asked:

"Q So, for example, if we took critical care areas that have 10 air changes an hour, in your professional opinion, would you be able to say whether 11 was better than 10, or 9 was equally as good as 10, or is that simply impossible?

A I'm not sure I could. I mean, I think if you look at the mathematics of this and, again, this is technical areas that-- you get dilution-- you get more rapid dilution the more air changes you have, but you still get fairly good dilution of

contaminated air in a relatively short space of time even with 10 air changes per hour."

Do you see that?

A Yes.

Q It goes on:

"Q In your opinion, is there though a risk associated with reducing air changes?

A There is a risk, but I wouldn't be able to give you a judgment as to how significant that risk would be."

Do you see that?

A Yes.

Q Now, there is a later exchange which I just wish to draw your attention to, and it is really drawing on the principles of Dr Lidwell. So, if we could look on to bundle 12, page 58, and it is the question in the top left-hand corner, slightly down, beginning, "So, applying the principles…" So, this was, effectively, a discussion about, "How much dilution are you going to get from four air changes per hour?" The question was put:

"Q So, applying the principles developed by Dr Lidwell, after four air changes would approximately 98 per cent of contaminants in a space be removed?

A Correct, yes."

Do you see that?

A Yes.

Q Again, it would be helpful just to have your observations. If four air changes is removing 98 per cent of the contaminant, why would that not be a safe number of air changes within Critical Care?

A Again, the context that's being described here is applying data from a simulation, and (inaudible) where you may have multiple people continually releasing aerosol is not the context that this is describing. I don't think I could give a judgment on what would be safe in that context.

Q So, again, if someone came to you, it would not just be as simple as saying, "Well, I want to achieve six and I have only achieved four. What is the risk and the difference?" That is just too multifactorial and difficult an assessment to make in terms of whether something, as a binary choice, is safe or unsafe?

A Yes.

Q I would like to move on now within the chronology and discuss what is happening around about 10 and 11 July. You told us earlier in your evidence that, effectively, NHS Lothian were told by Scottish Government,

"The ventilation system simply has to comply with published guidance." Is that correct?

A Yes.

Q So, did the whole dynamic really then shift from a discussion about whether the system as built was safe, and then look to analyse whether the system with the published guidance parameters – positive pressure and 10 air changes per hour – whether that would be safe?

A So, I think the goal had moved to compliance, and the inference was that compliant design would be a safe design.

Q With that, were some of the clinicians within NHS Lothian-- did they have concerns about moving away from balanced or negative pressure towards positive pressure for certain groups of patients?

A So, there was discussion with the Critical Care pediatricians over the design in Critical Care where they had previously expressed the desire for a pressure cascade that was negative or balanced, and the guidance to comply with was 10 pascals positive pressure. So, over the course of two days, we had a lot of discussion and visits to the unit to explore, on both sides, what it would

mean to have an SHTM 03-01 compliant design, and whether that would be an acceptable outcome.

Q Because I think you told us in your evidence today, and you certainly cover it in your statement as well, from a clinical perspective, if you are talking about cohorting patients, cohorting children, it is not wrong to have balanced or negative pressure as opposed to positive pressure, is it?

A So, it's all about context. If your primary concern is preventing spread of respiratory infection, as it was in the first wave of COVID where there's no vaccination, there's very little mitigation, then that is a sensible approach to take and that was the conclusion of the Specialist Ventilation and Healthcare Society, who are authorising engineers in ventilation, that, in this scenario – again, in the first wave of COVID – where health boards were in the situation of potentially running out of Intensive Care bed spaces, the question being posed was, can we convert operating theatres into intensive care units? Now, an operating theatre is at positive pressure, and so there was work being done to look at how can you make that safe to contain viruses, and the conclusion was that a balanced or slightly negative pressure regime was

the optimal way of containing respiratory viruses.

Q So, again, help me if you can. If the ventilation system designed at the RHCYP for the critical care spaces had been balanced or negative pressure and it had 10 air changes per hour, would you have had any concerns from an Infection Prevention and Control perspective?

A It would depend on what was happening in that area. So, if you're performing invasive device insertion, I would have had concern because the probability of infection post-procedure would be higher in that environment than if it was in positive pressure. It's difficult to quantify how much that would be because there are other mitigations in that process, such as skin disinfection and no-touch technique and how you perform the procedure, but hypothetically, there's more risk of infection complication by inserting devices in a negative pressure environment than a balanced or positive pressure environment. There would also be potential hazard if a neutropenic patient was being managed in that environment because, ideally, they would be in a positive pressure environment. So, it's really difficult to generalise because the permutations of the type of patient and

the type of procedure taking place at the bed space are so vast.

Q Thank you. If we could perhaps just look at bundle 13, volume 8, to page 591, please, and just for context, the email at the very bottom of this chain from Julie Freeman on 10 July, that was raising concerns effectively of clinicians for moving from balanced or negative towards positive pressure. So, you see the final line on page 591, "The bit I'm struggling with is the pressures with respect to the single rooms and the 4 bed bays." Do you see that?

A Yes.

Q And then we see your response above that, "Any views from Falfield please?" I will come back to that in a moment, and if we look to the final paragraph – approximately four or five lines up – there is a sentence beginning, "The current design of balanced or slightly negative..." Do you see that?

A Sorry, can you repeat that?

Q So, just above Julie Freeman's email, there's an email from you that begins, "Any views from Falfield please?" Do you see that?

A Yes.

Q The final paragraph in that email begins, "Discussion was

detailed but critical(sic) to get their agreement"----

A Yes.

Q -- "for us to have an SHT 03-01 compliant design." It is really the next bit, it says:

> "The current design of balanced or slightly negative 4 bedded rooms (deviation from SHTM 03-01) seems to have arisen from clinical teams rightly wanting to protect patients outwith a potential cohorted area and so much of this concern is to convince them that this is still possible with an SHTM 03-01 compliant design.
> Thanks, my brain is fried!"
> Do you see that?

A Yes.

Q And again, could you give us a-- how complicated and difficult are these types of discussions that you are having about compliance with guidance, deviations from guidance, how you go about making sure that the ventilation system is safe for individual patients?

A So, they are complex discussions. I think, having worked in infection control for a number of years, often during incident management, you are having to explain complex principles to educated colleagues who

may not be as familiar with that subject matter, and that was the situation here with the Critical Care team. Trying to explain both ventilation engineering principles, but also the infection control principles that were built into the architecture of the building that would aid either breaking transmission or reducing the probability of transmission if there was an infected patient in the unit. So, it had been a particularly long day of complex discussions and having to address very educated concerns and, at the end of the day, I think that was an attempt at humour in the face of adversity, to be honest.

Q Thank you. Again, just a comment at the start of that email, it says, "Any views from Falfield please?" You have told us already that some of your colleagues, including Lindsay Guthrie, just so happened to be at the Falfield course that was being run by Peter Hoffman of Public Health England and Malcolm Thomas, the engineer. Can you recall if you had any information fed back from discussions with Malcolm Thomas and Peter Hoffman?

A So, I didn't have any direct communication with Professor Hoffman or Mr Thomas. It was being directed through my colleagues that

were down there. So, having done the course myself before, the evenings, generally are-- they are informal ways of discussing real-life scenarios that the course participants have faced, or are facing, that relate to the built environment, and real-world scenarios, generally, are encouraged because they're practical. So, prior to Lindsay and Sarah and Jen and Michelle going down, we had agreed that if there were questions arising, we would feed them down to them in Falfield to be able to ask of the national experts, really as a second opinion, and that was happening on a pretty much a daily basis. I would be texting or emailing about issues. This was, really, one example.

Q As one example, is this effectively saying, "We want to cohort infectious children. The guidance would say positive pressure and 10 air changes per hour, but our clinical colleagues have concerns because they're used to cohorting children with RSV in balanced or negative pressure. Is it safe?" Is that the type of question that the experts are being asked?

A Yes, and to explore why it would be considered safe. From my perspective, really, looking to the people who had trained me for assurance that I was not misinterpreting things and going off piste.

Q What views were fed back to you from Falfield from Peter Hoffman and Malcolm Thomas?

A That the approach that we were taking was not deemed a risk.

Q So, effectively, if you comply with the guidance, you are going to provide a safe environment for patient care in the hospital?

A By inference, yes.

Q Thank you. We see some of that recorded in Jennifer Poyner's email on 11 July, bundle 13, volume 8, page 591 at the top – it is just at the top of that page – which says:

> "Overall with this one we think its not really an issue. The fact that there is a door that can be closed in the 4 bed room will in itself reduce infection spread by 80%. Changing a negative pressure facility in that room area will not necessarily add anything."

Do you see that?

A Yes.

Q Just in simple terms, what is being recorded in that part of the email? What is that communicating?

A It's communicating that there are factors that are more critical

to containment than, necessarily, what pressure cascade is between the room and the corridor.

Q Thank you. Then, if I could ask you to look on to bundle 13, volume 8, to page 554. This is a note recording a summary of discussions that are taking place on 10 and 11 July 2019. Do you see that?

A Yes.

Q So, in both 10 July and 11 July, you are recorded as an attendee.

Then, if we look below the box with all of the attendees it begins by stating:

> "We discussed the current proposals for improving the critical care ventilation to ensure that it is compliant with SHTM 03-01 with 10 air changes and 10 Pa positive pressure in the single rooms and 4 bedded bays."
>
> Do you see that?

A Yes.

Q And then there is a narration of what's discussed. If we look over the page onto page 555, there is the heading "Compliance with SHTM 03-01."

A Yes.

Q Which says:

> "Currently the 4 bedded rooms and single rooms have 4 air changes and this needs to increase to 10 air changes to ensure compliance with SHTM. It was acknowledged that the SHTM was more focused on adult Critical Care where the patient profile is different and the need to cohort patients was extremely rare."
>
> Do you see that?

A Yes.

Q Within the guidance, there is no specific guidance that differentiates between children as opposed to adults, and one of the points that you make within your statement is to say, "Well, children aren't really just small adults whenever it comes to clinical needs." Do you see there being a gap in the guidance? Does there really need to be specific guidance, specific research done, in terms of what specific environment is required for children within certain Critical Care spaces?

A So, in terms of air change rates and pressure cascades, I don't see that that would be any different to an adult Intensive Care Unit. The only difference that I'm aware of between a paediatric and an adult Intensive Care Unit is around temperature control of the bed spaces. In the health building note for Critical Care, there is a sentence that says

that in a paediatric intensive care unit, you should be able to regulate the ambient temperature of the bed space at each bed space rather than the entirety of the room, and that makes sense because small children can't regulate their body temperature particularly well, particularly under stress or if they've got burns or under anaesthetic. So, that's the only difference that I'm aware of.

Q Thank you. If we return to page 555 and look to the fourth bullet point:

> "IPCT view was that you could cohort patients with the same air-borne infection in the 4 bedded areas that were 10 air changes and 10Pa and that there is no reason this would result in an increased risk of spread of infection. A design of balanced or slightly negative pressure approaches the issue of spread of infection from a cohort from a different direction but it was agreed that neither approach increases the risk of infection spread but that the SHTM 03-01 compliant design has additional benefit for neutropenic patients who could be in single rooms at 10Pa positive pressure."

Do you see that?

A Yes.

Q Again, is that really what you have set out in your evidence today and your statement that, if you are trying to do different things, you might need balance and negative as opposed to positive? Neither is necessarily wrong, albeit you can do slightly more if you have positive pressure and 10 air changes per hour as opposed to balanced or negative.

A Yes, but there is also a misconception I think that we come across that if you have a positive pressure room, all the fouled air--contaminated air, will leave the room through the door because I think people assume that, because the room is positive to the corridor, that's the way the air is all going to go, but that isn't the case from engineering, because you extract the fouled air from within the room. So, there are misconceptions behind the perception that positive pressure would be a bad thing.

Q Thank you. And then we see the next bullet point says:

> "It was acknowledged that the design of the Unit also provided additional control measures to prevent spread of infection and the barriers to transmission included…"

And then there is a range of matters listed, bed space and a few others. Presumably, these are issues that would be relevant-- just say, for example, you had all of the parameters set out within SHTM 03-01, but you did not have exactly the number of air changes if you were doing a sort of individualised risk assessment to try to work out how much risk is tolerable. Presumably, some of these additional control measures are the types of issues you would be considering to see whether or not the risk was or was not acceptable for individual spaces for individual types of treatment.

A Yes. So, the size of rooms is helpful in that if the beds are over three metres away from each other, most droplets, certainly, would fall to the ground or to a horizontal surface from gravity. If you've got doors that close, you can contain the room. If you have positive pressure in all the rooms, then anything that is released into a corridor would then have to overcome a pressure barrier to get into another bedroom.

So, there are mitigations that are present, but I don't think they're particularly explicit or clear in the design guidance as to how they can be beneficial in preventing infection.

Q Do you think it would be

helpful if those types of issues were addressed in more detail within the guidance to try to assist someone who did have to try to make an assessment as to whether a specific space was safe or was not safe? The reason I say that is we are talking at the moment in the context of a new build hospital whereby you have a blank canvas and you can start from scratch, but presumably, a lot of the spaces that you would deal with for those assessments would actually be spaces whereby there are limitations in what can be done because of the built environment that already exists?

A In a refurbishment?

Q Yes.

A Yes. Yes.

Q So, would more guidance around about the impact that those specific factors listed in the minute have on Infection Prevention and Control be beneficial to individuals undertaking the role you were undertaking?

A Very probably, yes.

Q Yes. Thank you. If I could move on, please, and look to bundle 7, volume 1, at page 316. This is an email from Janice Mackenzie to other members of the project team. I think it is really just recording the outcome of the discussions in the

minute that we have just looked at. It is really just the second full paragraph beginning, "Following much discussion…" So, Ms Mackenzie states:

> "Following much discussion and looking at a range of different scenarios related to the patient groups they will be caring for and the requirement for the ability to cohort patients with the same infection the consensus is that the requirements of SHTM 03-01 in relation to ventilation within a Critical Care Unit will provide a safe ventilation design in conjunction with the design of… paediatric intensive care unit and good staff practice to achieve best outcomes for patients."

Do you see that?

A Yes.

Q So, effectively recording, after all that detailed discussion, the consensus view was that if you follow the parameters set out within the published guidance, the space will provide a safe environment for the treatment of ill children?

A Yes. That's the conclusion that we came to.

Q The Inquiry has heard evidence that what effectively follows is there is a new Settlement Agreement that is entered into between NHS Lothian and IHSL, the project company. It is sometimes referred to as High Value Change Notice 107, but that recorded what the new ventilation parameters were going to be. Did yourself and your colleague, Lindsay Guthrie, stay involved in the project as that design was finalised and then built?

A Yes. We were involved pretty much in all the meetings with the contractors.

Q Did you undertake a range of checks on the hospital before it opened to make sure that the system was designed and operating in conformance with the published guidance?

A So, that was more the role of the authorising engineer with regards to the ventilation system, but we were tasked with risk assessing pretty much every clinical space in the hospital, looking at what patient groups would be occupying it, what procedures would be performed in it, and whether there was any mismatch between how the ventilation performed. That was a requirement from the Oversight Board.

Q Lindsay Guthrie gave evidence to the Inquiry to say that she literally did a line-by-line review of

every space within the hospital, checking all the ventilation parameters. Were you involved in that process as well?

A Yes.

Q If I could ask you to look to bundle 13, volume 7, and to page 152. You see this is a document called:

"**NHS Lothian Infection Prevention Control Team Review of Suitability of the Performance of Redesigned Ventilation Systems in RHCYP DCN – March 2021**…"

Do you see that?

A Yes.

Q Do you recognise this document? What is it?

A Yes. I wrote it. It was a summary, really, of all the ways that we had to-- either had to change the ventilation to make it compliant, or ways that we had made improvements to the design to future-proof it and prepare it for pandemic.

Q Thank you. So, if we look over the page onto page 153, please. Do you see the bold heading:

"**Paediatric Intensive Care**

Pertinent Design Changes relating to High Value Change (HCV) 107:

- All clinical bed space areas to have a minimum of 10 air changes per hour and be at 10 Pascals positive pressure."

Do you see that?

A Yes.

Q Then the next heading:

"IPCT Assessment

- All bed spaces in multi-occupancy bays and single rooms now achieve the SHTM 03-01 criteria for critical care of a pressurised environment of 10 Pascals positive pressure with a minimum of 10 air changes per hour."

Do you see that?

A Yes.

Q Then if we look over the page, on to page 154, you see the bold heading, towards the bottom of the page, "**Paediatric Haematology/Oncology Ward (Lochranza)**". Do you see that?

A Yes.

Q Again, similar statements being made there. If we look on to page 155 at the bottom, we see that that is a document completed by yourself and your colleague, Lindsay Guthrie.

A Yes.

Q If I could ask you to look

to bundle 13, volume 8, page 716. You see this is an email from Brian Currie to a range of individuals including yourself, and it says:

> "Following recent requirements communicated by the Board's Chief Executive and as endorsed by the Executive Steering Board, the attached High Value Change Notice is required to be approved by the parties… below."

Do you see that?

A Yes.

Q It is a range of people to approve it. You have got the project manager, project technical advisor, service leads, Infection Prevention and Control, which is Lindsay Guthrie and yourself. Do you see that?

A Yes.

Q Authorising engineer, project director, director of facilities, executive director, HFS and HPS. Do you see that?

A Yes.

Q So, all of those individuals had to sign off on the redesign of the Critical Care Units for the RHCYP. Is that correct?

A Yes. It was a collective agreement.

Q So, having undertaken all the checks that we have just looked at and that you address within your statement as well, do you have any concerns as to whether the built environment, the ventilation system and the Critical Care Unit of the Royal Hospital for Children and Young People provides a safe environment for patient care?

A I have no concerns.

Q Thank you. We have looked in quite a lot of detail at the Royal Hospital for Children and Young People, the changes that were made, why it was safe. The Department for Clinical Neurosciences did not open. The blanket decision was taken simply that the hospital would not open on the planned date. From your perspective, was there any reason why the Department for Clinical Neurosciences could not have moved from the Western General to the site of Little France?

A In July 2019?

Q Yes.

A At that point in time, we were still gathering information about the water system. So, on 9 July 2019, which was the original date, we wouldn't have been able to move it, but once we had that information and were able to address some issues that affected those wards, which were minor issues, it would have been

feasible to move, but by the time we were getting to that point, the pandemic was taking over and there were other operational issues that had been unforeseen, such that adult Intensive Care was being overwhelmed with COVID, and moving the neurosurgical workload to the ITU at the Royal Infirmary was just not feasible at that stage.

Q So again, that is really why I was interested in your views on it. There was a possibility that the Department for Clinical Neurosciences could have moved at an earlier point than it did, but for COVID. Is that really what you are telling us?

A Potentially. Yes.

Q The final issue that I would like to explore with you today, Dr Inverarity, is really how these types of projects could be done better in the future. You have obviously worked on the project, been involved right through the remedial works. What are your general reflections in terms of how some of the issues that you encountered-- how could they be done better in the future?

A So, I think one of the things that we learned from the July 2019 period onwards was having the stakeholders in the same room together, or virtual room together, discussing the issue at the same time had clear benefits because misunderstandings, misconceptions, could be cleared up at the time. So, when the design engineer had uncertainty about the purpose of a room, there would be somebody who could address that at that time. Having the authorised engineers reviewing information-- They weren't necessarily always present at every meeting, but there would be key steps that they would review before progressing with installing new equipment, for instance. Having their involvement was very beneficial because they brought a whole wealth of experience from other health boards.

Q So, having effectively the designers, the clinicians, the engineers and Infection Prevention and Control, all having a roundtable discussion perhaps at an early stage in the project, you think that would be a beneficial step?

A Yes.

Q One of the issues that some other witnesses have raised is the potential for standardisation, so standard rooms, standard designs. Do you see that as being a potential area that would be beneficial to try to avoid issues around technical documents

about air changes and pressure regimes?

A Yes. It makes sense to have standardisation, and there are areas in a hospital that aren't going to deviate much. You know, office and a toilet really are pretty much the same regardless of which health board you're in. It's an approach that is certainly, I think, being explored in England in their plans for expanding new hospital buildings. It takes away the need to start from scratch each time that you have a building project.

Q Thank you. You will be aware of the creation of NHS Scotland Assure as a centre for excellence in the built environment.

A Yes.

Q What are your views in terms of NHS Scotland Assure? Do you think that it is going to cure all of the issues that arose in projects like the one that you worked on?

A I wouldn't agree with it in that respect. I think NHS Assure is useful in being an organisation to be able to coordinate a lot of concerns about the built environment. I do see it still very much in its infancy.

Q In terms of the model that has been created, NHS Scotland Assure is not going to have an inspection function, it is not acting as a regulator; it is simply going to be there reviewing through the Key Stage Assurance Reviews. Do you think that is the right model, effectively assisting with Key Stage Assurance Reviews, but not taking responsibility or having an inspection function or a regulatory function?

A So, I would have concerns that some of the issues that we encountered would still not have been picked up by that process, and I think having an assurance function tends to lead to things being catalogued rather than corrected, and there still needs to be a process of taking action to make things safe when non-conformance is identified.

Q How would you see that being improved in the future if there were changes made to NHS Scotland Assure?

A I think having memory of the events that have happened in other projects is key to being able to feed that into current projects so that the same mistakes aren't replicated. I think having highly trained individuals who can step into that and support boards is beneficial, particularly for smaller boards that have small teams because the workload required is enormous. I think there needs to be some thought as to how unwieldy and

complicated processes are, and simplified for that reason as well, because it's incredibly difficult for infection control teams to actually support the amount of input that's required in KSAR reviews.

Q A number of your colleagues, Sarah Jane Sutherland and Lindsay Guthrie, they talked about the demands of being involved in a project that is going through Key Stage Assurance Reviews and the volume of time that that takes up for Infection Prevention and Control nurses. Is that your experience, or are you slightly further removed as the Infection Prevention and Control doctor on those types of projects?

A No, that's my experience as well. The number of refurbishments or new-build projects in our Health Board has been large and the number of microbiologists able to support that has diminished.

Q With the increased workload created by Key Stage Assurance Reviews and NHS Scotland Assure, do you think there is simply enough people working within Infection Prevention and Control, both IPCNs and IPCDs, really to facilitate what is being set out by the new Centre for Excellence?

A Not in terms of numbers,

but I think there's also potentially misalignment in the tasks and the allocation to particular staff groups.

Q Okay.

A A lot of what we're asked to input into doesn't actually require a doctor and a nurse.

Q So, can you give us some concrete examples? What type of input are you being asked for at the minute that you think it is not really appropriate for an Infection Prevention and Control professional to be involved in?

A So, the type of project-- just because something is being built on hospital land, it may not have any clinical purpose and patients would not necessarily be there, and yet there still seems to be an expectation that the Infection Control team will have been involved in its design and ensuring that there's limited infection risk when, in fact, there's no healthcare being delivered in that facility.

Q Thank you. If I could ask you to look on to bundle 13, volume 7, please, at page 319. So, bundle 13, volume 7 at page 319, and it is an email from Tracey Gillies about NHS Assure, and you will see she states just in the main body, "So my understanding from LG on this is:" and then it is number four, "The usual

advice and support on offer to boards appears to have moved toa more ‘mark your homework approach.” Do you see that?

A Yes.

Q Is that something that you recognise?

A I think there has been occasions where we’ve asked questions for clarification on how to interpret guidance, or where there’s not clear steers to what to do, and sometimes that is batted back to the Health Board as “that’s your decision to make.”

Q And how could that be improved in the future?

A I think through the expertise of staff within Assure, working with the Boards to a successful outcome and bringing their experience from other projects, sharing of information.

Q If I could ask you, please, to look back to SHTM 03-01 2022, so that begins bundle 1, page 2263, and if we could look on, please, to page 2286, which sets out the “Ventilation Safety Group” from paragraph 4.4 onwards. Do you see that?

A Yes.

Q I will not read all of that out, but effectively, it provides for the creation of a multi-disciplinary group called the Ventilation Safety Group that has to have a range of expertise: authorising engineers, infection prevention control, authorised person estates, clinicians, personnel from the finance department and other stakeholders. Do you have any experience of ventilation safety groups?

A Yes. In Lothian we had created one back in July 2019.

Q And what has your experience been? Has it been a positive development?

A Yes. I think certainly from capital planning project manager perspective, it provides a forum where they can discuss things and get answers to questions to be able to progress projects faster, sometimes, than email discussions, and it is helpful to have the stakeholders all together, particularly the authorising engineers.

Q Thank you. Do you have any further reflections or ideas beyond what you have covered in your evidence today, or what is set out in your statement, in terms of how you think the types of project that you worked on could be done in a better way in the future? Or have we covered everything?

A I think everything’s been covered, to be honest.

Q Thank you. I just have a couple of final questions. I think at one point earlier in your evidence, you were discussing some involvement that you had with the Queen Elizabeth University Hospital, and you mentioned mycobacterium isolates, some work that you did on that. Is that correct?

A So, in Lothian, the Royal Infirmary Microbiology Department hosts the Scottish Mycobacteria Reference Laboratory, and so the other health boards in Scotland will send isolates of bacteria called mycobacteria – it's the same family of organisms as tuberculosis – to that laboratory for identification, for antimicrobial testing and some for genome sequencing when there are outbreaks. So, we receive isolates from all over the country, but we did have an awareness that we were seeing a particular isolate coming from patients at the Queen Elizabeth.

Q Okay, and were these usual or unusual in your experience?

A It wasn't unusual from the perspective of these sort of organisms we would expect to be receiving because we were the laboratory that dealt with them, and it wasn't unusual in that you would occasionally see them, but I think it

was considered unusual in terms of the number of isolates that were being received.

Q Okay. Thank you. Dr Inverarity, thank you for answering all my questions today. I appreciate it has been a long day. I do not have any further questions for you at the moment, but Lord Brodie may have some questions, or equally, there may be applications from core participants, but thank you.

A Okay.

Questioned by the Chair

THE CHAIR: Can I ask you this, Dr Inverarity? You were asked by Mr MacGregor for your comment on the model of NHS Assure. I think you made the point that it is still in development, in its infancy, as you put it. Now, you mentioned something about the assurance function, which I did not just quite catch-- what was the point you were making there?

A So, I think the assurance function sometimes can lead to cataloguing of problems rather than necessarily intervening to solve the problems.

Q Does that fit in with what I think you said a little later about-- I think you used the expression "batting

back" a question to the Health Board for making the critical decision?

A Yes. We've had experiences where we've had uncertainty about the interpretation of guidance, but sometimes that's been considered out of scope for them and it returns unanswered, or partially answered.

Q Thank you. Now, what I would like to do is just take, perhaps, 10 minutes to check with everyone else in the room, through Mr MacGregor, whether there are any further questions. There no further questions for you, but I just want to double check on that. So 10/15 minutes, Dr Inverarity, and if you could perhaps go into the witness room and I will rise and wait until Mr MacGregor reports back.

A Okay.

(Short break)

THE CHAIR: Mr MacGregor, what is the position?

MR MACGREGOR: Lord Brodie, there are four minor matters which I am more than happy to raise. There is one additional issue that my learned friend Ms Connolly would like to raise. It is probably best if Ms Connolly addresses you on what the specific issue is. I would essentially adopt a neutral position. On one view, the issues she wants to ask may technically be outwith the scope of the list of topics issued in advance of the hearings, but equally I can see if there is a question to be asked of Dr Inverarity now that saves him coming back and being inconvenienced in the future, there is a utility in doing that. So, it is probably best for your Lordship to hear from Ms Connolly, but I would, essentially, on behalf of the Counsel to the Inquiry team, adopt a neutral position.

THE CHAIR: Thank you, Mr MacGregor. Yes, Ms Connolly.

Questioned by Ms Connolly

MS CONNOLLY: Thank you, my Lord. This is a rule 9 application that is being made on behalf of the Cuddihy family and the Mackay family, my Lord. The rule 9 application relates to the issue of mycobacterium chelonae. Your Lordship has heard this witness, Dr Inverarity, tell us that he was involved in the lab that dealt with reports of mycobacterium chelonae from the Glasgow hospitals.

THE CHAIR: As I recollect his evidence, he is-- Well, the National Laboratory is situated in Edinburgh,

and it receives isolates from the rest of Scotland, and among the isolates are isolates from Glasgow. As yet, I do not know if we know that they include mycobacterium chelonae, but they well may. I do not think that that particular bacteria has been mentioned, has it?

MS CONNOLLY: I think Mr MacGregor had asked the witness some questions around mycobacterium and the unusual nature of some of them. My understanding, my Lord, is that that relates to mycobacterium chelonae.

THE CHAIR: Very well, right.

MS CONNOLLY: My question is related to this witness' knowledge and involvement in the advice given by his colleague, Professor Lawrence(?), to Dr Sastry, a consultant at the Royal Hospital for Children, in relation to the antibiotic treatment of mycobacterium chelonae and the cessation of said treatment.

THE CHAIR: We seem to be going a little bit off-piste here.

MS CONNOLLY: Oh, my Lord, it is a question that is relevant, really, to the Glasgow hospital. I appreciate it is not relevant directly to the Edinburgh hospital, and I acknowledged that with Mr MacGregor.

THE CHAIR: When I said "off-piste"-- You want to ask advice given

by Professor Lawrence to Dr Sastry in relation to treatment of an infection consequent on exposure to mycobacterium chelonae?

MS CONNOLLY: My Lord, perhaps I have not been clear. My understanding is that this witness was involved in the provision of that advice around treatment.

THE CHAIR: All right. All right, what would you seek to be establishing?

MS CONNOLLY: The question that arises, my Lord, is that the cessation of antibiotics was in consequence of the observation by doctors that they were causing more harm than good to the patients who were the recipients.

THE CHAIR: All right.

MS CONNOLLY: Your lordship may recall----

THE CHAIR: Do you want to say-- Is there anything else you want to add?

MS CONNOLLY: That is the only issue, my Lord. The other issues Mr MacGregor has kindly agreed to cover.

THE CHAIR: Right, okay. So, you would be asking about-- What it essentially comes to is whether this witness gave advice to a colleague. Is that what it comes to?

MS CONNOLLY: Yes, that and the nature of the advice, yes.

THE CHAIR: All right. Well, to the extent that the witness is able to answer these questions, I will allow you to ask about the advice given, which I think is really as far as we can take it, and I will anticipate that you will be able to deal with this in about 10 minutes----

MS CONNOLLY: Yes, my Lord. At the outset----

THE CHAIR: -- if that. Very well. Well, shall we hear, first of all, Mr MacGregor's questions, and then I will call on you to ask on that specific line.

MS CONNOLLY: Yes. Thank you, my Lord.

THE CHAIR: Dr Inverarity, there are a few questions more, which, first of all, Mr MacGregor will ask, and then a more specific line of questioning will come from one of the other legal representatives, Ms Connolly, but first of all, Mr MacGregor.

Questioned by Mr MacGregor

MR MACGREGOR: Thank you. Dr Inverarity, if I could ask you to have your statement in front of you again-- It will be brought up on the screen. If we could look to page 145 and to paragraph 136. Page 145. This will be bundle 3, I think, of the witness statements, and to page 145, and to paragraph 136. We have covered off the discussions on 2 July. Four lines up from the bottom, you say that:

> "On 4 July 2019, I was asked to attend a meeting to be held on 5 July and chaired by the NHSL Chief Executive, Tim Davison, and attended the meeting on 5 July. I had further e-mail discussion with Dr Inkster on 5 July."

Do you see that?

A Yes.

Q Do you recollect any meetings taking place around this time with individuals from the Queen Elizabeth University Hospital and NHS Lothian?

A In terms of face-to-face meetings?

Q Face-to-face, Teams meetings, team calls, that sort of thing.

A No, not aware of that.

Q Do you remember there being any meetings arranged to discuss the types of issue we have been discussing today where Dr Inkster was initially invited and then did not attend?

A I'm aware of-- There was a meeting that was organised at executive director level between the

two health boards – that was sometime after July, though – and I attended that. I think that was on Teams, but I don't recall whether Teresa was present or not.

Q You do not recall whether she was present or not? So, that meeting takes place, you cannot remember if she was there. Do you remember any meetings where she was initially invited and then was effectively not allowed to attend?

A I'm not aware of any of that.

Q Thank you. We have been discussing, obviously, the issue about four air changes per hour versus 10, comparisons potentially between Sciennes and Little France. Is it important to bear in mind, if we are making those two comparisons, to make sure we are comparing apples with apples? That, in relation to Sciennes, it was an old Victorian hospital that did have natural ventilation, you could open the windows, whereas the site at Little France, the new RHCYP, that did not have opening windows?

A So, my recollection on 10 July, when we walked around the Critical Care unit, was that there was at least one single room where the window opened.

Q One single room where the window opened, but generally you would not have opening windows at the new RHCYP?

A You shouldn't have opening windows in a Critical Care unit.

Q Okay, thank you. So, again, is that is that a significant difference one should bear in mind when thinking about Sciennes, whereby there is no mechanical ventilation, all that you had was natural ventilation by opening the windows?

A So, in Sciennes, I think in the two rooms that were generally referred to as "cubicles," there was a device in the window that would-- like, a fan assembly, that would have provided more than just an opening window.

Q Thank you. Then in your evidence you obviously mentioned the cohorting of patients, the difference between positive and negative. You also mentioned, during your evidence, staff concerns. Could you just perhaps expand on how significant would be the concerns that you would have around staff that are treating infectious patients?

A So, in terms of the examples that we gave earlier, if staff were working in an area where the

ventilation was unable to remove virus from the air because it was overwhelmed, then staff safety would be purely dependent on their use of PPE, and although many staff are competent with the use of PPE, you can have lapses in PPE, and ideally you wouldn't want to put staff in that position because you should really be engineering out that hazard.

Q Thank you. Then the final issue from me is you mentioned the issue of cataloguing; it is important to catalogue the problems as they arise. Clearly, once they are catalogued, they will then have to be dealt with and resolved. Do you see that as an issue that the Health Board should be dealing with in terms of resolution, the Centre for Excellence, or should it be a process whereby the various groups work together?

A So, I think it needs to be a combination. The health board clearly needs to be addressing the issue and be part of that resolution, but in terms of making that learning available to other health boards facing a similar situation, that would need to be coordinated centrally.

Q Thank you. Dr Inverarity, thank you. I do not have any further questions, but I think there is one matter from a core participant, but

thank you for answering my questions today.

THE CHAIR: Ms Connolly.

Questioned by Ms Connolly

MS CONNOLLY: Dr Inverarity, you have told us that you have a role, and I believe it is in the Scottish mycobacteria reference laboratory?

A I did have. I don't currently.

Q And what period of time did you hold that role?

A Certainly up until 2019 and a few months after July 2019. I can't remember when I stopped but, essentially, I had some sessions to assist the director of the laboratory and to assist with the running of the laboratory, but as events overtook with building projects I had to step back from that role.

Q And you told us that the laboratory receives mycobacterium isolates from across the whole of Scotland?

A Yes, that's its purpose as a reference laboratory.

Q And do those isolates include mycobacterium chelonae?

A They can do, yes.

Q And do you recall advice being sought by a treating doctor from

the Royal Hospital for Children in Glasgow on the appropriate treatment for mycobacterium chelonae?

A Not to myself, no. Generally, the laboratory will provide advice to clinicians and other health boards on the management of individual patients. Generally, I wouldn't have been involved in those conversations unless the director was on leave.

Q So it is only in his absence, and that is Professor Lawrence, is that?

A So, Dr Ian Lawrence.

Q Lawrence. Only in his absence you would be involved in giving any advice?

A Generally, yes.

Q And there were not any occasions from the Glasgow Children's Hospital where that situation arose that you can recall?

A I don't recall giving advice on patient management in the Queen Elizabeth.

Q Thank you. Thank you, my Lord.

THE CHAIR: Thank you, Ms Connolly. Doctor, we have now come to the close of your evidence and you are free to go, but before you go can I express my thanks – my personal thanks and my thanks on behalf of the Inquiry – not simply for your attendance but for all the work that went behind that attendance. You have provided a lengthy and very useful witness statement, which we have all shared. So, as I say, you are free to go, but thank you very much for your assistance.

THE WITNESS: Thank you.

THE CHAIR: Thank you. Now, Mr MacGregor, we should be able to resume at 10 tomorrow?

MR MACGREGOR: Yes, my Lord, it will be Ms Goldsmith first and there is two witnesses listed for tomorrow.

THE CHAIR: Very well. Well, can I wish you a pleasant afternoon and evening and we will see each other again tomorrow.

(The witness withdrew)