Thursday, 18 October 2012

(10.00 am)

(Delay in proceedings)

(10.08 am)

DR BRIGITTE BARTHOLOME (called)

Questions from MR REID

THE CHAIRMAN: Good morning. Mr Reid?

MR REID: If I can call Dr Brigitte Bartholome.

Thank you, doctor. Just before we begin, can I just make sure I get the pronunciation of your name completely correct?

Doctor, you have made two witness statements to the inquiry, both references are at 142. WS142/1, which is dated 22 January 2012, and the second 142/2, which is dated 18 June 2012. Are you aware of that?

A. Yes, I am aware of that.

Q. Would you like to adopt those statements as your evidence before this inquiry?

A. Yes, I would like to adopt them.

Q. If I can then call up your CV, doctor. It's at reference 311-007-002. This is the second page of your curriculum vitae. This is a very helpful summary of all of the different postings you had from 1988 on.
Am I correct in saying you qualified as a doctor in 1987 in Germany?

A. That's correct.
Q. And you'd been in Northern Ireland since August 1988 --
A. That's correct.
Q. -- apart from two years in Toronto?
A. That's correct.
Q. And you've been a registrar, by 1996, for two years, and you had been at the Children's Hospital for one year?
A. Yes.
Q. And you were senior registrar for a year?
A. At the time, yes. In 1996, yes.
Q. Since August 2001, you've been a consultant in emergency paediatrics and lead clinician at the paediatric emergency department at the Children's Hospital?
A. Yes.
Q. Can I ask you, what's the difference between, for us laypeople, the difference between a senior registrar and a registrar?
A. As a senior registrar, you would have more experience than a registrar. Usually, you would be appointed senior registrar after two to three years of being a registrar because of the added experience, but the role that you perform in the hospital would be the same.
Q. So for example, you would have been more senior than either Dr O'Hare or Dr Sands; is that correct?
A. That's correct, yes.

Q. And you'll also see from your CV that you had been in paediatric neurology for a year on appointment as a senior registrar and then moved on to Musgrave Ward; is that correct?
A. I was a senior registrar in Paul Ward for six months. The allocations are six months. But I was in Paul prior to moving to Musgrave Ward where I was in October 1996.
Q. So you just changed from paediatric neurology to the Musgrave Ward?
A. That's correct, yes.
Q. I think you had been in nephrology at one point as well; is that correct?
A. Yes, nephrology was part of my duties in Musgrave Ward, so I looked at the -- part of the specialties I covered there was kidney problems, nephrology.
Q. It is one of the main specialties in Musgrave Ward, isn't it, paediatric nephrology?
A. Musgrave Ward covered a lot of problems. It was general medicine, but it also was nephrology and endocrinology, so problems like diabetes were covered there as well.
Q. During your time in Musgrave Ward did you encounter Professor Maurice Savage?
A. Yes, I did. He was one of the two consultants working then.
Q. By October 1996, how frequent had your contact been with

him?

A. The Children's Hospital is a small place and Musgrave Ward is a small place, so I have no doubt that I encountered him every day when he was working and when I was working as well.

Q. Were you aware of the Adam Strain case and inquest in October 1996?

A. I certainly was aware of the case and I was aware that an inquest had happened. I cannot definitely say whether, in October 1996, I had read the full result, but the whole events surrounding this inquest had been known to me and to most of the doctors in the Children's Hospital.

Q. And did you ever discuss the case with Professor Savage?

A. I have no doubt that I did, but I cannot tell you specifically when that was.

Q. What do you think you would have known about the learning points from the Adam Strain case in October 1996?

A. Looking back on it, I think one of the main points that touched us all was the fact that a child who had been treated by the nephrology team for so long and had been looking forward to a transplant which would have made such a difference to his life, died in spite of the best efforts of the team and then we all were aware that

there had been issues with the fluids, but I do not remember at that time whether we were aware -- whether that was only preoperatively, throughout the surgery, or whether there were any problems afterwards as well.

Q. Would you have been aware of the impact of low sodium in Adam Strain's case?

A. I can't remember specifically whether I was aware of the low sodium at that time because, as I said, the inquest had been held. But we discussed his case in the ward because he had been one of the nephrology patients, so I'm sure that I knew that the sodium had been an issue.

Q. You said the Children's Hospital was a small place. Was the Adam Strain case discussed just within Musgrave Ward or was it also discussed generally around the hospital?

A. I cannot answer that for my colleagues. Being in the renal team and having been so closely involved with the patients on dialysis, because generally, thankfully, in Northern Ireland these are not many. We certainly knew him because he was on dialysis and he was frequently seen in the Musgrave Ward by the renal team.

THE CHAIRMAN: So you yourself knew Adam?

A. Seeing that I've worked there, I think I did. I can't clearly remember whether I definitely did, but from my clinical experience, I have no doubt that I had seen him a few times at least.

MR REID: And in terms of your knowledge in October 1996, what was your knowledge of the condition of hyponatraemia?

A. I think there's no doubt that we know much more about hyponatraemia and the problems that it raises now than we did in 1996. It is difficult for me to roll back to that specific point in time, but hyponatraemia is a condition that has been recognised as being a problem that can arise with fluids that are given to patients.

Q. Would you have been aware in October 1996 of the Arieff article from 1992?

A. It certainly was discussed in the ward as one of the points that was raised in the inquiry or -- it wasn't an inquiry at the moment.

Q. And would you have been aware of the fact that fluid overload may lead to cerebral oedema?

A. Yes, I would have been aware of that.

Q. Can I just bring you very briefly then to your rota for the evening of the 22nd October into the morning of the 23rd? It's at reference 302-031-002. Maybe it's not. We'll double-check to see where that is. The rota says that Dr G McKnight was assigned to be the on-call registrar for that evening. Do you have any recollection of why you were on instead of Dr McKnight?

A. I did the rota as one of the senior registrars

throughout that period, and we would usually make the rota out in advance for about three months. So when there were any circumstances, personal or professional, which required changes, we would do that. It would not be reflected on the rota that you have because that was the initial one that I gave to management. The other one would have been a piece of paper with scribbles all over it, with names here, there and everywhere. But it would generally be allocated fairly and all the people on the rota would have been happy with the way it worked.

Q. If I can bring you then to your role on the evening. If I can turn to your witness statement, 142/1, page 3, question 3. As you can see at question 3, you were the senior registrar on call from approximately 5 o'clock in the evening of the 22nd October to 9 am on the 23rd October; isn't that right?

A. That's correct, yes.

Q. And as you say, as the paediatric registrar, you're the most senior doctor on site between those times overnight.

A. Mm-hm. Yes.

Q. Would it also be correct to say that with the hours that you had as a registrar, you'd have been on since 9 am on Tuesday the 22nd October?

A. That is correct, and I would be on until 12 o'clock on the 23rd. I have only mentioned the on-call time here, but the on call finished at 9 o'clock and then I would do the ward round, so I would be able to leave the hospital at midday on the 23rd.

Q. Would you be on Musgrave Ward then from 9 am to 5 pm, then on call from 5 pm to 9 am, and then back on Musgrave Ward from 9 am until noon?

A. Yes.

Q. You say that you were the most senior doctor on site. There was an on-call consultant paediatrician, isn't that right, overnight?

A. Yes, that is correct.

Q. Was there an on-call consultant paediatric neurologist available as well?

A. He would have been on call, yes, he or she. There were only two of them at the time.

Q. Are those consultants generally off site then? Are they generally at home unless they're called in by medical staff to assist?

A. Both the paediatric consultant on call and the neurology consultant on call would be off site.

Q. As it says in your witness statement, your on call duties included covering the general paediatric wards, the specialty wards and you'd also have the SHO working

in the paediatric intensive care unit, and the hospital had about 120 beds at the time. You also would have covered the emergency department.

A. Yes.

Q. So it was quite a lot of wards and beds to cover. It was you as the most senior doctor covering all of those wards; is that correct?

A. That's correct. The Trust tried to find out how many beds were occupied on that night. The letter was only recently -- I'm sorry I don't have your reference number.

Q. Don't worry, doctor.

A. They stated that there were 114 beds occupied at that time.

Q. I'll assist the doctor by bringing them up. If I could bring up on the left-hand side of the screen reference 302-138-001 and, on the right-hand side of the screen, 302-139-001. On the left-hand side, we have the letter from the inquiry to DLS dated 3 October. On the right-hand side, the reply dated 10 October.

As you say, the questions asked were:

"How many children were in the Royal between 7 am on 22nd and 4 am on the 23rd?"

And as you identified -- the answer is from the PAS system -- it's determined there were 114 patients in the

Children's Hospital between 7 am on the 22nd and 4 am. And it says:

"How many children were seen in A&E?"

And the Trust is still investigating those numbers, I believe.

A. If I could make a comment about that, please?

Q. Certainly.

A. I tried to find out how many patients were seen from 5 o'clock when I started to be on call until 9 o'clock when my on call finished. On the current information system that we have in the emergency department, I would have been able to do that. But I was told that I could only get the patient number per 24-hour period. And it would not be able to give me the times when the patients would actually be seen. So I felt that that information would not be very useful.

THE CHAIRMAN: It would be too general?

A. It would be too general, but having said that, on average, we would see 100 patients per day in the emergency department, of which about half would come after 5 o'clock. That is a general trend, which has been proven over years. It still is the case now. So I would expect to have seen or to have been supported -- the SHO to see about 50 patients throughout that night.

MR REID: As the consultant in emergency medicine, you're

currently at the coalface of admissions; is that correct?

A. Yes, I've been doing that for the last 12 years.

Q. The letters also shown then, as you stated yourself, that you were the only paediatric registrar on duty overnight and you were responsible for covering A&E during those hours. If we can flick over to 002, the Trust can confirm you would have been responsible for 12 wards, which reflects the answer you gave in your witness statement.

Can I just ask this about the paediatric intensive care? You said there was an SHO covering that particular ward. Were you also responsible for the paediatric intensive care unit?

A. I would have been available for advice on paediatric issues. The anaesthetist issues -- by that I mean ventilation, adaptation of ventilation -- that would usually have been done in co-operation with the anaesthetist covering that place.

Q. So would there have been an anaesthetic registrar covering PICU?

A. Yes.

Q. Dr Webb has stated that there were no on-call neurology doctors other than the consultant, and the reference for that is WS138/2, page 6; is this correct?

A. That is correct. You would not have a neurology registrar. It would be expected to be covered by you as the registrar in the hospital.

Q. If I can bring up your witness statement, 142/1, page 17, question 24(a). Just at the bottom, you said:

"I covered the whole hospital with all the wards."

And you name all of the wards:

"I covered 120 paediatric patients who were all unwell or very unwell. This is a very vulnerable patient group whose condition can change quickly."

I'm aware that there are two SHOs covering between 5 pm and 10 pm; isn't that right?

A. That's correct, yes.

Q. And on that particular evening, there was a surgical SHO and then there was Dr Joanne Hughes, who was the paediatric SHO; isn't that correct?

A. Correct. If you look at the experience of both of those SHOs, they had been in paediatrics for six weeks. So the level of support that that would require of me would have been quite significant.

Q. Mm-hm. You sound concerned about that. Does that worry you, that fact?

A. It certainly was a worry because you had to depend on junior staff who were very inexperienced, and so you had to depend a lot on the experienced nursing staff to

support both the junior staff and you, by information provided to you, and also by advice to the junior staff, what would normally be done. But as a safety issue, it was always a big concern because, as I state in my witness statement, children who are admitted, who are staying in hospital, are unwell and children, when they are unwell, can become sick very quickly. So they are quite level and then they drop. As adults, we slowly go down a slide most of the time, so there is more time to actually intervene. But in children, if you miss the point, especially in very young children under two years, the timing of intervention can be essential, and covering so many people, so many children at that time, with the level of experience of the junior staff, was always worrying once you started your on call.

Q. And then after 10 pm, it was simply you and Dr Stewart covering, effectively, the whole hospital apart from A&E and PICU; is that right?

A. That is correct. Dr Stewart and I would cover the wards. I would also cover the emergency department. The emergency department junior doctor could have been a very inexperienced one, a six-week experienced like I stated for the other ones. The SHO who was on after 10 o'clock was a second-term SHO. By that I mean that he has done at least six months of paediatrics before.

Dr Stevenson also was the second-term SHO who worked with me in Musgrave Ward. So I knew how he worked and he knew how I worked. So that is very reassuring when you're on call.

Q. You said Dr Stevenson there. Was it not Dr Stewart?

A. Whoever was on after --

Q. Neil Stewart?

A. Apologies. Neil Stewart is who I'm talking about.

Q. I just wanted to check into the experience of Dr Stewart but I'll come back to that point.

If we can go to page 4 of your witness statement, 142/1. If we can bring that up by itself. You say at the very top:

"The registrar on call would be called for advice by the junior doctors to review children both on the wards and in the emergency department and for acute treatment of acutely unwell children. Crash calls and urgent review and treatment of children whose condition had seriously deteriorated were led by the registrar on call."

And:

"The children who were patients in the Children's Hospital are the most vulnerable and sick children in the province. Crash calls are therefore relatively frequent."

On call overnight, would you have the opportunity to visit every patient in the hospital during your shift?

A. I would not have the opportunity to visit every patient. My usual practice would be to go round the wards and ask the nursing staff, especially the senior nursing staff, and the junior doctor, about patients that they were concerned or worried about. I would also get a brief summary of the patients on the ward going through, saying patient A has a chest infection, patient B has this and patient C has this. So I would try to get an overall impression of the children on the ward, but sometimes it was not possible for me to go through all the wards before something happened that required my attention there and then.

THE CHAIRMAN: You would hope that a lot of children would be asleep and wouldn't need your attention at all, wouldn't you?

A. Unfortunately not, no. Children do not become sick between 9 and 5 and then sleep. And little children especially can easily be unsettled. I'm sure every mother in the audience can confirm that. So no, there is no definite expectation that children would be sleeping. But for stable patients, they will usually settle by 1, 2 o'clock.

MR REID: You say you would have found out about the

patients on the ward by asking the nurses, particularly the senior nurses, and the junior doctor on call. Would you look at the notes as well?

A. It depends on what concern or problems were raised by either nurses or the junior staff, but, yes, I would try to.

Q. Would it be fair to say then you're reliant quite heavily on the knowledge of the nursing staff and the junior doctors of the conditions and the seriousness of the conditions of the patients on the wards?

A. That is correct. When you do a handover at 5 o'clock, you get information from your colleagues about the patients on the ward, which would be quite brief, about the ones who are pretty straightforward, but you would get more information about patients who are complicated or where issues had not been clarified yet, where it was not quite clear what was going on. But throughout the night, I would have been very dependent on information feedback, both from nursing staff and junior staff to me.

Q. You're therefore looking at patients who are of concern to the nursing staff and the junior doctors, and reacting to crash calls?

A. Yes.

Q. Would you say generally that the on-call shift is a case

of firefighting, it's really responding to things as they happen?

A. There's no doubt that that's what it is, yes.

Q. If I can correct you, you said previously -- I think you had maybe mixed up Dr Stevenson with Dr Stewart. Dr Stewart was actually a first-term SHO. He was actually really quite junior. I think he'd only been an SHO for a matter of months at the time. You said earlier you were reassured, I think, by the fact that -- maybe you meant Dr Stevenson was an experienced SHO. Would it have been unusual for a junior SHO such as Dr Stewart to have been the on call SHO overnight?

A. No, it would not have been unusual, no. But the fact that he worked with me in Musgrave Ward made it easier for me because I knew his level of experience and I knew what I would have been happy for him to deal with.

Q. But would it be fair to say that as a very junior SHO you would have kept an eye on him in order to make sure that he was doing things properly?

A. I would have had to keep an eye on every junior doctor. That is part of the role of a registrar.

THE CHAIRMAN: If he is very junior, it adds to the weight on your shoulders because you can't be assured that somebody of limited experience can be left to look after certain patients when you go and look after others.

A. That is correct, yes.

MR REID: If I can bring up page 3 of your witness statement, please. It must be page 4. The quote I want isn't there. But the quote, I believe, is from one of your witness statements, that you recall the night was particularly busy -- sorry, if I can bring up Dr Stewart's witness statement at 141/3, question 4(b).

Just on the fourth paragraph:

"As I recall, that night was particularly busy for both Dr Bartholome and myself. Both of us spent the night moving quickly from one urgent case to another."

Do you have any recollection of whether that's correct or is that frankly just the usual course of events on the on call shift?

A. I have no recollection of that specific evening, but it would be the usual state of being on call at night. And considering that Dr Stewart only covered the ward, I would have the acute patients and problems from the emergency department as well.

Q. If I can go to page 14 of your witness statement, I'm going to ask you now just about the handovers from the daytime registrars. At 21(a):

"Dr Sands was the registrar allocated to Allen Ward for this period."

You're unable to state if he was the person who did

the handover to you regarding Claire that afternoon. Afterwards you say:

"At that time the handover was informal without any pro forma for a written handover. Notes were made by the individual doctors as they felt appropriate."

On call, you were in charge of all of the wards; isn't that correct?

A. That's correct.

Q. How many different registrars would you take handovers from?

A. I actually would have to look at the rota, how many registrars there were available. Usually it was a registrar in Musgrave Ward, a registrar in Paul Ward or an experienced doctor in Paul Ward, a registrar in Allen Ward, and as far as I can recall, these were the only definite registrars. And the other departments might have been covered either by the registrar or by the SHO. It depended a bit on the rota that the registrars and experienced SHOs were working.

Q. Can you remember anything about any handover from Dr Sands on that evening?

A. I cannot remember anything definite, no.

Q. So you don't know if one was done or was not done and you don't know what might have been said if one had been done?

A. From experience, I would have expected to get a handover from Dr Sands, especially seeing that a patient like Claire was so sick. But I cannot definitely recollect it, and that is why I answered the question as I did.

THE CHAIRMAN: I think we should establish at the start, doctor -- am I right in understanding from your statements that you do not actually recall this night?

A. That is correct.

THE CHAIRMAN: So you don't recall being called to intervene with Claire or you don't recall the events of that night at all?

A. No, I don't recall these events because I've been working in acute paediatrics since then, which is 16 years ago, and events like crash calls or unfortunately, death, are not uncommon in such a vulnerable group. And especially working in the emergency department, I think we would have had one of the highest numbers of these events. So no, I do not recall this specific child.

THE CHAIRMAN: So the evidence which you will give to us this morning is based on what appears in the notes and records, which were written either by yourself or by others, and also your best effort to reconstruct what you would expect that you would have done in a particular situation?

A. That is correct.

THE CHAIRMAN: Okay.

MR REID: Can I ask you then: what would you have expected Dr Sands to have told you at the handover going into the on call shift?

A. I would have expected Dr Sands to tell me that Claire had been admitted with a reduced level of consciousness, that at present it was not clear what was the cause of it, that she was treated for a possible cause of seizures with anti-epileptic medication and that Dr Webb, the neurology consultant, had seen her three times that afternoon and had devised a treatment plan. He also would have told me that she had been covered for a possible viral infection with an antiviral medication and acyclovir is the medication we use, and that she was covered with an antibiotic for possible bacterial infection of her brain.

Q. Would you have expected him to have told you about the differential diagnosis, "non-fitting status encephalitis/encephalopathy"?

A. The term encephalopathy means that something is not right with the brain and there are many different reasons. Infection is only one of them. There could have been, for example, toxic causes or electrolyte imbalances or trauma. So encephalopathy is very broad.

Encephalitis is quite specific, as one cause, for which she was treated with the antibiotics and the antivirals. And seizures -- and, in her case, non-fitting status -- would have been another recognised cause for encephalopathy.

Q. And if Dr Sands had told you the list of things that you said that you would have expected -- the reduced level of consciousness, the possible seizures, the anti-epileptic medication, the fact that Dr Webb had seen her three times -- would you have considered Claire to have been a patient of concern?

A. I would definitely have considered Claire to be a patient of concern, but I also would have been reassured by the fact that the consultant neurologist had devised a treatment plan after having reviewed her carefully three times throughout that afternoon.

Q. And would you have expected that you would have called in to see her at some point during the evening?

A. I have no doubt that I would have called in to see her and to check her observations with the nursing staff to see whether she was stable or whether there were any acute concerns. That would have been my usual practice with any patients who were that unwell.

Q. And would you have asked if there were any blood tests outstanding, for example?

A. I would have expected Dr Sands to tell me that.
Q. Would you have proactively asked him?
A. I honestly cannot remember that specific case, but in the handover, that would be part of the information that would be shared. For example, in Claire's case, he would have said that the phenytoin levels would be checked at that time and then I would have expected the result to be available for us throughout the night and to make sure that we would check that it was within the range expected.
Q. And in terms of plans that are to be put in place for the overnight period, is it your responsibility to know those things have to be done or is it your SHO's responsibility? For example, the phenytoin level.
A. It would have been the SHO's responsibility, I would say. I would have expected him to know that this is what he should do throughout the night.
Q. Can I just ask you briefly about what reference materials would have been available on the ward for registrars, consultants, SHOs? What textbooks were available for reference on the ward; can you recall?
A. I cannot recall what textbooks would have been available that night on that ward. But the big textbooks, for example, Forfar & Arneil -- which you quoted -- or Nelson, would certainly have been available in the

library. We would have the smaller textbooks, like the medical guidelines, on the ward somewhere.

Q. So would Forfar & Arneil or Nelson be on the ward trolley or available at the nursing station for example?

A. I would doubt it. Forfar & Arneil alone is a tome of 2000 pages and costs about, easily, £400 and --

THE CHAIRMAN: Where is the library?

A. The library would be on the first floor in the back of the hospital.

THE CHAIRMAN: Right. So within, what, a minute or two's walking distance? If you needed to refer to it, how long would it take you to get there?

A. Allen Ward is in the basement on the one side of the hospital and the library is on the first floor on the other side. So I would say walking alone would take about ten minutes, at least.

THE CHAIRMAN: Thank you.

MR REID: And in terms of the smaller textbooks, would the British National Formulary be available on the ward?

A. The BNF is always available on the ward. It is our Bible, so to speak, for medications, and to look up doses and how to make them up. That is always found on any of the wards in the hospital.

Q. And the Children's Hospital's paediatric prescriber, would it have been available on the ward?

A. As I said before, I cannot specifically recall that night, but I would have expected it to be available either in Allen Ward or in Musgrave Ward, and ideally in both. So if somebody was looking for it, they would know where to find it.

Q. Can I just ask you then about the actions of Dr Joanne Hughes? If I can bring up, just alongside each other, firstly on the left-hand side 090-026-075, please, then on the right-hand side, 090-026-073.

These are the drug kardexes, the prescription sheets for the intravenous drugs that Claire was receiving, both anticonvulsants, antibiotics and antiviral medicine. Dr Hughes says that she rewrote the kardex, and that's noted on the right-hand side, at 9.30 pm, in order to increase the prescription of the midazolam from 2 millilitres to 3 millilitres per hour.

A. Yes.

Q. Are you aware of that from your reading of the papers?

A. I'm aware of that from the reading of the papers, yes.

Q. Would Dr Hughes, as an SHO, have been able to vary the prescription of midazolam without the direction of a more senior colleague?

A. If I remember correctly, the instructions for the increase were given by Dr Webb in his treatment plan. But if that hadn't been the case -- but as far as

I recall it is in his treatment plan -- changes of medication of that importance in a child like Claire would have been discussed with me, if possible, I would say.

Q. I stand to be corrected by my learned friends, but I don't believe that the increase to 3 millilitres per hour is noted at any point by Dr Webb in his medical notes.

A. Apologies.

Q. I'll ask them the question again. Assuming the absence of such a note in Dr Webb's medical notes, could Dr Hughes, as an SHO, increase the dosage of midazolam from 2 millilitres per hour to 3 millilitres per hour?

A. I would have expected him to liaise with me in view of the fact that Claire was so unwell. As an infusion of an anti-epileptic medication, this would be quite unusual to be done on the ward in the first place, and Claire was not well and that was known to Dr Hughes and also to me.

Q. Am I correct in saying that midazolam was an unlicensed and off-label medication for this purpose? I'm not saying it's an incorrect medication, but at the time it was unlicensed and off-label for treating status epilepticus in children.

A. The problem with many drugs that we use in paediatrics

is that they are unlicensed. To get a licence, special trials have to be done, which take quite a while to confirm and many of the drug companies did not do that. So we used quite a lot of unlicensed medication and I don't think that the use of midazolam as an unlicensed medication would have caused any concern. It was known to be a medication that was effective to treat seizures and it had been prescribed by a consultant neurologist.

THE CHAIRMAN: What would be the purpose of her consulting with you before she increased the dose? Or why would you expect her to speak to you before she increased the dose?

A. I personally would say -- and I can only speak generally, not about this case -- that this girl had been on many anti-epileptic medications throughout the day, so having midazolam as an infusion and having received phenytoin or still getting it, were two very powerful medications for seizures. To change the dose that was received by Claire for either of one or the other is a decision that I would not expect a first-term SHO to make.

MR REID: So you either would have expected a direction for her to do that prior to her doing that, or for her to have contacted a senior colleague in order to authorise the increase of the dose?

A. I would expect that to have happened, yes.
Q. And would you have expected her to have noted in the medical notes themselves, the clinical notes, that she was increasing the dosage and rewriting the drug sheet?
A. I do not expect her to document that she rewrote the kardex, but I would have expected her to document in the notes that she liaised with a more senior colleague and that the decision to increase the infusion rate had been made by whoever that was.
Q. And would you have any comment about the fact that there is no note?
A. I personally think there should have been a note, and it is poor documentation that this was not done. It is something that I would expect not only to be dated, but also to be timed.
Q. And can I also ask you: what's the purpose of rewriting a kardex such as this if the dosage of midazolam was being increased?
A. I think one reason the kardex was rewritten was because the continuous medication slot on the left hand kardex was full, but also by changing the doses, she was trying -- and I am presuming this now because I haven't spoken to her about that -- to make it more clear to the nurses what they were supposed to give this young girl.
Q. Is it usual, whenever a dosage is changed, for the drug

kardex to be rewritten?

A. At that time, with the type of kardex that was used in 1996, we would have rewritten the kardex -- well, at least the medication, yes, because you're not allowed to change a dose by crossing it out, say, changing it from 3 to 5, without countersigning and then the whole kardex becomes so illegible that it becomes dangerous for the nurse and also, looking back on the medication given, you would not be able to say whether it was the lower dose or the higher dose that the child received. So it's a matter of safety. We would rewrite the medication on the kardex if the dose was changed.

Q. Because you can continue it on to the next page. If we bring up 076.

THE CHAIRMAN: Instead of 73?

MR REID: Yes. As you can see on the right-hand side, you can continue on with G, H, I, J, K, and so on.

A. Mm-hm.

Q. Even though the kardex is full, you could continue it on that second page; isn't that correct?

A. That is correct, but this is on the next page of the kardex, we would try within reason, unless a patient was on a lot of medication, to have it on the front side so that it's safer for the nurse to read and safer for the doctor, for example, to do a ward round, and review the

patients to see whether they're actually on.

Q. The "drugs once only" prescription area, which you can see on the bottom left, would you expect that to be transcribed across to the new version of the drugs kardex?

A. These prescriptions are once only prescriptions so I would not expect that to be transcribed because they had already been given or are supposed to have been given.

Q. The other thing that Dr Hughes did with the drugs is that she discontinued the sodium valproate. If we bring up 075 and 073 together, please. We can see, on the left-hand side, she's crossed through "sodium valproate" and she's signed it as the prescribing doctor and then initialled it as discontinued as well. And then it doesn't reappear on the rewritten drugs kardex.

Again, as with the midazolam, would you have expected the decision to discontinue to have either been from the direction of a senior colleague or to be checked with a senior colleague?

A. I would have expected that to be checked or at least be discussed with a senior colleague, because again sodium valproate is an anti-epileptic medication the use of sodium valproate was very unusual at that time and

actually is not being done any more now. I don't know when that practice changed, but it certainly would not have been something that I would have been used to as treatment.

Q. Finally on the medication, if I just direct you to the cefotaxime on either of the kardexes. Would you agree that the cefotaxime is ticked at the 9.30 pm slot?

A. Could you enlarge that a bit for me, please?

Q. Enlarge the left-hand side, please.

A. I just need the time bit.

Q. Thank you. You can see the third line:

"C: cefotaxime, 600 milligrams, 8.30 am, 12.30 pm, 5.30 pm, 9.30 pm."

A. That's correct.

Q. Would I be right in saying that's the direction or the times at which the drug is to be administered?

A. Yes.

Q. So you would expect that it would be administered at 9.30 pm?

A. About that time, yes.

Q. And the same is on the rewritten sheet. If we turn to the actual prescription sheet at 090-026-077. We can see at 5.30 there's a "C" and initials by Joanne Hughes that cefotaxime is given in accordance with the direction.

A. Yes. I can see that.
Q. At 9.30, can you see there seems to be a "D" and an "A" and then two different initials?
A. Yes, I can see that.
Q. Would you agree that the cefotaxime, the C, isn't present at 9.30 pm?
A. Yes, I cannot see it on that page.
Q. And in fact, it's at the "other time" section on the right-hand side, given at 11.20 pm. That's signed by Lorraine McCann, nurse; would you agree with that? Just on the right-hand side.
A. I can certainly see the time. I can't clearly identify whose signature that is.
Q. Staff Nurse McCann has confirmed that that is her signature. You accept then that cefotaxime was given at 5.30 pm and 11.20 pm?
A. Yes, that is according to the kardex.
Q. And the direction was for it to be given at 9.30 pm?
A. That's what it says, yes.
Q. Would you have then expected it to have been administered at 9.30 pm?
A. I would have expect it had to have been administered at 9.30 -- 5 pm.
Q. Would you have any comment about the fact that it wasn't administered until almost two hours later?

A. The IV antibiotics after the first dose were given -- were given by the nursing staff, so I would assume, but I cannot say for definite, that they were busy and did only go round doing the IV medications at that time. Because medication that was given by nursing staff always had to be counterchecked by another nurse. So you needed two nurses to be free to do that. And if there was only one nurse available, she would not have been able to give that medication without checking.

Q. As you're aware now, one of the differential diagnoses was encephalitis, and that was being covered by Dr Webb with the cefotaxime, the antibiotic, and the acyclovir, the antiviral. Would you have any concern about the fact that the antibiotic was delayed by that period of time?

A. I would not have any significant concerns, no. Of course it would have been better to give it every six hours as requested, but one hour or, in this case two hours' delay, I don't think would have made any significant difference in the treatment effect.

Q. If I can bring you to a different topic. If I can bring up reference 090-042-144, please. This is the "Record of attacks observed" sheet, which is filled in by the nurses; isn't that right?

A. Yes.

Q. Generally filled in by nurses.
A. The top one was filled in by the mother.
Q. Yes, that's correct. You can see at 7.15 pm, there was an "episode of teeth clenching" and "groaned", "duration 1 minute, state of afterwards: asleep". Would you have expected a doctor to have been informed of that particular episode?
A. I would have expected a doctor to be informed, yes, because Claire was on such a number of anti-epileptic medications that having a fit, in spite of all this, would have been of concern.
Q. And which doctor would that have been? Who would be the first point of call?
A. The first point of call would be the junior doctor and they would contact the more senior one.
Q. And would you have expected a junior doctor to have contacted a more senior colleague if they had been made aware of the 7.15 episode?
A. I cannot definitely answer that because they were made aware of it, but it was only a duration of one minute and I do not feel what they thought about this incident themselves, so I cannot answer that question.
Q. Well, maybe I can ask you about the 9 pm episode. The 9 pm episode says:

"Episode of screaming and drawing up of arms. Pulse

rate increased to 165 bpm. Pupils large, but reacting to light. Doctor informed. Duration: 30 seconds. State afterwards: asleep. Initials, Lorraine McCann."

You have stated in your witness statement that you don't recollect being informed; is that correct?

A. I do not recollect the events of the evening or that night.

Q. Again, who would you have expected to be informed of that particular episode?

A. I would expect at least the junior doctor to be informed of that event.

THE CHAIRMAN: You don't recall that night, doctor, but let us suppose that you had been informed and, in particular, at 9 o'clock. How would the records look differently if you had been informed?

A. If I had been informed of that, and I have to go by my usual working practice, I have no doubt that I would have tried my best to see Claire, and that would have been documented by the nurse. It would not have been "seen by doctor", but it would have been written as "seen by registrar" and there would have been a note in the chart about my assessment about Claire at that time.

THE CHAIRMAN: So apart from the fact that the nurse would record you going to see Claire if you had done so, then you would have expected to make an entry yourself in the

records?

A. If I had seen her, yes, I would have done.

THE CHAIRMAN: Okay.

MR REID: If we can bring up Dr Hughes' witness statement at 140/1, page 27, and also page 28 alongside it, please.

We asked Dr Hughes a similar question, if she or any other member of the medical staff witnessed the seizure. She said she didn't recall witnessing the seizure and therefore she cannot comment on who else may have witnessed it. She does not recall being contacted about the seizure and does not recall whether Dr Webb was made aware of the seizure as well.

Apart from yourself and Dr Hughes, who else would have been available that could have been informed by nursing staff?

A. According to the rota and according to our unusual working practices, we would have been the two doctors available to be contacted by the nursing staff. None of the others. The only other doctor in the hospital at that time on the floor, so to speak, was the surgical SHO, and he certainly would not have been informed of a seizure happening on the medical side.

Q. I have to ask you: is it possible that it could have been you who was informed, but simply that you do not recall it?

A. I do not recall the events from 16 years ago, so I do not think I can -- I'm in this sort of -- answer these questions according to your question.
Q. But it's possible that either you or Dr Hughes could have been informed, but simply that neither of you recall actually being informed at this stage?
A. It happened 16 years ago, so I'm unable to clearly answer your question. I can only state that we were the only two doctors in the hospital who I would have expected to be informed at that time.
Q. You said what you would have expected you would have done, if you had been informed. If it was another doctor, say a junior doctor, what would you have expected them to have done if they had been informed by the nursing staff of this episode?
A. It depends on the experience of the junior doctor, so I cannot speak for a colleague of mine. I think that would not be fair because it depends on whether they had experience of seizure, whether they were aware of all the medication, and especially the effect of the medications, which was expected.
Q. Can I ask you, would you have expected them to have examined Claire and attended?
A. When you're only one junior doctor covering the medical wards, you are usually very busy, and especially at that

night in the October time we have a lot of medical patients on the wards, so I cannot comment on the list of things that Dr Hughes had to do at that period of time. But yes, I would have expected her, had she been free, to have seen Claire or at least have attempted to see Claire later. But she went off at 10 o'clock.

THE CHAIRMAN: Can I take you back to the handover, which you would have expected to have received from Dr Sands at about 5 pm? Do you expect that Dr Hughes would have been with you for that handover?

A. As far as I recall from the rota -- but please check that for me -- Dr Hughes was actually working in Allen Ward. So I do not know whether she would have been there but she certainly would have been aware of that patient. I have no doubt about that.

THE CHAIRMAN: You see, the reason I'm asking you is this. You have said that reconstructing events as best you can from the records which you've seen and from your own practice, you expected you would have understood from a handover at about 5 pm that Claire was a patient of some concern and was therefore somebody who -- there might be other patients who would be less likely to concern you during the night, but Claire was one of the patients who would have to be looked at more closely. So if you had been aware at 9 pm that a seizure had been

recorded, that is something which, in all probability, you would have responded to because she was a patient of concern who had now had a seizure?

A. I have no doubt that I would have responded to that, yes.

THE CHAIRMAN: And what I'm trying to understand is whether Dr Hughes would have had the same level of understanding that Claire was a patient of concern. But that depends on whether she was with you at the handover or whether she already knew, from working in Allen Ward, what Claire's general condition was.

A. I have no doubt that Dr Hughes was aware that Claire was a patient that we were especially concerned about. Whether that was from the handover or from the fact that she worked there, I have no doubt that she would have been aware of that.

MR REID: I just have to correct you on that point, doctor. If I can bring up witness statement 140/1, page 2. This is Dr Hughes' witness statement:

"State the times at which you were on duty."

Well, first of all, at the top, question 1, she says:

"[She] was an SHO based in Musgrave Ward."

Which was your ward.

A. Sorry about that, yes.

Q. And at the bottom:

"State whether you were present in the hospital."

She says on the 21st October she was present 9 to 5 in Musgrave Ward, just to correct you on the fact that she might have been in Allen Ward.

THE CHAIRMAN: Let's bring her into the 22nd. Where was she on the 22nd?

MR REID: She doesn't say it particularly there, but she does say that generally she was based on Musgrave Ward.

THE CHAIRMAN: If you look at (ii), just below where it is highlighted:

"Present 9 am to 10 pm, 22 October. On duty in Musgrave until 5 pm. On call throughout the hospital from 5 to 10."

So since Claire was in Allen Ward and Dr Hughes had been working on Musgrave Ward until 5 pm on Tuesday the 22nd, that's really why I was asking you, would you expect her to be with you at the handover from Dr Sands from Allen Ward at 5 pm, or what would have been the practice?

A. The practice would have been that you would try to have the night team going together to get the handover, but that practically might not have been possible.

THE CHAIRMAN: Yes. She wouldn't need a handover from Musgrave Ward because she had been working on

Musgrave Ward.

A. That is right.

THE CHAIRMAN: The only wards that she would need a handover from would be Allen Ward and Paul Ward; is that right?

A. No, she would have been working or looking after patients from Allen Ward, Paul Ward, haematology, and Clarke Clinic as well.

THE CHAIRMAN: Okay.

MR REID: I asked you whether you would have expected another doctor who had been informed of this episode, whether they would have attended and examined Claire. Would you have expected them to make a note in the clinical notes of the fact that they had been informed of this episode?

A. I would have expected them to document that they have been informed and that, as a result of that, they had come to see Claire and had a look at her.

Q. And would you have expected them to have consulted a senior colleague such as yourself?

A. Yes.

Q. Just for the record, that's also the opinion of the inquiry's expert paediatrician, Dr Scott-Jupp, which is at 234-002-008.

What we do know is, as I've brought you to before, is that Dr Hughes did attend to rewrite the drugs kardex

at 9.30 pm. Dr Hughes is there rewriting the drugs prescription sheet; would you have expected her, when she was there at 9.30, changing the medication, to have re-examined Claire?

A. Seeing that she was on the ward and actually dealing with something that affected Claire, she was rewriting her kardex, so that would usually be done at the bedside or close to that. Yes, I would have expected her to have a look at Claire and examine her and document that.

THE CHAIRMAN: Because you would not rewrite the drugs without knowing the state of the patient and the state of the patient would include the fact that there was a seizure at 9 pm.

A. You could rewrite the drug kardex without knowing the state of the patient at the nurse's desk, but the fact that she had a seizure shortly before would have been reason enough to actually go and have a look at the patient too.

MR REID: If we can bring up 090-039-137. This is the central nervous system observation chart. The top third is her Glasgow Coma Scale scores. At 9 pm, her score had fallen from 8 to 6. Would you have expected to have been contacted by nursing staff about the drop in the GCS score from 8 to 6?

A. Seeing that Claire had actually been quite stable -- by

that I mean her Glasgow Coma Scale had been between 7 and 8 -- I think I would have expected to have been contacted because she was a patient of concern, she had received a lot of medication, and in spite of all that her Glasgow Coma Scale was going down.

Q. Then in and around 9.30 pm, you may be aware that Claire's parents left for the night. At your witness statement, 142/2, page 9, 12(b), I think you said it's an assumption:

"I assume that at least one family member was with Claire throughout the night. She was very sick."

If you had been told about Claire and that her parents were leaving at around 9.30 pm and had been allowed to leave by medical and nursing staff, what would you have expected you would have done?

A. I personally would have been surprised at the fact that they left Claire, seeing that she had been so unwell all day. She had been admitted more than 24 hours before, being very unwell, being vacant and not responding to voice is something that you would not expect of a girl of her age. And this really had not improved, if anything it had got worse in spite of the frequent attendance of doctors and in spite of much medication being given to her. And parents generally have a very good feeling about their child, it is one of the basic

rules of paediatrics that parents are right about their child until very clearly proven otherwise. So I would have been surprised at the fact that they left her being like that.

Q. And who should have known about the seriousness of Claire's condition within the overnight team?

A. I would have expected everybody to know about the seriousness of Claire's condition. There's no doubt she was the sickest patient on the ward at that time.

Q. So yourself, your junior house officer and the nursing staff?

A. That is correct, yes.

Q. And would you have expected the on-call paediatrician to have known about the seriousness of Claire's condition?

A. I am not aware of what Dr Sands had actually told the on-call paediatrician and I'm also not aware -- I have not been able to get the information who that actually was. But the fact that she had been seen three times by a consultant neurology colleague would certainly indicate to that person that Claire was not well and that a lot of treatment was ongoing.

Q. If I can then bring you to the serum sodium result at 11.30 pm. If we can bring up 090-022-056. This is Dr Neil Stewart's, your SHO's, note. The note reads:

"22 October 1996. 11.30 pm. Sodium 121. Potassium

3.3. Urea 2.9. Creatine 33."

There's a phenytoin level there as well. Then he's writing:

"Hyponatraemic, query fluid overload with low-sodium fluids, query SIADH. Impression: query need for increased sodium content in fluids. Discuss with registrar."

I'll come to the rest of it in a moment.

Dr Stewart contacts you about this result; isn't that correct?

A. Yes, that is correct. And it is documented by him.

Q. Would this have been, apart from the handover, your first knowledge of how Claire had been over the evening?

A. From my experience and practice I would say that I had known about that before and that I had at least been told by other people before 11.30 that Claire had -- about the state of Claire and how she had been because I would have been in the hospital at that stage for more than five hours.

Q. And how did Dr Stewart contact you, would it have been face-to-face, would it have been telephone, would it have been pager? What would be the usual practice?

A. It depends on how busy I was. The most common way to be contacted as a registrar on call would have been by pager and I replied then by telephone. Or if I were

busy doing something else, a nurse would reply, would liaise the problem or the issue to me and I would try to reply as soon as possible to speak to the doctor.

Q. How would Dr Stewart commonly have found out about the sodium result? I know I'm asking you what Dr Stewart would have known, but how would doctors be made aware on the ward of blood results? Is it a nurse comes up to them or is it routine checks by them?

A. The blood that was taken from Claire was not a routine blood test, it was an emergency blood test, so it would have been phoned to the lab as an emergency sample to be expected. They would do the test and we would expect the result back within 90 minutes, sort of two hours at the most. So either the nursing staff or the doctor would check that result because it was sent as an urgent sample and it was important to see both what the electrolytes were and what the phenytoin level was. So it could have been either a member of the nursing staff or the doctor who checked the result. The result would have been available on the screen.

Q. What's your basis for saying it was an urgent sample?

A. Any blood sample that's taken out of normal working hours is an urgent specimen. Generally, the bloods taken in paediatrics are treated as urgent specimens and not as normal ones. That would certainly be our

practice now.

Q. I think you said that urgent blood samples would be brought to the attention of the senior house officers on the ward; is that right?

A. The results. They would expect a result and either the junior house officer or the nursing staff would check for the result and then be able to read it on the screen.

Q. Do you have any recollection of the telephone conversation that you had with Dr Stewart?

A. No, I do not.

Q. What would you have expected him to have told you over the phone about Claire?

A. It is a lot of speculation and I will try to answer it to the best of my experience. But I would have expected him to tell me that Claire had not improved, that her Glasgow Coma Scale had fallen, and that her electrolyte result was very abnormal, especially the sodium was 121, which was very concerning.

Q. Would you have expected him to have told you about previous diagnoses in the medical notes, for example the "non-fitting status, encephalitis/encephalopathy"?

A. I would have expected to know that myself without him telling it to me again.

THE CHAIRMAN: From the handover?

A. Yes.

MR REID: You had over 100 patients to look after that night. Would you have been able to recall the condition of each of them?

A. No, I would not, but I would recall the condition of the ones that we were concerned about and that our colleagues throughout the day asked us to keep a special eye on, and Claire, no doubt, would have been one of them.

Q. Would you agree that everything up to the point "discussed with reg" would be concerns of Dr Stewart rather than yourself? Let me rephrase. Dr Stewart has written:

"Hyponatraemic query fluid overload with low-sodium fluids and query SIADH."

Would you have expected either of those to have come to yourself or would you expect those to have just been Dr Stewart's thoughts on the matter?

A. I will answer about SIADH first. SIADH is a condition that is very common in children who have serious illnesses like meningitis, encephalitis or seizures which do not settle. So Claire had at least three reasons to develop this condition. And the low-sodium fluid contribution, it is something that -- I'm not sure whether I would have expected Dr Stewart to be aware of,

but he certainly would have mentioned it to me.
Q. As is recorded by Dr Stewart, after discussing with yourself, the decision was taken to reduce fluids to two-thirds of the present value, which was 41 millilitres per hour. That's what is recorded; isn't that correct?
A. That's correct.
Q. And you believe that was your direction?
A. The reduction of fluids to two-thirds of normal in a child with low sodium, the treatment at that time was reduction to two-thirds, yes. I agree with that treatment recorded by him.
Q. You don't consider you should have reduced the IV fluids any further, more than two thirds?
A. It is difficult to answer that question without hindsight and without all the experience and all the sort of information that has been passed on since then, so I do not think I can answer this question looking back 16 years from now. I certainly can say one of the paediatric textbooks that you photocopied -- I think it is the Forfar & Arneil -- states that the treatment for low sodium is reduction to two-thirds of normal. I'm sorry, I can't recall the special page, but it does say in that text.
Q. We'll check that during the upcoming break.

First of all, if I can bring you to the inquiry's experts on the matter. If I can bring up 234-002-008. Dr Scott-Jupp says at (b):

"Was the action following receipt of the result of serum sodium 121 appropriate? It appears the SHO received telephone advice from the registrar and was advised to restrict the fluids further. As above, I believe that the registrar should have re-examined the child with such a rapid fall in serum sodium without any other cause. I believe that more severe fluid restriction should have been imposed at that point. Even if there had within no ongoing losses through copious vomiting or diarrhoea, she had already received a reasonable volume of fluid in a day and it may have been appropriate to stop IV fluids completely. The usual advice is to allow the serum sodium to rise by no more than 2 millimoles per litre per hour, the maximum safe rate. Also, once hyponatraemia had been diagnosed, it would have been advisable to check simultaneous urine and blood osmolality."

You did advise a check on the urine osmolality; is that correct?

A. Yes, I did.

Q. We'll go to fluid restriction in a moment. Would there have been any benefit in checking the blood osmolality

as well?

A. The most important test that I required to make further decisions was the urine osmolality, but it would have been possible to check the blood osmolality as well.

Q. Would you have considered a repeat serum sodium test a priority as well?

A. I would have repeated the sodium test within a few hours to see where our treatment was going.

Q. I think you said that the lead time from the urgent blood sample would have been 1 to 2 hours. So the result really is from 1 to 2 hours ago. Would you not have considered that perhaps some time had moved on since the last sodium result?

A. I do not think I can definitely answer these questions because we had not actually changed the fluid management of that girl. So taking bloods off a child is always something that requires a good reason. Looking back on it, I have no doubt that I would have repeated the electrolytes much quicker now than I would have done then.

Q. What comment would you have about Dr Scott-Jupp's opinion that:

"More severe fluid restrictions should have been imposed and it may have been appropriate even to stop IV fluids completely"?

What comment would you have about Dr Scott-Jupp's comment?

A. If you could clarify what kind of comment you're looking for.

Q. Dr Scott-Jupp says he thinks it appropriate that fluid restriction should have been more severe, more than two-thirds of the maintenance rate, and in fact it may have been appropriate to stop the IV fluids completely. Your position obviously was that at the time it was appropriate for the two-thirds rate. What would you have to say about the difference of opinion between yourself and Dr Scott-up?

A. I can only say that I did the treatment that I knew was correct for hyponatraemia at that time. Looking back on it again with hindsight, you could have stopped the fluids at that time.

THE CHAIRMAN: But you think, subject to checking, that Forfar & Arneil would be, at that time, consistent with the step which you directed?

A. Yes, I would consider that because, as Scott-Jupp also states in his statement, the correction of sodium done too quickly can have serious consequences. The consequence of changing sodium too quickly is a condition we call pontine demyelination, which basically means that part of the brainstem which

contains the basic commands of the brain to the body -- like breathing or adapting the heart rate, all these kind of things -- dissolve and that is a very serious complication that you try to avoid.

MR GREEN: Sir, in the interests of fairness, perhaps the observation should be made that not only is there a conflict between Dr Bartholome and Dr Scott-Jupp on this point, there's actually a conflict between the experts on this point. Because Dr Neville, at 232-002-011, indicated at (b) -- if we move in the answer three lines down:

"However, I would have expected the registrar/consultant to have acted on the assumption of cerebral oedema by restricting fluid intake to 2/3 of normal requirements ..."

I just thought in the interests of balance --

THE CHAIRMAN: Yes. That's fine. While we're there, Mr Green we'll read on to the end of the sentence. Yes, there is an issue about whether the witness's position is correct and she does have some support from at least one of the experts, and perhaps from the textbook. But that isn't the only concern about what was or was not done at about 11 o'clock.

MR GREEN: Absolutely right, but it was just on that particular point where my learned friend, quite

properly, put the inconsistency of view between Dr Scott-Jupp and Dr Bartholome, I thought, in the interests of balance, I ought to raise the view of Dr Neville.

THE CHAIRMAN: Thank you.

MR REID: I'd like to thank my learned friend.

MR QUINN: Can I just make one point here very quickly? The parents were concerned about this and we did write to the inquiry team about this point. If I can ask to bring up the timeline document, which is 310-016-001.

I just ask my learned friend if he's going to refer at this time to the spike in the overall fluids, that is in relation to the midazolam infusion as well as -- so what I'm asking is: could the witness be questioned on the point of an overall reduction, not only just the two-thirds on the 20 per cent solution, but also in the infusion reduction as well? Because we actually asked for that infusion spike to be placed on top of the line graph so that it shows the true fluid intake, not just the IV intake in relation to the 20 per cent fluids.

MR REID: Mr Chairman, I intended to move to that point later. I certainly will and it is noted.

THE CHAIRMAN: There's a number of points to make from the 11.30 intervention.

MR REID: That's correct.

Just in terms of the Professor Neville note, if we can bring up 232-002-011. I did intend to put this to the doctor. My learned friend's point is correct. However, as you pointed out, Mr Chairman, the end of the paragraph says:

"... to avoid further water overload, which might contribute to cerebral oedema, by inducing a diuresis by mannitol or furosemide/frusemide and ventilating her to reduce her partial pressure of carbon dioxide to reduce intracranial pressure."

So Professor Neville there is offering up two other possible things that could have been done: the administration of mannitol to induce diuresis and ventilation to reduce the partial pressure of CO2. Would you have considered either of those options appropriate? That's at the receipt of the serum sodium result at 11.30.

A. I cannot comment on that specific serum result because I do not remember the events of that night. But it certainly is not documented by the advice that Dr Stewart documents, that I talked about that to him at that time.

THE CHAIRMAN: I think, doctor, there are different elements to what happened at 11.30, but a common view seems to be that you should have seen Claire at 11.30. As

I understand it, what happened is -- correct me if I'm wrong -- the records seem to suggest that you didn't actually see her, but you spoke to Dr Stewart and Dr Stewart, having spoken with you, then reduced the volume of the fluid. Some of the other criticisms seem to be based on the notion that since Claire was a patient of concern, as that phrase has been used this morning, and since you were given information by Dr Stewart at about 11.30, which was very disturbing, that that should have prompted you to physically see Claire yourself rather than just discuss her condition with Dr Stewart on the phone. What would you say to that?

A. From my usual working practice, I have no doubt that I intended to see her and I tried to reconstruct what had been happening throughout that night to say for definite why I didn't do that. I have been unable to do so because of lack of specific information for that night. But I would not have left Claire without seeing her, I have no doubt about that, and it is very regrettable and I'm very sorry about the fact that I didn't do it that time, but I have no doubt that it wasn't for lack of trying.

THE CHAIRMAN: It depends who else and with so many patients -- are you saying it's really quite impossible

to track down what other patients you were with?
A. That's what I was trying to find out, yes. Because as I stated before, Claire was a patient of concern, she was on a lot of medication and she had actually not only not responded, but deteriorated on the attempts of our treatment. So I have no doubt that I would have tried to see her as soon as possible.
THE CHAIRMAN: Well, accepting that, and you've acknowledged that, if you were under that level of pressure then that leads on to another point about whether, if you didn't see Claire, you must have been with a patient who was causing a similar level of concern.
A. Yes.
THE CHAIRMAN: But in that situation, when you're under so much pressure, is that not the point where you call in the consultant because you have at least one patient who's causing great concern, possibly a second patient who you might be working with, and that's a scenario in which the intervention or the contribution of a consultant, at least by phone if not bringing the consultant in, would be appropriate?
A. It would have been appropriate, but having said that, it was not unusual to have several patients who are acutely unwell and who required acute attention. The only thing I can say now, looking back, especially on Claire's

outcome, is that I should have been much quicker in contacting a consultant about advice or assistance for that girl.

THE CHAIRMAN: It's a little bit off the point, but can I ask you: was the issue about the extent of the available cover by registrars, consultants, was that an ongoing issue within the Children's Hospital in the mid-1990s?

A. Yes.

THE CHAIRMAN: Because from what you said earlier on, unhappily it was not unusual for you to be under great pressure at night and it wasn't, in fact, unusual for children to die during the night. It didn't happen all the time obviously, but it did happen from time to time. Was this an issue with management in the mid-1990s that there was not enough cover?

A. I would have to affirm, yes, it was an issue with management. Nowadays, we have about 90 beds and we have three registrars doing the job that I did then or my colleagues did then.

THE CHAIRMAN: So you have three times the number of registrars for a slightly smaller number of patients?

A. Yes, that is 20 -- even 25 less patients, which is quite significant.

THE CHAIRMAN: And does that mean that the night cover is --

it's not easy, but it's less, considerably less, stressful than it was 16 years ago?

A. Yes.

THE CHAIRMAN: I'm sorry to take away from these points, which we'll have to go back to, but when did the move to three registrars take place?

A. I would have to look that up. I honestly don't know.

THE CHAIRMAN: Was it gradual, going from one registrar to two and then from two to three? Do you remember? Was it done in one move?

A. I honestly cannot remember. I would have to check the timeline of that development with management.

THE CHAIRMAN: Okay. I'm sorry, I've gone a bit off-track. Let's go back to the 11.30 issues if we can.

MR REID: We referred to Forfar & Arneil, and we'll look at that during the break. The other textbook, Nelson -- if I can refer to 311-018-009. It's quite small so we'll have to find the relevant sections. If we start with the hyponatraemia, which is in bold letters there. There's a section which says:

"With water overload, fluid restriction is the appropriate measure."

Which is what you did:

"The serum sodium level may return rapidly to normal if there is good renal function, but this may take

several days or weeks for patients with SIADH. Adding extra salt to the diet or increasing the sodium concentration of parenterally administered fluid often corrects a sodium deficit."

Would you accept that Nelson is saying there that restriction of fluids is appropriate in patients without SIADH, but with patients who have SIADH the sodium level might take quite a period of time to correct with simple fluid restriction?

A. I have no doubt Claire had SIADH. As I explained earlier, she had at least three good causes to have it. As I also explained earlier on, correction too quickly can be dangerous, so I would have aimed for a correction of 2 millimoles per hour, roughly. The fluid restriction would have been the first step in that direction.

Q. But you accept that it's more difficult to correct the serum sodium level in a patient who has SIADH compared to a patient who does not have SIADH?

A. I would read this text as: you have to do it very slowly in patients with SIADH because you do not want to cause pontine demyelination.

Q. If we look further on down to the next paragraph:

"Measuring urinary sodium concentration helps determine the caution of hyponatraemia."

And later on it says:

"Correction requires administration of isotonic saline."

And solution No. 18 is not an isotonic saline.

A. Yes.

Q. Would you accept that the textbook, Nelson, is saying there that correction of hyponatraemia requires administration of isotonic saline?

A. The important point of this paragraph is that the sodium concentration usually exceeds 20 millimoles per litre. I had asked for the test to be done and I was awaiting the result to see whether the hyponatraemia was definitely caused by SIADH or whether there was another reason, but I did not receive the test. Going through the chart, I have never actually been able to find out if it has actually been performed.

Q. Yes, there's no result in the documentation for the osmolality test; isn't that right?

A. Yes. Having been a test done at night, I would have expected the result to back within an hour, an hour-and-a-half, because it would have been treated like a normal blood sample in the speed of processing. So within an hour, an hour-and-a-half, I would have had this information and that would have guided me more towards the cause of the hyponatraemia.

Q. If I can sum up, doctor, are you effectively saying that you would have been able to correct the hyponatraemia, but you simply didn't have the time for the results or for the actions you were taking to take place and correct what was going on, and you simply didn't have time as well then to attend Claire and examine her for yourself? If you'd had more time then something else might have happened?

A. If I come to the second part of your statement first, I would have seen Claire and examined her -- I have no doubt about that -- if I'd had the time to do so. The first part of your statement, I would have corrected the hyponatraemia, yes, I would have done that, but I needed to know whether it was caused by SIADH or if there was another reason for that, and for that I needed the result of the urine osmolality, which I did not have at that time.

MR REID: This might be a convenient time for a break, Mr Chairman.

THE CHAIRMAN: Yes. We'll break for 15 minutes, thank you.

(11.38 am)

(A short break)

(11.55 am)

MR REID: Mr Chairman, if I can refer to reference 311-018, page 13.

Doctor, I had asked you to look during the break at the text that you were referring to. I believe it was Nelson you were referring to rather than Forfar & Arneil; is that correct?

A. I showed you the paragraph.

Q. At page 13, this is the chapter in Nelson on inappropriate secretion of ADH, SIADH. If we can turn over the page to page 14, if we can zoom in on the treatment section, please. It says:

"Suggested treatment for SIADH. Successful treatment of the underlying disorder is followed by spontaneous remission. Immediate management of the hyponatraemia consists simply of restriction of fluids. Sodium should be made available to replace the sodium lost. Hypertonic saline solution is usually of little benefit because even large sodium loads are excreted in the urine."

Is that the section that you were referring to?

A. That's the section I referred to, yes.

Q. But you have said that if you got back a result of the urine osmolality that had shown SIADH, you might have thought about a different approach, a different treatment.

A. Yes, I certainly would have done more than just fluid restriction.

Q. And you might have considered using hypotonic fluids, mannitol, something like that?
A. Yes.
Q. Another question arose from one of my learned friends during the break. If I can refer to page 090-022-055. This is the note of the final attendance by Dr Webb at 5 o'clock on the 22nd October. Just at the bottom, "Plan number 2", it says:

"Check viral cultures. Query enterovirus. Stool, urine, blood, T/S."

There was a blood sample taken later on -- you said it was an urgent sample -- for electrolytes and to check the phenytoin level, and that's the result that came back at 11.30. Do you know why there was any delay or whether there was any delay in doing those blood tests that were requested by Dr Webb at 5 o'clock?
A. If you look at my witness statement -- and I'm sorry, I don't quite know the page, but you have to take phenytoin levels about six hours after the infusion or the bolus has been given, so the timing of that blood test was about six hours after the fluid had been given so that the phenytoin level would have been accessible and appropriate. If you do the blood specimen too early, it is not relevant, because the level you get then might continue to go down. And if do you it too

late, then you might get a level, but Dr Webb tried to get the level as soon as possible.

Q. So the blood test that came back at 11.30 was for the phenytoin level, a routine check to see what the phenytoin level was it -- was it -- I'm sorry --

A. No, it was not a routine test because it was important that the level of phenytoin that was given was appropriate and reached the level that we expected.

Q. I didn't finish what I was going to say. Was it routine that U&Es were done at the same time as the phenytoin level was checked?

A. Phenytoin levels are rarely checked acutely because the infusion of phenytoin itself is unusual, but when you do drug levels, it would be routine that we do electrolytes at the same time because it involves only one venipuncture.

Q. Do you think that that blood sample that was taken for the phenytoin levels and, coincidentally, for the U&Es reflected the request by Dr Webb at 5 o'clock or do you think that was simply checking the phenytoin level as was required?

A. Clinically, it would be accepted practice and also required practice to check the phenytoin level after a phenytoin infusion to make see that you're on the right way. Phenytoin is medication that has a very

narrow window for the treatment. If you give too little and the level is low, it doesn't do anything. So you cannot expect the treatment effect, ie helping to control the seizures, to happen. If you give too much, the toxic evidence or the toxic side effects rise. It's a primary exponential curve and you only have a narrow window which you're aiming for, so it is essential to check the level to make sure you are not too high because then the toxicity would be worse than the treatment effect. And as I said before, if it is too low, you would not expect the treatment to work.

Q. Can I ask you two questions arising from that? Firstly, do you know then if any blood sample was taken as a result of Dr Webb's request there in front of you at 090-022-055? Do you know if that was done at all?

A. Which blood tests are you referring to, please?

Q. "Check viral cultures, query enterovirus, stool, urine bloods and T/S."

A. I cannot say whether that was taken as part of this blood sample. Certainly stool and urine is a specimen that is being taken by the nurses and I do not know whether Dr Stewart did the viral cultures. But the viral cultures would only come back about 48 hours or later after the blood test had been taken. So even if you hadn't taken it at that time, I do not think that

it would have influenced the treatment and the attempt to control the seizures that we were doing that night.

Q. You were talking about the phenytoin levels.

If we bring up 090-022-056. We can see that the phenytoin level at 11.30 pm was 23.4 milligrams per litre, and in brackets it says "10 to 20". Would I be correct in saying that 10 to 20 is the advised range for the phenytoin levels?

A. Yes, 10 to 20 would be the level we're aiming for, but the fact that it was 23 would not -- if anything, it showed us that the phenytoin was well within the range, slightly higher than expected, and we were really looking for the level to be appropriate to have a treatment effect. So the main cause of the blood sample was to exclude that it was too low at that stage.

MR McCREA: Mr Chairman, the blood was actually taken at 9.30, so the phenytoin level is measured at 9.30 rather than at 11.30.

A. Yes.

THE CHAIRMAN: So what's in the note at 11.30 is the result of the test at 9.30?

MR McCREA: Yes.

MR REID: I believe that is correct.

The phenytoin level was just above the normal range. Would you have expected any adverse effects of it being

above the normal range of 10 to 20?

A. At the level of 23, no, I would not have expected any adverse effects as a cause of that.

Q. If I can bring up 090-038-135. We can see there in the column "oral", it's written:

"Phenytoin. 110."

The phenytoin is written at 2300 hours and then the number "110" is written at 2400 hours. In the nursing note then, at 090-040-138, we can see:

"11pm. IV phenytoin erected by doctor and run over one hour. Cardiac monitor in situ throughout infusion."

The 11.30 result has a phenytoin of 23.4, just above the recommended level. Would you have done anything differently if you'd known that further phenytoin was being administered at 11 pm?

A. Could you clarify what you mean?

Q. You have said that the phenytoin level was just above normal.

A. Mm-hm.

Q. And yet further phenytoin was being given over the one hour of 11 to midnight. If you had been told of that in or around 11.30 by Dr Stewart, would you have wanted the phenytoin to be stopped since it was already above the range?

A. The phenytoin level that we checked at 9.30 was the

result of the bolus that was given, and phenytoin does not last throughout the whole night. So it has to be given as a continuous infusion afterwards. The level that was checked at the blood test at 9.30 showed us that the bolus of the medication had been appropriate. By that I mean that the result was within treatment level and the continuing infusion has to be given and what would be common practice then is to check the level again in the morning to see how it works. The bolus of phenytoin usually works very well, but it is well-known that a continuous infusion afterwards can have very variable effects on the patient who receives it. Some patients maintain their level, in some patients the levels go very high and in others they go very low. Because of the toxic side effects of phenytoin that I mentioned earlier on, it is important to then check the levels the next morning, but also it's important to check the levels the next morning to ensure that the child is receiving enough of that medication.

Q. To be fair to you, doctor, the serum phenytoin levels were checked seemingly in or around 3 am or 4 am according to 090-022-057.

A. I think they were 19 or something like that.

Q. Yes, it was either 19.2 or it could be 14.2.

A. It certainly was not in the toxic range.

Q. Yes. Can I ask: you restricted the fluids to two-thirds, the Solution No. 18, isn't that right, on receipt of the serum sodium result?
A. Mm-hm.
Q. If we go back to the fluid balance chart at 090-038-135, we can see that that 110 millilitres of phenytoin is being administered, it seems, according to the nursing note, between 11 pm and 12 midnight; isn't that right?
A. Yes.
Q. What would phenytoin normally be diluted into in order to give it as an intravenous fluid?
A. The fluid that it would be diluted in is normal saline, which is a fluid that is not low in sodium, it would be isotonic, we call it. It is the only fluid that phenytoin can be made up in.
Q. And what about the acyclovir, which seems to have been administered?
A. It also would be made up in normal saline only. It is not allowed to be made up in other fluid. So both these medication fluids were normal saline, which are highly isotonic so they would not have been hypotonic, contributing to the fluid that the child received on a low level.
Q. If I can bring up the chart my learned friend brought up earlier, 310-001-001. What we have there is the light

blue line which is the cumulative total of the Solution No. 18 received by Claire from her admission to Allen Ward until her transfer to PICU. Can you see that?

A. Yes.

Q. The dark blue line then is a cumulative total of all of the fluids that she received, including the medication, the fluids in which the medications were diluted; do you see that?

A. Yes.

Q. Do you see that it is at a slightly higher level really from about 9 o'clock in the evening of the 22nd on. It starts to peel off and be a higher level.

A. Mm-hm.

Q. One of the points, certainly, which I think the family is concerned about is the fact that when the fluid rate was restricted to two-thirds, the only fluid that was restricted was the Solution No. 18 and that account wasn't taken of the other medications. They continued at the rates at which they were being prescribed. Did you have any countenance of the effect of the other medications on her fluid management?

A. As I stated earlier on, both medications are made up in normal saline, so while it is fluid that is given above the rate of maintenance, I do not think that the fluid

given in form of the medication would have contributed in any significant way to the hyponatraemia because it was isotonic fluid.

Q. And just to complete matters, if I can refer to 310-015-001. This is a table compiled by the inquiry of the fluids received from 10 pm until Claire's transfer to PICU.

A. Yes.

Q. We can see there the acyclovir is run from, I think, 9.30 until 10.30, which is why it's split between times. You can see that Claire was supposed to be receiving 64 millilitres per hour of the Solution No. 18. That was her normal maintenance rate before the reduction by two-thirds; is that correct?

A. Yes.

Q. As you say, it was reduced to 41. Just before 11.30, with the effect of the medication, you can see that she was receiving a total fluid of 107.2 millilitres from 9 pm until 10 pm, 104 millilitres from 10 pm until 11 pm, and then 135.9 from 11 pm until midnight.

Do you have any comment to make about the fact that those numbers are significantly more than the 64 millilitres per hour that was Claire's maintenance rate?

A. I think you have to take into consideration that the

child was 24 kilograms. So while it was more than the maintenance only, I would not have any significant concerns about the extra amount that she had received. When you're dealing with very young children under the weight of 10 kilograms, every millilitre matters, but a child of 24 kilograms I would have expected to cope reasonably well with the medication given in the saline that it was made up in. The modern practice now would be that that is taken into consideration, and I have no explanation of why that was not done then.

THE CHAIRMAN: When you say "the modern practice now", does that mean if Claire's situation arose in another child now and you reduced her fluids to two-thirds, that in calculating that total you would take into account other fluids which were being used to administer drugs?

A. Yes. This is one of the effects of the Adam Strain inquiry into all the hyponatraemia discussion that has happened since then. We would be much more careful about the fluid that is given in total and not only the maintenance fluid as such.

THE CHAIRMAN: Sorry, when you say, "one of the effects of the Adam Strain inquiry", do you mean one of the effects of the inquest into Adam's death or do you mean something later than that?

A. I cannot clearly give you a timeline, but we are much

more aware now of fluid, not only as something to be given to make sure that a child doesn't get dehydrated, but fluid being medication, and that every aspect of the fluid management now has to be carefully calculated to make sure that, as best as we can, we get it right and don't cause any harm by fluids given.

MR REID: If I can return just to the serum sodium result at 11.30. You had spoken to Dr Stewart on the phone, you had advised the restriction of fluid to two-thirds and to send the urine for osmolality. You knew about Claire's condition as well. I think you might have referred to her as being maybe the sickest child on the ward, I think, at some point during your evidence. Did you consider or would you have considered admitting Claire to PICU at that stage because of the seriousness of her condition as the sickest child on the ward?

A. The situation I was in that evening, as the registrar, was that the child had been assessed three times by a consultant and he was aware of the degree of sickness of this little girl, and who was happy for Claire to remain in intensive care. He does not mention in his treatment plan "consider admission to PICU" and I would have regarded that as an indication that he was happy for her to remain on the ward on the treatment that had been instigated by him, to await the effect of that

treatment on the ward.

Q. Do you feel, having looked at the notes, that Claire had deteriorated during the period of 5 until 11.30 pm?

A. If you go back to the Glasgow Coma Scale --

Q. Which is 090-039-137.

A. -- you can see that on the records at 4 pm, her Glasgow Coma Scale was 6, and at 5 pm her Glasgow Coma Scale was 7.

Q. I think it was 6 at 5 pm.

A. And it was 6 at 3 pm too. So over two hours her Glasgow Coma Scale was 6 and Dr Webb had seen her the last time afterwards. So if he was happy as a consultant neurologist for her to remain on the ward in that state, then I would have felt reassured by that.

Q. But since then, she had received the various anticonvulsant medicines, she had been on midazolam for quite some time, she was in receipt of phenytoin as well and you just received the serum sodium result. You may not have been aware of the attacks from 7.15 or 9.30, but the combination of the fact that she had been on these medications and that you got this result through, would that not have sent alarm bells ringing that perhaps she needed a higher degree of care in the paediatric intensive care unit?

A. With the level of experience in paediatric that I have

now, I would have sent her to intensive care, no doubt about that. As a registrar then, as I stated before -- Dr Webb had seen her and he had made a treatment plan and had not mentioned transfer to ICU. I honestly can't say that I would have considered that, seeing that he did not.

THE CHAIRMAN: Well, he hadn't, you're quite right, raised that before he left at 5 or 5.30 or so. But since then, her condition had got worse, hadn't it?

A. It hadn't improved, I would say, because her Glasgow Coma Scale had been 6 before when she was seen by Dr Webb.

THE CHAIRMAN: You've also got a very low sodium reading, which becomes apparent some time after 11 o'clock.

A. That is correct.

THE CHAIRMAN: So that's a sign of deterioration.

A. We didn't have a sodium level earlier throughout the day, but it certainly was a sign that she was not well, yes.

THE CHAIRMAN: A sodium level at about 121, that would be -- that's not just marginal, that is quite serious, isn't it?

A. That's correct.

THE CHAIRMAN: Particularly for a child who's already been in hospital for a bit over 24 hours at that stage.

I think what we're really asking you is: even if Dr Webb hasn't raised the idea of moving Claire into intensive care, would the deterioration through that Tuesday night not have led to that having to be reconsidered?

A. One of the criteria for intensive care is problems with airway or breathing, and if you look at her observations, her heart rate and saturation monitoring had always been stable. The care that she would have required at that stage would have been at least high dependency unit, where it would have been much easier to keep a close eye on her. But I would agree that the intensive care should at least have been considered and I should have discussed that either with Dr Steen or Dr Webb by that stage.

THE CHAIRMAN: Thank you.

A. I certainly would do it now.

MR McCREA: Mr Chairman, in recently discovered correspondence or e-mails between Dr Webb and the DLS, there is Dr Webb's statement, which is edited to some extent, from a situation where he said it's with some regret or that he should have referred Claire at 5 pm. I can't find the reference, but he does change that in his coroner's statement, his formal statement.

THE CHAIRMAN: Right. Dr Bartholome is saying that, at least she now accepts that at least a transfer to PICU

should have been considered and discussed with Doctors Webb and Steen, late that evening.

MR REID: Just to go back to a point you raised earlier about the urine osmolality test. How long would that normally take, doctor?

A. It would have been proceeded like a normal blood sample, so I would have expected the result back within an hour to 90 minutes.

Q. Unfortunately, the first time you see Claire is round 3 am after the respiratory arrest. If you'd asked for it at 11.30, would you have expected it to have been returned before that unfortunate event?

A. Yes, I would have expected it to be back earlier.

THE CHAIRMAN: Mr McCrea, when you get that reference, would you give it to -- Mr Sephton, do you have it?

MR SEPHTON: Dr Webb says in his first statement to the inquiry that it was a mistake not to have referred Claire to intensive care, and in his second statement, right at the end, he says it's a mistake that he will always regret.

THE CHAIRMAN: Thank you.

MR REID: Would it have been the responsibility of the SHO or nursing staff to have sent the urine for osmolality?

A. The request should have been made known to the nursing staff so that they knew that we were looking for

a specimen for this test, and it would have been the nursing staff who had sent it. The form could have been filled out for that request either by the nursing staff or by the junior doctor.

Q. Just for the record, I believe it's recorded in the clinical notes, but it's not recorded in the nursing notes.

If we can bring up the flowchart at 310-014-001. SIADH was suspected in Claire's case. Would you have considered at that stage, at 11.30, that raised intracranial pressure could have been a cause of Claire's symptoms at that time as a result of the SIADH?

A. SIADH can be caused by, as we mentioned before, an infection of the brain like encephalitis, by seizures, and by many other conditions. The effect of SIADH on the brain depends a bit on the severity but also on the duration of that condition. Claire had been on the ward for less than 24 hours, but she had been very sick. So it is difficult to say retrospectively whether I would have considered it then or later when she had the respiratory arrest.

Q. Would you have wanted your SHO to have checked for signs of increased intracranial pressure, for example, checking for papilloedema or something like that?

A. Yes, but one problem is that Claire was treated for one

of the signs of cerebral oedema, or problems with it, which is seizures, and she was also treated for infection of the brain, which is encephalitis, which can cause a lot of these effects. So it is very difficult to say, even now, which would have been the cause and which would have been the effect.

Q. So even if she had had, for example, papilloedema, are you saying that might have been a side effect of one of the medications?

A. Definitely papilloedema would have raised the problem of cerebral oedema as the main point of concern there and then.

Q. Because a check, for example, for papilloedema is not mentioned in Dr Stewart's note.

A. That is correct.

Q. Would you have expected that either he would have done so on his own, of his own volition, or you'd have advised him that he should check for signs of increased intracranial pressure?

A. I would have expected him to check that himself and he could have liaised with me whether he should check that either. But in the notes on the charts -- and this is the only documentation that I can refer to -- it doesn't state that he actually examined Claire; it states that he asked me about what he should do, but it does not

state a special -- that he did an examination especially of the central nervous system.

Q. I mean, he has asked you for advice. Is one of those pieces of advice that you maybe should have given Dr Stewart was to check if there was any sign of raised intracranial pressure? Would you accept that that is one of the things you should have said that to Dr Stewart?

A. I cannot say whether I said that or not because it is not documented. From my usual clinical behaviour, I would have expected that I would have said something along these lines to him. But having said that, she already was on very close observation about her central nervous system. But I would have expected him to have a look, yes.

Q. Finally, just on the sodium result part, would you have been aware of how quickly the sodium had fallen, as in that there was a result of 132 the previous evening at about midnight and this result now was 121 at 11.30 pm?

A. No, the one result of 121 would not have given me an indication of how quickly it had fallen because it could have been that it was quite stable, but then as a result of Claire deteriorating, it dropped suddenly, or it could have been that it slowly deteriorated throughout the whole day. Only having the electrolyte result from

8 pm the night before would not have clarified the situation for me one way or the other.

Q. I think the night before the blood sample was, in the round, perhaps 10.30 and the result seems to be, in the round, midnight rather than 8.30, but the times aren't precise.

You said earlier in your evidence that -- and I think it's on the transcript -- you consider that perhaps you should have been quicker at asking a consultant for advice on the evening of the 22nd, the morning of the 23rd. Have I represented what you said earlier correctly?

A. Yes, that is correct.

Q. Do you consider now, with the benefit of hindsight, that you should have contacted the on-call consultant regarding Claire's condition?

A. Yes, I think especially knowing the result of Claire's illness now, I should have considered contacting them, yes.

Q. In your witness statement at WS142/1, page 15, you were asked a question:

"State whether you contacted and informed a consultant of this blood result."

And you wrote:

"Contact with the consultant is not documented."

I understand obviously that you have difficulty recalling the events of the 22nd. Elsewhere you say it would be unusual for you not to document. I think you said:

"I generally would document discussion with a consultant."

Do you consider that you did or you did not contact the consultant of the evening of the 22nd into the 23rd?

A. I can only say, as I stated in my witness statement, that it is not documented and I would normally do so, but I do not recollect the events of that specific night at that time.

MR McCREA: Mr Chairman, the reference actually is 139-098-021. It's the last paragraph on that page, which has changed. The original one is:

"I made the mistake of not seeking an intensive care placement for Claire before I left the hospital on the evening of October 22."

And he changed it then to:

"Although I did not seek ..."

THE CHAIRMAN: Thank you.

MR REID: If I can move then to the respiratory arrest.

A. Just one comment to your quote. Actually, I read a statement from Dr Webb, where he recently wrote that he will always regret that he did not liaise with

intensive care, so that was later than that.

THE CHAIRMAN: Yes.

A. I'm sorry, I can't quote the definite page of that.

THE CHAIRMAN: We'll find that. Thank you, doctor.

MR REID: The respiratory arrest at 2.30. If I can call up 090-022-056. This is the bottom half. Can you confirm that that's your writing, doctor?

A. Yes, I confirm that that is my handwriting.

Q. "3 am, called to see. Had been stable when suddenly she had a respiratory arrest and developed fixed dilated pupils. When I saw she was Cheyne-Stoking and requiring O2 including face mask. Saturation with bagging in high 90s. Good volume pulse. Attempted to intubate. Not successful. Anaesthetic colleague came and intubated her orally with 6.5 tube. Transferred to PICU."

Why was there no note in this 3 am note of the differential diagnoses of Claire's condition?

A. This was a note that was written after the event, prior to Claire going to intensive care, just to give my colleagues in intensive care a rough summary what I had found and what I had done. It was not a note that was written while I was sitting down carefully going through the notes and then writing the whole summary of our attendance on the ward. That was not the intention of that note.

Q. Did you not think it relevant maybe to include the "encephalitis/encephalopathy, non-fitting status", writing that down as a possibility of the diagnosis?
A. Going from a clinical experience and normal action, I have no doubt that intensive care was informed by me about that, but that I did not document it, because that's what she was treated for, that was what all her medication was for, and that is what we were trying to improve throughout her stay in the ward.
Q. Likewise, three-and-a-half hours earlier, you had been contacted by Dr Stewart about hyponatraemia, possible fluid overload and possible SIADH. Did you consider that any of those were relevant as a note?
A. They certainly were relevant and I, again, from experience, I'm certain I told them about that. But I did not document that in my note because that was a quick note just to tell them roughly what I had done throughout that event. It was not a summary of her stay on the ward.
Q. That note says, "3 am called to see. Had been stable."
Do you stand by that comment that Claire had been stable up until 3 am?
A. You'd have to consider the definition of "stable" that I used in that event. I would have regarded her as unstable if her observations had gone up and down, say

if her heart rate had changed from 80 to 120, going higher, then going down again, if she had had any sign of a significant change in her respiratory pattern or if she had suddenly developed a high temperature or symptoms like that. So she had been very sick, but the observations that we had taken of her had been reasonably stable. That is the aim of "stable" that I used here.

Q. Her Glasgow Coma Scale had been 6 since 9 pm; isn't that correct?

A. That is correct, yes.

THE CHAIRMAN: Is that an example of what you mean by "stable", that because her GCS was the same from 6 pm that then that shows some level of stability in that it hadn't gone down any further?

A. It certainly ... The Glasgow Coma Scale not having deteriorated more showed, up to a point, a level of stability, but having said that, it has to be taken into consideration of the number itself, which is 6.

THE CHAIRMAN: You understand how, to us, it seems a bit odd to say that Claire had been stable when suddenly she had a respiratory arrest because, earlier on, during the evening, as you have acknowledged during your own evidence, there were heightened concerns about how ill she was? So to describe her in a note at 3 am as being

stable seems a bit out of keeping with what had gone on over the previous few hours. Do you understand the point?

A. I do understand the point, yes.

MR REID: You say that you had no doubt that the PICU staff were aware of Claire's condition whenever she was transferred to PICU. Would it have been your responsibility as the doctor attending her at that point to inform them of Claire's condition and her treatment?

A. Yes, it would have been.

Q. And would you have spoken with the consultant in PICU at that time?

A. I certainly would have spoken with the registrar who intubated Claire. I'm not quite sure at what time Dr McKaigue actually came in to see her. But if I'd still been in intensive care, yes, I would have spoken to him about that.

Q. This is really a correction. At witness statement 142/1, page 4, you say what contact you had with Claire and her family:

"I do not recall the case of Claire Roberts. No contact with the family of Claire Roberts is documented by me."

Mr Roberts will say that he received a call from you at 3.45 to say that Claire was having breathing

difficulties and that he and his wife should make their way to the hospital as soon as possible and that you informed him that Claire was going to ICU. I know your memory is poor, but --

A. No, I accept I do stand corrected because it is -- I have no doubt that it was me who spoke to the parents while Claire was going up to intensive care. This is would not have been something I would have asked anybody else to do.

Q. Would you normally have documented that?

A. I cannot clearly answer that. A situation like arrest in her case is a situation where events happen very quickly and the parents need to know about what happened because we would have wanted them to come in as quickly as possible because she now was in intensive care and ventilated. I should have documented that, but I did not do that.

Q. If we just bring up your note at 090-022-056 once again. Your note on the bottom half. It's not signed; isn't that correct, doctor?

A. That is correct, yes.

Q. Do you accept you should have signed your note?

A. I should have signed my note, yes.

Q. Would you have looked through Claire's previous notes at any point before the transfer to PICU?

A. Do you mean after she arrested or before?
Q. On writing this note and on her transfer to PICU, would you have taken the time to quickly look through her medical notes at any point?
A. I would have doubted that. This note was quickly to give my colleagues a brief summary of what had happened on the ward. I do not think that I would have carefully gone through the notes and reviewed all the events up to that point.
Q. Can I ask you then about Claire's transfer to PICU and she was sent for an emergency CT scan. The CT request form is at 302-042-002. It's signed by yourself. Do you accept that the entries in this form are your own?
A. Yes, they're my own.
Q. Okay. And we can see it says:

"Mentally handicapped, usually active and alert, walking and very chatty. Drowsy for last 36 hours. Query cause. Respiratory arrest at 3 am. Query cause. Severe cerebral oedema. Pupils fixed and dilated."

First of all, were you here yesterday or have you had the opportunity to see Dr Steen's evidence from yesterday?
A. I was here yesterday morning.
Q. Dr Steen addressed the issue of mental handicap. What

would you have to say about the use of that term in 1996?

A. It is certainly a term that we do not use in 2012. It was used in the 90s. It is a description of a child who has learning difficulties because it is such a wide range from mild learning difficulties to the severest, where there's hardly any language or speech, for example. The terminology has changed to learning difficulties. But the use of mentally handicapped is in no way derogatory; it is just one of the terminology words that were used at that time and that were used by me. You'll also find -- I think Dr Steen referred to that yesterday -- that it is written down in the nursing notes as well.

Q. Yes. Just in the "relevant history", "clinical findings" and "previous operations", do you consider that you should have noted the low sodium in that section?

A. The CT was done to determine the severity of the cerebral oedema and to see whether there were any causes causing her to have the clinical signs of pupils fixed and dilated. I do not think that hyponatraemia as an add-on would have made any difference in what the radiologist was looking for.

Q. And we also see that non-fitting status, encephalitis

and encephalopathy aren't noted as well. All there is is: query, cause. Would noting that diagnosis not maybe assist in the interpretation of the CT scan?

A. No, it would not. It was very clear what we were looking for. We were looking for the degree of severity of cerebral oedema and we were looking for any other causes that might contribute to this, like a bleed or any other significant am normality that could cause cerebral oedema as well. So a CT is an image; it is not an explanation for a condition.

Q. We were talking just at the very start of your evidence about the Adam Strain case and inquest, and you said you probably had some discussions within Musgrave Ward about the Adam Strain case. Claire's case is one in which you were aware that she had hyponatraemia and then a short time later she had fixed and dilated pupils and cerebral oedema. Did any alarm bells ring in your mind in terms of your memory of the Adam Strain case, or your knowledge of the Adam Strain case, in regard to Claire's case?

A. Which alarm bells do you mean? Just because of the sodium number or because of the cerebral oedema as such?

Q. Doctor, as I say, it's the factual matrix of the fact that it was hyponatraemia and use of Solution No. 18 and a short time later that there was cerebral oedema, fixed

and dilated pupils. Did you see any correlation between the two cases given your knowledge of the Adam Strain case?

A. It is difficult to definitely answer that now in 2012 because the syndrome of inappropriate ADH secretion is known to cause hyponatraemia and is known to cause cerebral oedema. But certainly, in discussion of this case amongst the medical staff afterwards, I think the fact that No.18 Solution was used would have, I've no doubt about that, contributed to the discussion about the use of this fluid.

Q. So you have no doubt that following what happened in Claire's case that the use of Solution No. 18 would have been discussed amongst your colleagues at the Royal?

A. I have no doubt that we discussed the fact that she had developed such sever cerebral oedema so quickly on fluid that was primarily maintenance fluid. By that I mean she did not receive a resuscitation fluid bolus of 20 ml per kilogram of, say, Number 18. So, yes, I think it would have been discussed, but I cannot be more specific because I cannot recall a definite time for this kind of discussion.

Q. And would you have expected that discussion to have been documented, minuted or there to have been meetings about that fact?

A. I cannot recall and I do not know whether there were any official meetings about this fact.

Q. Would you have expected anything to have been done as a result of what happened in Claire's case?

A. To be done?

THE CHAIRMAN: Changes to practice.

A. As a registrar, I do not think that I would have been able to influence the changes to practice, but it certainly should have been something that should have been discussed in an audit meeting. An audit meeting is a meeting where the majority of the medical staff of the hospital try to attend to discuss cases of children who have died, like Claire, and then we encourage discussion about the cause of death and we encourage discussions about learning points as a result of this cause of death and the fact that she had cerebral oedema.

MR REID: Can I bring you to your witness statement at WS142/2, page 11? At (f), which is generally the reply you gave earlier in evidence:

"The radiology department required a written request to be able to perform the CT investigation."

The next paragraph, you say:

"No definite diagnosis had yet been made. Claire was treated for possible seizures, covered with antibiotics for a possible bacterial infection of the

brain and covered with acyclovir for possible herpes encephalitis."

Do you accept that, at that point when you're writing the CT request form, the cause of Claire's condition was not known for sure?

A. It was not known for sure. Yes, I accept that.

Q. In fact, as you said, there was no definite diagnosis and all the clinicians had were possible diagnoses?

A. Yes, working diagnoses, yes.

Q. Your involvement with Claire's case finished at that point. Would you have expected Claire's case to have been reported to the coroner?

A. Are you asking me with the information that I have now or with the information then?

Q. With the information you had then.

THE CHAIRMAN: Both. First of all, in light of the information which you had at the time, would you have expected Claire's death to be reported to the coroner?

A. I personally would have expected that because, as I state in my statement here, but also in my CT request, we did not know why she did what she did. We had possible differential diagnoses, but none of them had been proven at that stage. The only thing that was proven in inverted commas was the fact that she had cerebral oedema. Seizures were not proven, we do not

have an EEG result. Infection was not proven because we do not have any CSF fluid. CSF fluid is the fluid that goes round the brain that that would be fluid that you check for signs of acute infection and, if possible, try to diagnose what it is that causes the infection. The viral cultures and the bacterial cultures from that fluid would take at least 48 hours to come back but Claire had only been with us for a little bit more than 24 hours. Basically, we had possibilities but nothing was definite.

THE CHAIRMAN: And I take it then that the answer to the second part of the question about whether Claire's death would now be reported to the coroner, that would be the same, it would be reported?

A. I certainly would report it to a coroner, yes, because the cause of death is unclear.

MR REID: Do you know when you first learned of Claire's death?

A. I have no doubt that I learned about the fact that she had severe cerebral oedema that night. I was off the next day from about lunchtime onwards, but I have no doubt that I learned about her in the next three to four days because it was a devastating outcome, and as the registrar being involved in an event like an arrest, I always followed up the child to see what the result of

that treatment or -- well, it's not treatment, the intervention was. And in her case, it was her death.

Q. You also mentioned about audits and discussions after her death. Would you have expected there to have been an audit after Claire's death? I think you said that you would have.

A. The audit happens every month, but I would have expected Claire to be one of the mortality -- mortality means children who have died -- one of the mortality cases to be discussed. The problem with Claire was the fact that she had a brain post-mortem and the result of a brain post-mortem can take several months to come back. The brain has to be prepared and then the specialists have to have a look at it and then they feed back on their findings. And only then is there a point in discussing it at an audit meeting because only then do we have any facts rather than speculations. We had speculations throughout her stay and throughout her stay in intensive care but nothing, as I stated before, was proven.

THE CHAIRMAN: Does that affect the way in which a death like Claire's is audited if it takes a number of months for you to have a post-mortem result? Does that, in effect, delay any discussion for a number of months?

A. It would delay it because we have no definite reason for her death except for the cerebral oedema.

THE CHAIRMAN: Then does it become possible that Claire's death just sort of slips away and isn't actually properly discussed and reviewed and audited?

A. I can only speak as my experience as audit manager, but that was after Claire's event, it was when I was a consultant. We have a duty to discuss all the children who have died in the hospital and I certainly would have tried my best to ensure that she would have been had I been the manager of the audit meeting at that time [sic].

THE CHAIRMAN: You know that one of the family's big concerns, as I understand it, is that her death -- well, apart from, obviously, the fact that she died and apart from the fact that they went home at about 9 o'clock on Tuesday evening not understanding that she was seriously ill, they're then called back in in the early hours of Wednesday morning on foot of your phone call and they're given the worst news they could get. There is then a limited post-mortem, there's no report to the coroner, and then after the post-mortem report there seems to have been nothing obvious done or no obvious lesson learnt.

A. I cannot say whether she was discussed at an audit or not because I do not think that we have been able to find any information about that.

THE CHAIRMAN: That's correct.
A. But as a result of several of the hyponatraemia patients that were treated, a lot of our treatment of children generally has changed in the Children's Hospital. We have become much more aware of hyponatraemia in the first place. We have introduced a fluid management scheme. It is part of Peter Crean's guidelines on hyponatraemia. There is a wallchart in the back. I'm sure you can find the reference --
THE CHAIRMAN: We have it.
A. -- which is available in every ward now. It is part of the induction, so every doctor who starts in the Children's Hospital is made aware of the fluid management protocol that there is. They're also made aware that if they have the slightest doubt about fluid administration or medication containing more than a small amount of fluid, they should discuss it with a more senior doctor. And it is a teaching point in the student year 4. I was teaching fourth year students in paediatrics about fluid management for several years and I made it a highly important point of that teaching that electrolyte changes, especially hyponatraemia, is something that has to be looked for and has to be actively treated, but most of all, most importantly, should be avoided by having careful fluid management in

place.

THE CHAIRMAN: The other big issue from your evidence this morning is -- and this must, I'm sure, worry the Roberts. We heard over the last few days from Dr Steen and it seems that for no reason which she can find or we can find, she knew very little about Claire before she was called into the hospital in the early hours of the 23rd, the Wednesday. And that may be because she was overstretched or preoccupied with looking after somebody else, we just don't know, but we know from your evidence that if you didn't go to see Claire at about 11 o'clock or soon afterwards, it was because you were overstretched looking after other children; is that right?

A. I assume that to be the case, yes.

THE CHAIRMAN: But then it's not just that you weren't able to see her at 11 or 11.30 with Dr Stewart, it appears then from the records that you weren't able to see her at all until you were called after the arrest and you made your note at 3 am, so you would have seen her from about 2.30, or maybe some time shortly after that; is that right?

A. Yes.

THE CHAIRMAN: But that means that between 11.30 and 2.30, you weren't free to be able to catch up on Claire's

case, which you were more worried about as a result of what Dr Stewart had said to you on the phone, some time after 11 pm; is that right?

A. Yes.

THE CHAIRMAN: Can that continue to happen? Can that happen again in the sense of being so overstretched that you don't even get to see a child who is, at this stage, very, very unwell?

A. Yes, it can happen again because if you are on call and have several sick children, and if you're dealing with one, then it is possible not to see another one. Yes, it can happen again.

THE CHAIRMAN: But now you have the fallback that there are two other registrars who are on these shifts with you, so there's a better chance of somebody being able to help?

A. There is a better chance of somebody being able to help, but I do not think I'm competent to be able to comment on that now because I work in the emergency department now and have done for the last 11 years. There we try to provide senior cover after midnight so that there always is somebody about who can be asked about these patients to support the registrar on the ward or intensive care, to make sure they do not have to come down throughout that time.

THE CHAIRMAN: Can I also just confirm with you that in terms of the hours which you worked during this couple of days, you went into work on the Tuesday morning, is that right, at 9 am?

A. Yes.

THE CHAIRMAN: You're on the Musgrave Ward until 5 pm. You stay in the hospital from 5 pm on Tuesday as the registrar with responsibility for the wards that we have discussed earlier, and that continues until 9 am. Even then, you don't get away, you don't actually leave on Wednesday until at about noon.

A. That is correct because we would have done the ward round on Musgrave Ward. As the registrar on call, you would have then done the ward round on the ward that you're normally allocated to.

THE CHAIRMAN: So that's a 27-hour shift?

A. I didn't add it all up, but yes.

THE CHAIRMAN: From 9 am until noon on Wednesday? Does that still happen?

A. No, that does not happen. Usually the registrar -- the shift system overall has changed now. The registrars are now doing 8 to 12-hour shifts rather than 24-hour shifts. But when I was a registrar in 1996, we had longer shifts.

THE CHAIRMAN: Okay. Thank you. Mr Reid?

MR REID: Mr Chairman, I have finished my questioning. I would suggest maybe a five-minute break. I can take questions off any of my learned friends and then we can break for lunch and have Dr O'Hare after lunch.

(12.56 pm)

(A short break)

(12.59 pm)

MR REID: Just a few points. If I can bring up Dr Stewart's witness statement at 141/2, page 7. We're just going to refer to the question 11(d). Dr Stewart says:

"In my mind, that evening, our goal was to nurse Claire through the night, ensure her serum phenytoin levels were within normal limits and check her serum, urea and electrolytes, which had been taken earlier. I do not remember any doctor involved with Claire's care that day expressing any concern that her sodium level would be so severely affected by the SIADH. None of us expected it."

The question, doctor, is: Dr Stewart there doesn't seem to be overly concerned about Claire's condition overnight. It's a case of them nursing her through the night, getting through the night into the next morning. It doesn't seem they expected anything adverse would happen overnight. Your evidence was that Claire was the sickest child on the ward. I know you're commenting on

Dr Stewart's evidence, but can I ask you how you square Dr Stewart's statement with your own statement that Claire was the sickest child on the ward?

A. I do not think that Dr Stewart and I contradicted each other. We were trying to see how she was throughout the night and then Dr Webb had made plans for further investigations in the morning, should her condition not improve.

Q. And generally, having looked at the notes, what do you think was the level of concern amongst the medical staff and the nursing staff overnight before Claire's respiratory arrest?

A. Do you mean a change in concern or the overall concern?

Q. What was the overall concern?

A. I think the overall concern -- we were all in agreement that Claire was very sick. She had hourly CNS observations, which alone is an indicator of concerns about the state of her central nervous system. She was on a lot of medications, one of them being phenytoin, where Dr Stewart was expected to check the levels, and he's aware of that. So I do not think that we contradict each other in what he and I are saying.

Q. I think you have already said, with the level of concern, you were surprised that Claire's parents were allowed to leave at 9.30 pm on the night of the 22nd;

isn't that correct?
A. That's correct, yes.
Q. The next point is that Claire, by 11.30 pm on 22 October, had received rectal diazepam, IV phenytoin, IV midazolam, IV sodium valproate, the cefotaxime and the acyclovir. The first four are all anticonvulsant drugs. Do you think that it was appropriate -- I realise that you're a paediatrician rather than a neurologist -- to have used such a cocktail of anticonvulsant medication with Claire during 22 October?
A. Could you clarify what your question to me is?
Q. I'm saying you're aware of the medication that she was receiving. Do you think that medication was appropriate for her to receive?
A. I think that would be a question you have to pose to Dr Webb because the medication was given on instructions of the paediatric neurologist.
THE CHAIRMAN: Can I ask it in a slightly different way? Knowing what the level of drug administration was, does it cause you to raise an eyebrow or think that that's a bit unusual, that there's so many drugs being given to this 9 year-old girl?
A. I worked with Dr Webb in my previous attachment and I had a high regard -- and still have -- for his knowledge and the treatment plan he devised for his

patients. So I had no -- I was concerned about the fact that she was on so many medications, but seeing that they had been sanctioned by the consultant paediatric neurologist, I felt that he felt it was appropriate. So therefore I would be happy to continue with that on his instructions.

MR REID: We raised earlier about the urine osmolality test and the fact that it seems that there was no results, nothing ever resulted from that particular test. In order to send urine for osmolality testing, I presume you need a specimen of urine in the first place; would that be correct?

A. That would be correct, yes.

Q. Claire had SIADH, which obviously is antidiuretic hormone, and in that case she would have been urinating less; would that be correct?

A. You would expect her to urinate less than you would normally do without the anti-diuretic hormone, but there is no definite number that you would allocate to that.

Q. Do you wait until she urinates naturally in order to send the urine for osmolality or is there any way that you can obtain the urine sample in another fashion? Do you simply have to wait to her to urinate in order to you can do the test?

A. What we would do is if we're looking for urine

osmolality on the ward is, in a girl like her, put a pad in a nappy and wait for her to wet it. Then you can wring it and have the urine specimen then. If a child like Claire was in intensive care, then you would catheterise her or she might be catheterised seeing that she is in there most likely for careful balance and observation of her fluids, input and output.

Q. Claire wasn't in intensive care until, of course, later, and she wasn't catheterised. So would it be that you would have to wait for her to pass urine until an osmolality test could be sent?

A. If we tried to get a specimen via the pad, yes.

Q. If I can bring up reference 090-038-135. This is Claire's fluid balance chart for 22 October. We can see in the output section "PU", which I believe stands for "passed urine".

A. Yes.

Q. There's one at 11.05, 7 pm and 9 pm. As we can see, there's nothing following that. Would you take from that that no urine was passed and that, therefore, no urine could have been sent for the osmolality test?

A. According to the note, that's what I would read it as, yes. But I cannot quite decipher the small bit underneath the third --

Q. I think it might say "small mouthfuls" and it might

refer to the column "aspirate or vomit".
A. Right.
Q. Would you be concerned then that a test for osmolality hadn't been sent within the four-and-a-half hours between you requesting it and Claire's transfer to PICU?
A. I certainly would have expected her to pass urine before because four hours -- children usually pass urine more frequently than every six hours.
Q. Even though Claire was a patient with a syndrome of inappropriate secretion of antidiuretic hormone, so wouldn't be passing urine as often; would that be correct?
A. It is not the frequency, it's more the amount that you would be looking at.
Q. So you're saying that she would pass it as frequently, but just the amount each time would be less?
A. That's what I would expect, yes. Both.
Q. And if you'd known by 3 o'clock, at the arrest, by then that a test hadn't been sent, would you have considered catheterisation in order to obtain urine for an osmolality test?
A. Yes, I would have. But as far as I'm aware, she was catheterised when she was in intensive care to check her fluid balance then.
Q. I mean before her catheterisation and transfer to PICU,

if you'd been made aware, for example, that she hadn't passed urine, would you have considered catheterisation?

A. I would have considered it if she hadn't passed urine -- at what time did I request it? At 11.30. So if she hadn't passed urine by 4, 5 o'clock, yes.

Q. When the chairman was asking you questions before the break, you stated that you were an audit manager at one point in your career. Are you still not a manager now?

A. No, I'm not doing the audits now.

Q. Were you not a manager at the time of Claire's death?

A. No.

Q. But you've been an audit manager in between times?

A. Yes, since then, since I started as a consultant in 2001.

Q. What records are generally kept of audits within the Children's Hospital?

A. The records that were kept while I was doing the audits are the brief statement of the patients that died, for example a patient without using the definite name -- say patient PT -- diagnosis, pneumonia, intracranial bleed, something like that, just to notify or be aware that that case had been discussed.

Q. And can I just clarify, do you know when you were an audit manager, what years?

A. I would have to look that up on my CV.

Q. We'll have a look at that over the lunch break. Would every child who died in the Children's Hospital be subject to audit?
A. We'd try our best to do that, yes.
Q. You'd try your best so that every child who died -- whether it be seemingly natural causes or anything else -- would be subject to audit within the Children's Hospital?
A. Yes, it's an obligation that we have that we have to check out and inform our colleagues about a death.
Q. How long has it been an obligation for?
A. I cannot answer that, I don't know.
Q. Would it have been an obligation in 1996?
A. Again, I would have to check that. I don't know.
Q. But you are saying that every child who was deceased was subject to audit. The inquiry hasn't received any record of an audit involving Claire Roberts. The question, therefore, doctor, is: if there's no record of an audit, do you think that an audit was done?
A. Do you mean no record of a discussion of her case?
Q. Yes.
A. As I wasn't the manager of the audit at that time, I cannot recall how thorough the notes would have been of my predecessor. When I was the manager of the audit, I would have noted down the patients that were discussed

on that date.

THE CHAIRMAN: Well, if there's a obligation to review these deaths, that's presumably on the basis that there may be lessons to be learned; is that correct?

A. That's correct.

THE CHAIRMAN: Does that come with an obligation to retain the records for some time?

A. I honestly cannot answer that. I can only say that when I did it I made a note of the fact that the patients were discussed. I do not know whether that was combined with an obligation to actually keep these notes.

THE CHAIRMAN: It would seem to make sense, wouldn't it? If you have a patient who dies in, say, 2002 and then something similar occurs in 2004 and in 2006, you might want to look back to see if there's a trend between patients dying with similar circumstances.

A. Mm-hm. Yes.

THE CHAIRMAN: But you can't do that unless you keep the audit records.

A. That is correct. But I don't know whether records were kept at that time and if they were retained or not.

THE CHAIRMAN: Okay.

MR REID: Nothing further, Mr Chairman.

THE CHAIRMAN: Okay. Doctor, thank you very much for coming and helping us today. You're now free to leave.

Thank you.

(The witness withdrew)

Ladies and gentlemen, we've got Dr O'Hare by video link, and that will take just a few moments after 2 o'clock, so we'll resume at 2.15.

(1.15 pm)

(The Short Adjournment)

(2.15 pm)

DR BERNADETTE O'HARE (called)

Questions from MR REID

(The witness appeared via video link)

THE CHAIRMAN: Doctor, can you tell us who you can see?

A. At the moment, I think I can see you. It's a little pixellated, but I think that's fine.

THE CHAIRMAN: Okay. My name is John O'Hara, I'm the chairman of the inquiry, but most of the questions which are going to be asked to you will be asked by David Reid, who I think will come up on the screen in front of you in a moment or two. He will ask you the questions, subject to any interventions from the floor in Banbridge; is that okay?

A. That's fine. Can you hear me okay?

THE CHAIRMAN: We can hear you clearly.

A. I'm ready to start.

THE CHAIRMAN: Thank you very much. Here is Mr Reid.

MR REID: Dr O'Hare, I am aware that because of the way in which we're conducting this exercise, there seems to be a 4 to 5 second delay in the audio. So what I'll do is I will wait until after you've answered the questions for a few seconds and if you wouldn't mind also waiting just until the end of any of my questions before responding.

A. Yes. I agree.

Q. Can I confirm with you that you have access to your witness statements, some of the documents in file 090 -- which are Claire Roberts' notes and records from the Children's Hospital -- and the expert reports of Dr Scott-Jupp and Professor Neville?

A. I have access to the clinical notes, I have access to my witness statements, I have access to Dr Volprecht's witness statement, and I have access to both of the expert witnesses that you've named. There will be some things that I just couldn't manage to print off, but I've read most of them and I'll be happy for you to read them out to me.

Q. That's excellent, thank you. Can I confirm that your witness statements are WS135/1 and 135/2? And you have also made a correction to your witness statement, which is now references WS135/1, page 24, and that's about the noting of the sodium result of 132 in or around midnight

of 21 into 22 October.

A. That's correct.

Q. Can I ask you if you will adopt those statements of yours as the evidence to the inquiry?

A. Yes.

Q. Thank you, doctor. If I can bring up your CV -- and I am aware that not everything that's brought up on the screen you have access to. The reference is 311-022-005. The page we're showing on the screen is the fifth page of your CV showing the training posts where you were between August 1988 and February 2000.

Can I confirm with you, doctor: you had been a registrar for almost a year by October 1996; is that correct?

A. Yes. If you just check below that, I think you'll find that I was a registrar in Australia prior to that.

Q. Yes. You were a resident registrar in paediatrics at the Brisbane Children's Hospital and the Mater Children's Hospital in Sidney and then you were locum registrar in paediatric neurology between October 1991 and January 1992. But you started work as a specialist paediatric registrar at the Children's Hospital in December 1995; is that correct?

A. Towards the end of December 1995, I would have started on my rotation. I completed a diploma in tropical

medicine just prior to this and it ended just in the days coming up to Christmas, so towards the end of December 1995.

Q. If you can refer to your first witness statement, page 2, question 1, that's 135/1, page 2. You say:

"At the time of the child's death I had nine months and three weeks' experience as a paediatric registrar. I started my training in the Children's Hospital, 1 August 1996, having worked in the Ulster Hospital Dundonald prior to this."

A. That's correct. What I've written is as you read out.

Q. Is it that you started in the Children's Hospital in December or was it August or was it December and then you were in the Ulster for a bit and then back in August?

A. Okay. So when I completed the diploma in tropical medicine, I would have come back, possibly done one week in the Ulster Hospital, then come 1 January that year, I would have continued and I would have continued to the end of July, at which time I would have transferred to the Royal Belfast Hospital For Sick Children.

Q. Just in terms of the Children's Hospital, it's a question that has been asked of several of the witnesses: what textbooks were available for reference on the ward in October 1996 at the Children's Hospital?

A. I don't recollect what textbooks were available in 1996.
Q. Would have you had access to, for example, Forfar & Arneil or Nelson's textbook on paediatrics?
A. Those textbooks were available. They were in a library on the top floor, that's the third floor of the old building. So they were certainly in the hospital in the library. They may have been in the ward, I don't recollect.
Q. Would you have had access to the British National Formulary for medication on the ward?
A. Yes.
Q. Thank you. Before October 1996, did you have any awareness of the case of Adam Strain and the subsequent inquest into his death?
A. No.
Q. You hadn't heard any discussions or conversations or anything of that nature in the Children's Hospital at any point during 1996?
A. As far as I recollect, I don't record any conversations about Adam Strain.
Q. Okay. If I can bring you to 21 October 1996. If you can refer in your file to 090-012-014, which is the A&E note taken by Dr Puthucheary; do you have that?
A. Yes. I don't have it, but I'm very familiar with it.
Q. In that, he goes through her history. At the end of the

history, at the bottom in primary diagnosis, he says:

"Encephalitis?"

And then there's a signature by you in the middle, beside the word "admit". That was your signature admitting Claire to Allen Ward, isn't that correct?

A. That's correct.

Q. Then if we bring up your note on Claire's admission to Allen Ward, 090-022-050. If we just pull up alongside that, for the people in Banbridge, 051 as well. On pages 50 and 51, this is you taking a history and a record of the examination of Claire; is that right?

A. Yes. That's correct.

Q. In that, we can see that you record that Claire was:

"Vomiting at 3 pm and every hour since. Slurred speech and drowsy. Off form yesterday. Loose motion three days ago. History of severe learning difficulties."

Her seizure history and then on the opposite side of the page, we have your examination:

"Fundi was normal, discs not blurred. Sit up and stares vacantly. Query ataxic."

And the fact that she had cogwheel rigidity in her right arm.

What was your view generally of Claire's symptoms on admission?

A. I have to be clear with you, sir. I recollect a snapshot of examining Claire, I don't recollect the whole admission, differential, et cetera, okay? So what I will do for you is I will interpret my notes for the inquiry as best I can.

Q. Please do.

A. Okay. As you correctly say, this was a child who had been vomiting every hour since 3 pm on the background of her severe learning difficulties, having had seizures between six months and one year, which were controlled by sodium valproate. And it then goes on into a detailed developmental history, the speech, the hearing, the vision, et cetera.

Then in the "gross motor", I have written something that is relevant to the examination, so she could walk up and downstairs and she favoured the left-hand side of her body. That's on the first page.

Q. Yes.

A. So that was a very important part of that history. She went to Torbank Special School and was under the care of Dr Gaston. There was another part of the history. Recently tried on Ritalin but side effects, became agitated and had a dry mouth.

If we turn to the second page, 022-051, I continue with my examination. Her temperature was 37, which is

afebrile. The heart sounded normal to me, the pulse rate was within normal range at 80 per minute, the abdomen was soft and not tender and there were no masses. Specifically, there was no hepatomegaly, no big liver. I then examined her central nervous system, and you can see that I have written "fundi normal" and the "discs were not blurred". And the importance of that finding we can discuss as we go along.

Pupils were equal and reacting to light; that's the "PEARL". Then I have examined the remainder of the central cranial nerves. I haven't done them all, I have done VII, IX and X and I have ticked to indicate these were normal.

I then tried to sit her up, it seems, and this is the part of the examination I do recollect. I tried to get Claire to sit up or I got her to sit up, as far as I can recollect, and I would done that in order to visualise her fundi, to look with an ophthalmoscope -- a special light -- at the back of the eyes. When she was doing that, I obviously queried, is she a little ataxic, unsteady, when sitting up.

Then I went to the peripheral nervous system examination which you referred to, and I've written in the upper limb there was cogwheel rigidity. That means there was increased tone, but it's not constantly

increased. When you bend the child's arm up it's cogwheel, so it goes up in a stuttering manner.

I've recorded for the rest of my tone examination for in the upper and the lowers limbs that there was increased tone.

I then examined her reflexes. That's where we use a reflex hammer and try and elicit a jerk. As you'll see there, there's a difference between the right side and left side. The right side has 2 pluses throughout most of the BJ -- the BJ means "biceps jerk" -- triceps jerk, supinator jerk -- that's "SJ" -- the knee-jerk, ankle jerk, and P stands for plantars. There's two downward arrows and that means downgoing, and downgoing is normal.

Below that I have written "clonus" and that's on both sides, both right and left. So in order to interpret those signs, they're asymmetrical, the right is different to the left; okay? The clonus just means arrhythmic movement, and usually best elicited at the ankle joint when you suddenly bend the ankle up. So for example when you bend the ankle up, the ankle joint shakes and it's a marker of usually an upper motor neurone lesion or something, damage or whatever.

When I examined her, I would have been examining her in light of the fact -- and I go back to the history

here, 090-022-050 -- favours the left side of her body; okay? Favouring the left side of the body in a child means that the right side -- if you favour the left, it's the best side. The right side didn't work as well. So I would interpret those CNS findings in the light of that history I've written down.

Q. That's very helpful, doctor. In terms of the abnormal findings, if we put them that way, of the history, you would have found obviously that the vomiting was abnormal, slurred speech and drowsiness was abnormal, the fact that she was off form as abnormal, and the cogwheel rigidity was abnormal. Would you include also the clonus, would that be abnormal as well? Is that a fair summary of the abnormal findings?

A. No, that's not a fair summary. Your history was fairly summarised. It's abnormal to be vomiting and abnormal to have slurred speech and it's abnormal to be drowsy; okay? The examination must be interpreted in what the child was like normally; okay?

So in order to interpret those examination findings, you would have needed to know how was the child last week or the week before; okay? And what would have aided me in that interpretation would have been the fact that she favoured her left side, and as I've said, favouring the left side means that was the better side.

Children favour the side that's better.

So the favouring of the left side is in keeping with my findings, which, for the right side, was increased tone, and for the left side, there's normal tone.

Q. Okay. If I can refer you to your witness statement at page 20, it states that you believe -- I'll allow you to just get page 20 of your witness statement. 135/1, page 20.

A. Would I suggest, sir, that you read it out?

Q. You state:

"I believe Claire was unwell, but was difficult to assess in view of her past medical history."

Can I ask you, doctor, what made her difficult to assess in view of her past medical history?

A. So as I just explained in some detail, the past medical history of favouring one side over the other, the past medical history of cognitive delay, I found it difficult to assess her in view of that.

Q. Obviously, you did a central nervous system examination at that time. Are you aware of the Glasgow Coma Scale?

A. Yes.

Q. If you were to assign Claire a Glasgow Coma Scale score at that point on her admission to Allen Ward -- and if I can assist, 090-039-137 is Claire's later central nervous system observation chart. What Glasgow Coma

Scale would you have afforded Claire at that point?

A. I think I have to be cautious about retrospectively assigning a Glasgow Coma Scale. I didn't do it at the time. You may ask maybe one of the expert witnesses, one of the neurologists to do it. I'm happy to work through it together, but I think we have to be very cautious because it wasn't specifically done at the time.

Q. That's duly noted, doctor. If you would be able to, on the basis of the examination you did, able to assign her a Glasgow Coma Scale according to the numbers on page 137, that would be helpful.

A. Okay, I will try, but I don't think it will be a full assessment. The first part of the Glasgow Coma Score is the eyes, and there are four parts, as I think everybody can see. So "Responds spontaneously to speech, to pain, none".

Looking at what I've examined, I'm looking at she sits up, I seem to have been able to examine the fundi, I presume her eyes were open to do that, you can't do with it her eyes closed. So I'm assuming she may have had a 4 for eyes.

Moving to best verbal response, and again I'm doing this purely from the notes, slurred speech. So if we look at best verbal response, we can say

inappropriate words, which is number 3, or confused, number 4. So say we say a 4 or a 3 for the speech.

Best motor response. If we look at my examination, you can say power not assessed. Okay? So she obviously was not able to obey commands. Below that is written: not responding to parents' voice, intermittently responding to deep pain. I would have gauged that to be a 4. And that's at 11. At the worst case scenario -- it depends if you took the verbal as a 4 -- then you would say 12.

Q. So a Glasgow Coma Scale of 11 or 12. If I can refer you in your own witness statement to page 6 of 135/1; do you have that there?

A. Yes.

Q. Firstly, if I can just ask, who would have been present when you were doing the examination? Would your SHO have been present and would any nurses have been present at that time?

A. I have no recollection of who was present. What the normal practice would have been, if the A&E was very busy, the SHO would have continued to see other patients. If it was quieter, if he was interested, then he would have joined me, but I have no recollection of what happened in this case.

Q. And we heard from a registrar colleague of yours earlier

today, Dr Bartholome, and she said that at one point during the evening, between 10 pm and 5 am, the only doctors covering the wards would have been one registrar and one SHO. Would that have been your recollection in 1996 of the on-call shift?

A. I'm sure there was one registrar covering, I think, about 120 patients, which included four ICU beds. There would have been one SHO, I think, in A&E, and there would have been one on the ward, so yes, as far as I can recollect.

Q. Looking at your witness statement, at page 6, which you have before you, if I can refer you to question 11(d), you say:

"I appear to have written a continuation sheet in A&E when I reviewed the patient. My working diagnosis was a viral illness."

If I can stop at that point, we'll move on to the rest of the answer shortly. What was your basis for viral illness from the history and examination that you took?

A. So the basis for writing a viral illness would have been on interpretation of the notes, that the child was vomiting that afternoon, that she had had a loose motion three days ago, so it would have been: is this a viral gastro-enteritis? The symptoms were of that nature.

Q. Where would the virus have been? Would it have been a stomach virus, would it have been a virus elsewhere in the body? Where would you have thought the virus would have been?
A. Given the nature of her symptoms, ie they were gastrointestinal, I would have suspected they were in the gastrointestinal system.
Q. So a tummy bug effectively?
A. Yes.
Q. How do you account, with a possible diagnosis of a viral illness, for the slurred speech and the drowsiness?
A. If we go back to where I've written the possible diagnosis, I think I've written viral illness, then I've written encephalitis and I've stroked it out. And then below that I've written:

"IV diazepam if query seizure activity."

So on interpretation of these notes, I think this child had a viral illness. I think her slurred speech and drowsiness -- I felt it may have been something to do with seizure activity by the fact that I've written:

"IV diazepam if there's any visible seizure activity".

I have not written, and I can't recall whether I thought, was this in relation to the seizure, it obviously -- she wasn't visibly seizing in front of me

that I could see. Was this a postictal period? Did she have a seizure earlier in the day that the parents didn't witness or didn't remember or didn't see, or was this, as we've heard much more about later on, was this a non-convulsive status. So I haven't written any of those, but I was obviously suspecting something along those lines.

Q. Do you think you would have considered non-fitting status as a possibility at that time?

A. I think I would have considered it at that time. I had never seen it before. I've seen it once since, but I would have considered it at that time. But I can't be sure as I haven't recorded that.

Q. Would you consider that status epilepticus, whether fitting or non-fitting, would be a cause for concern, even perhaps an emergency situation?

A. So status epilepticus and non-convulsive status, as far as I know -- but you'll have to check with my neurology colleagues about this -- they're two different things. Status epilepticus is when a child is visibly fitting and you can see it and we do try to control those within about 30 minutes. So we do regard that as a seizure. Non-convulsive status, I think you're better to speak to your neurology experts about that. It's a much more difficult thing.

Q. Can I refer briefly you -- and I know you don't have it in front of you -- to an extract from Nelson's Textbook on Paediatrics. That's 311-018-015. I will read out for you what it says. It says, as exactly as you've said:

"Status epilepticus is a medical emergency that requires an organised and skilful approach in order to minimise the associated mortality and morbidity."

You would agree with that?

A. Yes.

Q. If you considered that status was a possibility, do you consider that you maybe should have treated it or noted it or made contact with a consultant?

A. Sir, I think your question to me was: would I have known about a condition of non-convulsive status in 1996?

Q. Yes.

A. My answer to you is: I think I would have known about that condition. Okay? I do not know if I considered it, and I think I said this: I do not know if I considered it in terms of this child.

Q. Very well. You did, however, consider that Claire may have had a subclinical seizure because you've written that you would give diazepam if there were any seizures observed. Would that have raised any cause for concern with you in a child such as Claire?

A. Sorry, which aspect of it raised concern? I didn't understand your question.

Q. The fact that you considered that Claire may have suffered a subclinical seizure and you had written that diazepam should be administered if there were any further seizures. Did that make Claire a patient of concern for you?

A. I think I said that -- because I've written that, I would have thought along those lines. She was a concern for me and that's why I have written:

"Reassess later on in the evening."

Q. On page 6 of your statement, which you have in front of you, 135/1, page 6, continuing on after your working diagnosis of a viral illness:

"I appeared to have also written 'encephalitis' and then deleted it. My reason for deleting this as a differential diagnosis was the absence of a fever, as encephalitis with an infective aetiology is associated with fever."

Would you have been surprised that Dr Sands may have restored encephalitis as a possible diagnosis 12 hours later in the absence of a fever?

A. I mean ... Was I surprised that Dr Sands thought about encephalitis 12 hours later? Is that the question?

Q. Yes.

MS WOODS: Mr Chairman, can we be absolutely clear about timings here? I don't think it's 12 hours later. Dr O'Hare examined Claire at 8 pm and I believe Dr Sands' revision was some time around lunchtime.

MR REID: I think the timing of the revision is somewhat disputed.

MS WOODS: We certainly know that it wasn't at 8 am.

MR REID: That's fair.

THE CHAIRMAN: 15-plus hours later.

MR REID: Yes, doctor. Would you have been surprised that Dr Sands restored encephalitis as a diagnosis around noon the next day, that's about 15 hours later?

A. So did he restore it as a diagnosis or a differential diagnosis?

Q. As a differential.

A. Differential diagnosis, so I think it's important to remember that everyone approaches these things differently and we approach them at different times in our career in different ways. Some people write the working diagnosis -- for example, mine was viral illness -- and then proceed to write a long list of differential diagnoses; okay? Other people write what they think is the problem. The important thing to remember is that diagnosis is a process, it's not a one-off event, you don't go along to a child,

particularly a child as complex as this, and say: this is the problem. You make your diagnosis or your working diagnosis, you review the child, you try and decide am I right, did I miss something. It's very much a process and it's very much of a personal -- whether you list everything or whether you do not list everything. It wouldn't surprise me in the least that someone decided to list it as a differential diagnosis.

Q. Are you therefore saying, doctor, that you had encephalitis as a differential diagnosis, but were not considering it as a primary diagnosis at the time?

A. Again, from interpretation of my notes, I've written down encephalitis and stroked it out, which makes me think that I would have thought about it. The other thing that makes me think I would have thought about it is the SHO has written it down as his sole diagnosis, so I would certainly have given it a lot of consideration, did this child have encephalitis; okay? And I think at some stage in my witness statement I say in the absence of a fever I felt it was unlikely that she had encephalitis. In the absence of a raised pulse rate and all of the other things that we associate with infection.

Q. Claire had a white cell count, which was a result that came in that morning, of 16.52. The reference for

that is 090-032-108. The range on the biochemistry sheet says that the normal reference range is 4 to 11. And this result was obviously 16.52. How would that have factored into your thinking? Well, first of all, were you aware of that result at any point during your management of Claire as far as you can recall?

A. I have no recollection that I was aware or not aware of that result.

Q. If you had been aware of that result for the white cell count, would that have factored into your thinking or changed your thinking in any way about Claire's possible diagnosis?

MS WOODS: Mr Chairman, could I interrupt? I just want to make sure we're being clear in the chronology. My understanding is that the questions are being based on Dr O'Hare's initial examination at 8 pm. Of course, the blood results would not have been available at that time. They weren't available until some time later in the evening.

MR REID: I thank my learned friend, but I'm asking generally to the doctor: if she had been aware of the white cell count, how that would have affected any differential diagnosis made earlier. If you'd been aware of that 16.52 result, doctor, whenever you made your differential diagnosis -- and I accept you didn't

have that when you first made your differential diagnosis -- would that have factored into your thinking in any way? Would that have impacted upon it?

A. Thank you. You've read out the reference range. As far as I recall, you said it was between -- sorry?

Q. 4,000 and 11,000s per UL.

A. This would be the reference range that's often quoted on laboratory results, but it's very important to remember that children's white cell count very much varies according to their age. So for someone of Claire's age, 9 years, it will be slightly higher than that. A normal I would take up to 13.5. So the 16.5 is outside what I'd expect to be normal, it's slightly outside of it, and I think we do not have whether or not that was a lymphocytes or polymorphs and it wouldn't actually have helped a lot had I had it at 8 pm, which I did not have.

White cell count is a very non-specific sign; okay? For example, if it's all polymorphs one tends to think more of a bacterial infection; if it's lymphocytes, one tends to think more of a viral infection. I didn't have the results at 8 pm. As far as I know, I didn't have them at any time. Had I had them, I would have factored it in, but it wouldn't have majorly influenced anything I did.

Q. In general, the fact it was raised shows there may have been some infectious cause behind that, no matter which, whether it was bacterial or viral?
A. As I said, it's a very non-specific finding. It may be found in infection, but it can also, for example, after a child has had a seizure it's quite common to have a raised white cell count.
Q. Can I ask you about other investigations that you did or did not do in regards to Claire? If I can refer you to your witness statement, 135/1, page 10. This is question 13(c).
MS WOODS: Mr Chairman, just before we move on to what is a slightly different subject. Dr O'Hare, right back towards the start of her evidence, I think it's page 116 of our [draft] transcript, was going through the neurological examination that she made and she was describing how one of her findings was that the fundi were normal. At that stage, she said "We'll come on to that". I wonder if that could be dealt with before we do move on to investigations.
MR REID: Doctor, you have said about the fundi being normal and that that was important. Would you care to explain that further for us, please?
A. Okay, thank you for that opportunity. When we think of normal fundi, it helps us to -- I think we need to

consider it in the context of the differential diagnosis. So for example, if it was infectious, if she had meningitis sometimes these children do have papilloedema or abnormal fundi. Cerebral oedema, you can have abnormal fundi. So there's many reasons why you might have abnormal fundi -- brain tumour, abnormal fundi. So these are the types of things that would make you -- abnormal fundi would have made you think of those things, and I was reassured, I believe, on interpretation of the notes, that the fundi were normal and the discs weren't blurred. She did not have papilloedema. And that would have lowered -- not ruled out -- my suspicions of the differentials that I've mentioned to you.

Q. Thank you, doctor. If I can then turn to the witness statement at page 10, which you should have in front of you. You were asked:

"State whether you considered carrying out more extensive biochemical tests -- including liver function tests, calcium, glucose, ammonia and toxicology -- on Claire's admission to Allen Ward."

And your answer there is:

"There was no history of intoxication and I did not consider sending laboratory tests for toxicology at this stage."

Then you also explain about the other tests.

The point is raised by the inquiry's experts as to the investigations that should have been carried out. Dr Scott-Jupp says that he would have expected more extensive biochemical tests including those tests and that's also a comment repeated by Professor Neville. The reference for Dr Scott-Jupp is 234-002-002. Hopefully you have had the opportunity to see what Dr Scott-Jupp and Professor Neville have said about other possible investigations, doctor. Do you consider that you should have made more investigations into Claire's condition, including those tests?

A. Certainly what we teach our students nowadays is you don't do a test on a child unless you're looking for something; okay? So I'm going to answer this question -- I can't answer it as a block "I should have done more tests", I can't answer it like a this. I need to go through each test that was raised by the expert witnesses one by one, if that's okay by you, sir.

Q. Yes.

A. I will start, with your permission, with the serum calcium. Calcium can be high or it can be low. It's very unusual for it to be associated with seizures in a child of this age. Low calcium would commonly be associated with seizures in a neonate, but very

uncommonly of a child of this age. If a child of this age had hypocalcaemia, I'd expect them to have tetany -- that is muscle spasms -- of their fingers. If they had high calcium, they would have a much longer history of malaise, unwell, generally unwell. So I wouldn't have thought of doing serum calcium after hours on this child, no.

If we move on to serum glucose, that was done as a routine part of the U&E and I think it's recorded on the third page of my written notes that it was 6.6, which is within the normal limits. If we think about whether we should have done liver function tests -- and I think, to answer this, we need to think very carefully about it. Liver function tests, I would have to think: how would that have helped me on that night? Number one, I don't know if I would have got the results back, but let's assume I would have got the results back, how would they have helped me? So we had a child with a change in her level of consciousness, and I think the question mark was should we have checked her liver function, might she have had hepatic encephalopathy, for example, resulting in abnormal CNS findings.

I have never seen that in a child without jaundice, without a big liver, without the stigmata of liver disease. I'm not saying it doesn't exist, I haven't

seen it since then either. So I think it's very unlikely that she had hepatic encephalopathy, so for that reason I wouldn't have done them, if that was the thinking behind whether we should do the LFTs.

If it was, let's think about more unusual conditions, something like Reye's syndrome, which I've seen mentioned by different witnesses. So Reye's syndrome is a sort of catch-all thing. It describes a child who has abnormal liver function and encephalopathy. So therefore, it's reasonable to think in terms of this child, could she have had Reye's syndrome.

However, Reye's syndrome is a diagnosis that was often made in the 70s and 80s and hasn't been made in the recent past simply because we have much better diagnostics. We now diagnose children who have inborn errors of metabolism much better.

I also had the information that her glucose was entirely normal. And that -- the ammonia would have come into that thinking. Did we think about Reye's syndrome, did we think about an inborn error of metabolism? And I can't say to you whether I thought about them or didn't think about them. I know I didn't do them. Whether I should have done them after hours or whether there are tests I would have expected to be done

should her condition not improve or should her condition deteriorate. I think it is more likely that they would have thought those will be tests we will do if things don't go according to plan.

I'm not sure, as I said, that the LFTs would have been back and I'm not sure that ammonia would have been back at night-time. And on subsequent assessment of Claire's notes, I think she was thoroughly investigated in 1987, with serum amino and organic acids and urine organic acids -- pyruvate and lactate -- for an inborn error of metabolism. I don't know if I knew that at the time, but I'm saying this was also an important part of that evidence.

However, in balance, I did say she had a viral infection. It possibly could have been hepatitis A. It would have been reasonable to do the liver function tests, so in hindsight I would have done the liver function tests.

Q. Thank you, doctor.

A. In terms of a toxic screen, Claire's family didn't give me any note that she had taken anything. She fed herself with supervision, they hadn't said she had taken anything unusual or they had found anything. Parents may not always give a history of that, but at that stage there was no history of her having taken anything

unusual. However, I think it would have been very reasonable to pursue that line of investigation if she deteriorated, didn't improve, possibly the following day.

The other thought in terms of investigations I think someone has mentioned was urine osmolality and should urine osmolality have been done at that time. And I think there was some discussion in the last couple of days how easy it was or how difficult it was to get urine osmolality.

So I think it's -- at 8 pm, I did not have the urea and electrolyte results, so it wouldn't have occurred to me to do urine osmolality at that stage. In terms of -- and can I just bring your attention to one document? It's called Patient Safety Alert -- I'll try and find the number, but I think it's in your documents.

Q. I think we're aware of the Patient Safety Alert, doctor.

A. On the third page of that, it says:

"Urine chemistry may be helpful in a small number of high-risk cases."

So it wouldn't have occurred to me to do urine chemistry at that stage.

Q. Thank you.

A. I'm happy to ...

Q. I should say, for the sake of balance, Scott-Jupp does

commend you for a clear and competently set out admission note, he says that the important points in the history are clear and a competent clinical examination recorded. And Professor Neville likewise, thinks you performed a competent examination. However, if I can bring up reference 232-002-003 of Professor Neville's report, he has a list of what he considers the differential diagnoses should have been. There's seven items, five of which he would have expected a paediatric registrar to have suggested.

You did suggest encephalitis, you did suggest infection. The metabolic disorders, including acute liver failure/hyponatraemia with cerebral oedema. Do you consider that you should have suggested that as a possible differential diagnosis?

A. I think I'd have to discuss them one by one again, sir, because he has given a long list. I think the first one he mentioned was -- sorry, could you help me with the first one in his list?

Q. The first one is encephalitis, which you did consider and crossed out.

A. Yes.

Q. I don't need you to go into that. The second is overwhelming infection, and I think you have considered -- you stated that you did consider

infection. I'm just asking about the third one, "metabolic disorders, including acute liver failure/hyponatraemia with cerebral oedema". Do you agree with Professor Neville that you should have considered that as a potential differential diagnosis?

A. Just before I start on that, am I correct that he also said I should have considered an intracranial haemorrhage, hydrocephalus, poisoning.

Q. He does say you should have considered an intracranial haemorrhage. He says you may not have been aware of a hydrocephalus, but you should have been aware of poisoning and he wouldn't have expected you to be aware of non-convulsive status.

THE CHAIRMAN: Just a moment. Ms Woods?

MS WOODS: While we're dealing with what Professor Neville says he would expect a competent paediatric registrar to consider and not to consider, on the face of it, there's an inconsistency in Professor Neville's report. So on page 232-002-003, he suggests that someone in Dr O'Hare's position should have considered metabolic disorders, including acute hyponatraemia with cerebral oedema, but on page 5 of his report he seems there to suggest that hyponatraemia/cerebral oedema, is not one of the differentials that someone in Dr O'Hare's position should consider.

MR REID: Perhaps if that can be brought up on the screen -- 232-002-005 -- for the benefit of everyone.

MS WOODS: It's on to the next page where he sets out his caveat. So Mr Chairman, you'll see about a third of the way down the page there's a little asterisk, and it says:

"These are the diagnoses that I think should have been within the competence of a paediatric registrar."

And if we look at the top of the page, there's no asterisk next to "hyponatraemia/cerebral oedema". But as I say, there seems to be some internal inconsistency in this report.

MR REID: I have to agree, I think, on that. There are eight differential diagnoses there and there are seven in the earlier stage in the report.

Can I ask you if we can flick back to page 5 there, please? The point was metabolic disorders and Professor Neville says:

"A combination of encephalopathy with acute liver disease, Reye's syndrome, is uncommon and readily excluded by liver function blood tests and would modify treatment."

I think you have accepted now that maybe you should have done further investigations in terms of the liver function tests, but -- that is accepted by you, is that

correct?

A. I think there's a slight misunderstanding. I accepted that I should have done a liver function test, given that I'd raised the possibility of gastro-enteritis and a viral infection that may have been hepatitis A. I think it is very unlikely that she would have had hepatic encephalopathy and that would have been a cause of her change in neurological status.

Q. Why did you not note the various diagnoses that you ruled out in the notes? Do you consider that that would have been of assistance to other clinicians -- for example, your junior doctor -- to know which diagnoses had been ruled out by yourself?

A. As I think I said, this is very much a personal thing. For example, now I would write "working diagnosis" and then a long list of differential diagnoses. What investigations I was doing to try and rule them in or rule them out. And if there were acutely unwell or they needed acute management, what management I planned to do. At that stage, it doesn't appear to have been my practice to write everything that I was thinking down. And of course, I don't recall, so I don't know what I was thinking. But I think we need to go back to Professor Neville's long list of potential diagnoses and discuss them.

I'm not comfortable with discussing just number 3; I think we need to discuss all of them. Because he has listed all of these and he has said that a competent registrar should have thought of all of these or five of the seven. So I would be more comfortable if we could discuss them one by one.

Q. Which particular ones would you like to discuss, doctor?

THE CHAIRMAN: Let's discuss them all one by one. You have dealt with number 3. The next one, number 4, is intracranial haemorrhage.

A. We can start at number 4. There was no headache and there was no history of her having a bleeding disorder. I didn't have the results at the time, but I would have known her platelets later on that day, and her platelets, as we can see, they were 422. It would be unlikely, but not impossible, that this child had had an intracranial haemorrhage. However, as we know from subsequent investigation -- the CT scan, in fact -- she did not have an intracranial haemorrhage.

Moving on to hydrocephalus, I presume Professor Neville meant this in the context of a brain tumour and the sudden onset of hydrocephalus. Hydrocephalus is too much fluid on the brain. It can be congenital or it can be acquired. Congenital hydrocephalus, of course, presents very much earlier in

life and there's absolutely no way that this child could have had congenital hydrocephalus. Acquired hydrocephalus, as I say, usually happens when there's a block to the flow of the CSF around the brain, and that's why it's mentioned, I assume, he's just listed -- I assume that's what he meant.

Poisoning I think I have mentioned. The parents didn't give any history of poison. I have no reason to think they wouldn't have told me if the child had taken anything, given that she required supervision with feeding. Non-convulsive status I am going to leave, but I do want to go back a little bit to encephalitis.

As I mentioned, encephalitis is usually associated with fever. I assessed her and I obviously decided she didn't have it. I think it is also important to remember that the subsequent investigations, which sadly are now available to us, also confirm that she didn't have encephalitis.

In terms of infection, I think Professor Neville says that the only reason he mentions it or listed it as one of those seven that he listed is because it was treatable. Now, I think we have to be very careful about listing things in differentials simply because they're treatable. What else do we list? I think we have to be very careful listing things because

they're treatable. I obviously assessed this child and didn't think she had an overwhelming infection. Her pulse rate was normal, her blood pressure was normal, she didn't have a fever. So it appears that it wasn't my practice at the time to list highly unlikely differential diagnoses just because they're treatable. And it wouldn't have been my practice to treat highly unlikely differential diagnoses because I think you have to remember that treatment also has its risks. So for example if I had sort of listed overwhelming infection, for example, and my SHO had read that on the ward and said, "Dr O'Hare thinks this child has overwhelming infection, I think I'll give her some antibiotics". And what if that child is in anaphylaxis to those antibiotics? Then people are saying, "Why did you give this child antibiotics? She didn't have any signs of infection".

(Intervention by the stenographer)

MR REID: Sorry, doctor. If you can just slow down. The stenographer has to keep up.

A. Sorry, sorry.

Q. You were saying if the doctor decided to give her antibiotics and the patient was in anaphylaxis.

A. I think one has to be careful. Everything we do in medicine, it's a balance of the risks and the benefits.

So for me to write down "maybe overwhelming infection", maybe a junior doctor would misinterpret that and decide to start antibiotics. There's always risks and benefits to everything we do. I think everything we do has to be balanced with the downside.

And then going to, I think really your original question, sir, his fourth, which was metabolic or hyponatraemia; is that correct?

Q. Yes.

THE CHAIRMAN: It's the third.

A. Third question, yes. Why did I not consider hyponatraemia in this child? I didn't have her urea and electrolyte results at 8 pm that evening. She was coming in from home, she would not have been on IV fluids, I would have thought it -- I wouldn't have considered it at that time in that child.

MR REID: Can I ask you then just about your treatment? If we turn to your witness statement at page 3, you say that your initial management was to give Claire IV fluids and should there be any seizure activity, to treat with IV diazepam and to review her after her IV fluids.

Can I ask you: did you direct any treatment other than IV fluids and monitoring?

A. I don't recall the event. I can only interpret what

I've written. I've written "IV fluids" and, if there was any seizure activity, to give her IV diazepam and reassess. So that's all I can help the inquiry with, I'm afraid.

Q. Would it have been your normal practice --

A. Sorry.

Q. Go ahead.

A. I was just about to say: if I'd ordered any other treatment, it would have been my normal practice to record it.

Q. Would it have been your practice to direct nursing staff as to the frequency or type of observations that you would want overnight of Claire?

A. I would have assumed that the routine observations would have been done. I believe they were temperature, pulse and respiratory rate at that time, and they would have been done every four hours, so I would have assumed that would have happened as a routine.

Q. And can I ask, with the treatment of the IV fluids, were you treating for dehydration due to the vomiting and then observing Claire, hoping that her own immune system would respond to the viral infection?

A. I think I wasn't treating her for dehydration; I was treating her with maintenance fluids. There's nowhere in my notes that I've indicated I thought she was

dehydrated. On interpretation of the notes, there's no way she could have been dehydrated. Her pulse rate was within the normal range, her blood pressure was normal. I haven't indicated any concerns about dehydration. So I don't think it can be assumed that she was being treated for dehydration. I think it was noted that she was vomiting very frequently and therefore unlikely to be able to hydrate herself overnight and it was felt wise to give her maintenance fluids -- not extra fluids, not to rehydrate her. At no time was it thought to rehydrate this child because there was no evidence of dehydration.

Going back to was I hoping her immune system would cure the viral infection, I think you said. Viral -- and this is, as you know, I'm sure, very, very common in children. They often would present with a gastro-enteritis and they often recover. As that was my working diagnosis -- the other important thing to remember is there's very little treatment available -- certainly in 1996, even in 2012 -- for viral illnesses. So there wouldn't have been any routine treatment and the treatment in paediatrics has and remains very much supportive. You support the child until they recover, while observing them for any change or deterioration.

Q. Can I ask you about your note, the final thing you say

in your note at that point, which is "reassess after fluids"? What did you mean by that and what did you expect to see?

A. That would have been a note for me to reassess that child after she had had fluids for a couple of hours.

Q. And what would you have wanted to see or not wanted to see in terms of Claire's condition at, say, midnight after that initial period of fluids?

A. Again, going back to what I've written:

"Viral illness, query, if any query seizures, give diazepam."

So the reason for that reassessment would have been for quite a number of things, but one certainly would have been did this child have any seizures since I'd seen her in A&E, given that that's what I'd written. Was there any record of any seizures?

My other reason for readmitting [sic] and the other reason I would have assessed her was: was there any spike in fever from the time that I'd seen her at 8 pm, was there any spike in fever, was there change in her pulse rate, her respiratory rate and her blood pressure? I'm sure you have the notes, but as far as I can see from the records, there was no change in either her pulse rate, respiratory rate or blood pressure. So that review would have been for that reason.

At my review -- this is moving on to 12 midnight -- I also seem to have checked her for meningitis and I note that I hadn't written that in my current(?) review, so I assume I went back just to make sure. Children with meningitis often present with neck stiffness, so I would have went back just to make sure there were no signs of neck stiffness.

Q. When you went back at midnight, the note says:

"Slightly more responsive, no meningism [which is the neck stiffness you were saying]. Observe and reassess AM."

Before we come to looking at that note, I'm going to draw your attention to a letter from your instructing solicitors --

A. Sorry, sir --

Q. You can't hear?

A. Yes, that's better.

Q. Your solicitors have contacted the inquiry to say that there is a mistake in one of your statements, that you were under the mistaken belief that you had made the entry in the records at page 52, which listed the sodium result of 132. That is now appended to your witness statement at 135/1, page 24.

A. I'm sorry, I'm sorry, we really ... There's a real echo on what you're saying. I need the IT people to look at

that.
Q. Perhaps this might be a good time for a short ...
THE CHAIRMAN: Can you hear Mr Reid better now if he speaks more directly into the microphone? Is there an echo?
A. I can hear you perfectly well. There's an echo, I just can't hear.
MR REID: I will try and speak more directly into the microphone. Is that better, Dr O'Hare?
A. Let's try again.
Q. I'm speaking directly into the microphone now. Is that better?
A. That's fine.
Q. Okay. Your solicitors have contacted the inquiry to say that in your first witness statement you were under the mistaken belief that you made the entry in the records, which listed the sodium result of 132. And you have since realised that, in fact, this note was made by another doctor; is that correct?
A. Yes. What you've read out is correct, that is my letter to the inquiry. Let me give you a little bit of background to it. When I was reading these notes, I was doing them on the screen, I hadn't printed them off. And then when I came home to give evidence on 26 September before the inquiry was adjourned, I had the opportunity to print them off and look at them.

I looked at them carefully and I think -- I don't know if they are on the screen there, but you will agree that the glucose really does not look like my handwriting.

Q. If we can bring that up on the screen, it's 090-022-052. Since that wasn't your writing, do you have any knowledge of whether you were aware of the sodium result of 132 whenever you did your review at midnight?

A. I think I have to be very honest with you, sir: I'm quite clear the glucose wasn't written by my handwriting. The other results, I really am not sure whether it was written by me. I thought not because of the glucose, but I don't know.

THE CHAIRMAN: Doctor, if I can intervene: at 12 midnight, there are two lines which are written and then they seem to be followed by your signature; is that how you read it?

A. Yes.

THE CHAIRMAN: Do you believe that what is written below your signature and is then followed by Dr Volprecht's signature was not written by you?

A. I believe -- I don't know if it was written by me or not.

THE CHAIRMAN: Okay. I think what we're getting to is whether you knew at midnight what the sodium result was

and what the other results were. What is your best estimate of that?

A. I can't say if I knew or not, but I'm happy to answer. I was the senior doctor on call in the hospital and I was responsible for this child. So whether I knew or not, I can't be 100 per cent sure. But what I can say -- and I think I've given in my evidence -- this was a marginally low sodium and it may or may not have triggered a change in her management.

THE CHAIRMAN: Can I ask in this way: if you were not personally aware of those various results, including the sodium result, would you necessarily have expected Dr Volprecht or anybody else to draw them to your attention?

A. I think to answer that question, sir, I have to give you -- it is a very common thing to see a slightly low sodium in children. Records would say 45 per cent of children with meningitis, 30 per cent of children with bronchiolitis. It is incredibly common. In fact, I think in fact one of the other witnesses found this so common that they even thought this was normal. So I think it's just very marginally below normal and very, very common.

THE CHAIRMAN: Do I interpret that to mean that there is nothing in those results which would have triggered you

to change your plan for Claire's treatment?
A. I can only speak in general terms. I think many paediatricians would not have changed the fluids with those results in 1996.
THE CHAIRMAN: Okay. And is there anything in those results which, if you were not aware of them, you would have necessarily expected Dr Volprecht to contact you about?
A. No, sir.
THE CHAIRMAN: Okay. Thank you.
MR REID: You have written in your note, "Observe and reassess AM", doctor. What did you mean by "Reassess AM"?
A. Again, my interpretation of what I've written is that she would have been reassessed in the morning ward round. Bearing in mind when I'd last seen her, she was a little bit better, I was happy there was no meningism and my plan was she be reassessed at the post-take ward round.
Q. Would you have wanted to have seen fresh blood results in the morning?
A. I mean, we're very careful in children not to perform phlebotomy or take blood from them more than we absolutely have to. The children don't like it, the parent don't like it. So the usual practice would have been to do the ward round, make sure that at that review

it wasn't decided -- as you've said, LFTs could have been added, other tests could have been added. So generally speaking, people would have waited for the ward round, done the -- made the plan, taken the bloods all at one time with one needle injury -- needlestick.

Q. So would you have expected the bloods to have been repeated post ward round?

A. That depends very much on the child's condition. So if Claire had been feeling much better in the morning, then the fluids probably would have been stopped, as is the case in the vast majority of children who present to us with a viral illness. If her condition had deteriorated, then it would have been reasonable to repeat her bloods first thing in the morning, after the ward round.

Q. If Claire had been in Allen Ward from approximately 9 pm on the 21st, the evening of the 21st, and had vomited throughout the night and by the next morning, at the ward round of maybe around 11 am, had still not improved, would you have considered that a matter of concern?

A. I just want to make sure you do understand that I wasn't covering Allen Ward after 9 am on 22 October.

Q. I do. The query is about whether blood tests should have been repeated the next morning, and your point

is that if the child hadn't deteriorated or was getting better, then blood tests may not have been required. My point to you is that she had been on the ward for over 12 hours by the time of the ward round and had been vomiting throughout the night and was still not better by the next morning, by the time of the ward round.

In those circumstances -- and I know you weren't on the ward round -- would you have expected blood tests to have been done after that ward round?

A. I would have.

Q. Professor Neville has commented on the 132 result, which came in at some point during the evening, morning, of the 21st into 22 October. If I can bring up 232-002-004. He states that:

"On Claire's admission, many would have administered IV fluids of either 0.45 per cent or 0.9 per cent saline as a precautionary measure."

I am aware by the way that Dr Scott-Jupp says something different, but I will come to him in a moment. He says:

"The use of Solution No. 18 in a drowsy child should have been with a warning for urgent review and it would be appropriate to use restricted fluids and many would use a higher sodium concentration containing fluid. I think that a higher concentration of salt-containing

fluid regime should have been used when the initial low sodium level came back at midnight. The management with Solution No. 18 I have commented on as being potentially unwise, but certainly requiring careful monitoring of consciousness and of the sodium level in the plasma. When the first serum sodium concentration result returned at approximately midnight, either 0.45 per cent or 0.9 per cent saline should have been administered as a precautionary measure ..."

Although he does concede that not everyone would have done so:

"... plus a repeat test of the serum sodium concentration should have been carried out. The problem was there was no repeat serum sodium test 6 hours from the first test."

There are a number of points arising from that.

Firstly, do you accept what Professor Neville says about that when that result came back at midnight, that a different sodium solution should have been administered as a precautionary measure?

A. I think we first have to discuss the issue of Solution No. 18 before we can discuss that, the fluids that she was on, which were common practice at that time. Okay? Is that okay?

Q. Yes.

A. And this is the crux of the inquiry, so it is crucial that the inquiry understands what we were doing and why we were doing it. Can I ask the inquiry to go to document 096-022-143, please?

Q. We have that up on screen, doctor.

A. Thank you very much. I think it's important first to realise why we did what we did with children's fluids. So this document is from the Acute Paediatric Life Support. It's a document, I think, provided by Dr Dewi Evans, a general paediatrician, as part of his evidence. On page 246 we have, at the bottom, in table B3 -- is that ...

Q. Yes, that is up.

A. Okay. If we look at "sodium" and we look at "millimoles per kilo per day", and we see that for the first ten kilos -- this is what was recommended, this is what we all did. For the first 10 kilos, it says "2 to 4 millimoles per kilogram per day". And I think Claire was 24 kilograms.

For the second 10 kilograms, it says she should have 1 to 2 millimoles per kilogram per day, and for subsequent -- that is after 20 kilos -- she should have 0.5 to 1.

With your permission, I'm going to calculate what we thought her sodium requirement should have been in 1996.

Q. Just one moment, doctor. I will allow you to do that in a second. Just for the record, I don't think any expert has said that the calculation by Dr Volprecht, the initial calculation, was incorrect. Obviously, there's a question of what maybe should have been done after the midnight result, but certainly go on ahead with the calculation.

A. Thank you. I think it's important we do. This is an inquiry into hyponatraemia, it's an inquiry that's being going on for a long time. I think it's very important that we understand why these fluids were prescribed, the background of why, not the calculations about 64, but why Solution No. 18 was selected. This has been going on for a long time, it's affected a lot of people. I think it's crucially important that we understand this.

Q. Go ahead.

A. If we look at sodium, the first 10 kilos is 2 to 4 millimoles per kilogram. If we take the average of that, that's 3, and multiply by 10, we get 30. Are you happy with that?

Q. Yes.

A. The second 10 kilograms is 1 to 2, so if we take 1.5 as an average, because most people tend to go in the middle of a range, and we multiply it by 10, we get 15. Then

the subsequent kilograms is 0.5 to 1. If we take 1, I think Claire was 24 kilograms, so that would have been four more millimoles of sodium. Her sodium requirement, according to our guidelines, would have been 30 plus 15, which is 45, plus 4, which is 49; okay?

Q. Yes.

A. That's what we believed she would have required. If we look at the sodium solution she was prescribed, it was Solution No. 18. And I think -- on document 096-022-144, can I draw your attention to table B4, please?

Q. Yes, we have that.

A. What you see in that table is the sodium content of the different solutions that were available to us. There was nothing else. We had to choose one of these solutions. If you look at saline 0.18 per cent/dextrose 4 per cent. It's about the fifth one down.

Q. Yes.

A. Do you agree that there's 30 millimoles per litre of sodium in that solution?

Q. Yes, it's 30 there.

A. If we go back and say, "Okay, our way of working out, calculating, fluids in 1996, we would have thought she needed 49 millimoles of sodium". If we had given her more, we would have been worried about hypernatraemia.

That's what's in the standard APLS teaching. So there's 30 in the No.18 Solution and I think if you recall, she got 64 ml per hour, which works out at approximately 1.5 litres; okay?

Q. Yes.

A. Which I know works out at 1.5 litres. 1.5 litres of fluid would have provided 30 plus half of that, which is 15, or 45 millimoles of sodium. So what I said is she required 49, we would give her fluids where we believed she got 45. As close as possible to her sodium requirements; okay?

And I think we have to remember that these have been the standards in place for 50 years, Solution No. 18 was used. It was based on a paper in 1957 to say that children needed 3 millimoles of sodium per kilogram. And it was all based on this and it continued from this time. Before I worked in the Royal, I had worked in several teaching hospitals in several different countries and I don't remember that we did anything different in the Royal than we did anywhere else I worked. We would give Solution No. 18 to children.

Q. Yes, doctor. Thank you for that. To be fair to you, doctor, Dr Scott-Jupp, if we can pull up 234-002-002, he does state at the bottom:

"The IV fluid given was Solution No. 18. This was

absolutely the standard IV fluids given to most children needing fluids for any reason in 1996. This policy has changed over the last few years."

If I could turn over the page to page 3, please. Can I ask you, doctor --

MS WOODS: Mr Chairman, could I also for the sake of completeness -- you will of course also be aware that Dr Bingham, who was a consultant paediatrician and gave evidence at Claire's inquest, and his evidence was also that the Solution No. 18 was the standard fluid used in 1996.

THE CHAIRMAN: Thank you.

A. I think what is emerging is a picture of what the general consensus was, it was written in our textbooks it was written in the APLS. Could I draw your attention again to the document 096-022-144, please?

If I could draw your attention to just above table B4, that paragraph about halfway down:

"Always check the sodium concentration in millimoles per litre is what you require and be very careful to specify the concentration of the dextrose and the saline."

So when prescribing IV fluid for a child, I would routinely, as most paediatricians would routinely do, check: what's the sodium requirement, have I given them

too much?

The closest we had at that time -- and probably since, I don't think there's very much better -- was Solution No. 18 to what we believed was the requirement.

Can I just draw the inquiry's attention to a document I've submitted? I don't know whether you want to do it now before a break, "Hypotonic versus isotonic saline in hospitalised children: a systematic review".

Q. We have that, doctor. It's the Choong article, which is in Archives of Diseases in Childhood, 2006, which is witness statement 135/2, page 6. I presume that the highlighted sections on that are your own highlights; is that correct?

A. That's correct, yes.

Q. We do have that.

A. I think we need to discuss ... I wonder, could I request a comfort break before we start going into that discussion?

THE CHAIRMAN: Ten minutes, doctor; okay? Thank you.

(3.42 pm)

(A short break)

(3.55 pm)

THE CHAIRMAN: Doctor, can you see us again?

A. I can see you.

THE CHAIRMAN: Great. And you can hear us okay?
A. I can hear you fine.
THE CHAIRMAN: Thank you very much. Let's resume.
MR REID: Doctor, I think just before the break you said you wanted to discuss, I think it's the article, the 2006 Choong article. Would you like to just discuss the points that you want to raise from that article, please?
A. Yes. This is the only article I've brought to the inquiry and I think it's a very important one.

The first thing to remark is it was in 2006, and the second thing to note is that it was published in the Archives of Diseases in Childhood, which is a journal all paediatricians get every month because we're members of the Royal College of Paediatrics and Child Health. It is a systematic review and it's the first systematic review of its kind.

Let me explain what a systematic review means or what the importance of it is. Before people decide about guidelines or change guidelines, we try to review the evidence, and in the hierarchy of evidence, right at the bottom would be a case report, so single case. And very few people -- I think you would agree it's wise -- would change anything on the basis of one case report.

The next thing you go to is a case series and I think the article I've seen referred to, a 1992

article by someone called Arieff -- I think it was in the US -- of children who had had an anaesthetic. That's a cse series, so that's one up from one single report.

Then you move up to cohort studies and then finally to randomised control studies. Right at the of top of that you get a systematic review, and if you're really lucky, then a meta-analysis, which is where they take the data from all those studies, take it together and say: this is the pooled estimate of all these studies. So rather than have a study in 200 children, you might have a study for several thousands. So it's a very important piece of evidence to help us decide important things like how to manage children and, of course, something as crucial as fluids.

So I wanted you to look at this, I wanted the inquiry to look at this article because of the time and because of where it was published, and now we'll turn to the content of this article.

I think if you look on the first page and the first paragraph, you'll see that on the second sentence:

"The prescription for IV maintenance fluids was originally prescribed in 1957 by Holliday and Segar."

It was Holliday and Segar who then decided we would decide on the volume of fluids according to the first

10 kilograms, second 10 kilograms, et cetera. It was they that rationalised that adding three and two millimoles per kilogram of sodium and potassium respectively approximates to the need of healthy children.

In the next line:

"This is the basis for the current recommendation that IV maintenance solutions are ideal for children."

So this was written in 2006, and it said this is the basis for the current recommendation for hypotonic IV maintenance fluids.

Would the inquiry accept that that was written in 2006, and that reflects what we did.

MR REID: Of course, that does reflect 2006, yes.

A. Moving down, we see at the beginning of the second paragraph:

"The number of deaths and significant neurological sequelae from hospital-acquired hyponatraemia in children receiving hypotonic maintenance solutions have increased in the last 10 years [ie 1996 to 2006] and despite these concerns, standard texts and guidelines continue to recommend hypotonic maintenance solutions for all paediatric patients."

This was an article written 10 years after the event that we're discussing today.

I would then like to, if I could, draw the inquiry's attention to -- if you turn the page over on page 829.

THE CHAIRMAN: That's our page 7.

A. There's a diagram to the left at the top. That detail is not important. Finally, "Clinical outcomes: plasma sodium". This is the third sentence down:

"Hypotonic maintenance solutions significantly increased the risk of developing hyponatraemia with an OR [an ORD ratio] of 17 times."

So this is very solid evidence, very good evidence available to us in 2006, that hypotonic solutions caused hyponatraemia.

Then if you would -- and I'm just going to finish off now -- go to the last page of the article, please.

THE CHAIRMAN: Internally, is that page 834? Doctor, is that page 834 in your version?

A. Yes.

THE CHAIRMAN: Then in the inquiry version, it's page 12. Thank you. Go on ahead.

A. If I could ask you to read what's written in the boxes on the top of that page, 834. It says:

"What is already known on this topic: the current standard of prescribing maintenance IV fluids is based on historical evidence [from the 1957 paper by Holliday and Segar]."

That was based on calculating how much sodium children needed. This next line:

"The safety of this practice is yet to be tested in well-conducted clinical trials."

And then what this studies adds is:

"This is the first systematic review which examines [this is on the right at the top] the evidence for standard IV maintenance solutions in children. This review provides evidence that, at least for some paediatric patients, hypotonic solutions exacerbate the risks of hyponatraemia, while isotonic solutions may be protective."

So I really just wanted to help the inquiry. This is where we are with Solution No. 18. This is what we read, this is what we're told, this is the first systematic review. And then we have the, as you know, the thing we've referred to earlier on, the patient safety thing, warning us about it, and that was in 2007, the year after this article. And it would be this kind of standard or this level of evidence that really is required, bearing in mind this was something we did for 50 years. This isn't something that was done for a short period; this was done for a long time. And it is only recently we have started to hear about these cases of hyponatraemia.

What we don't know yet is --

THE CHAIRMAN: Sorry, doctor. Unfortunately, in Northern Ireland, our position changed largely because of the death of Raychel Ferguson in Altnagelvin and in the Royal in 2001, which led the Department of Health here to establish a working party, which came up with new guidelines. So does that mean that compared to this article, this systematic review, that the position was changed here in Northern Ireland on the basis of concerns that had emerged and Northern Ireland was slightly ahead, for all the worst reasons, of other areas because of our experiences?

A. It would appear from what you've said. I don't know when other hospitals or other parts of the British Isles changed their recommendations, but that would appear to be the case.

MR REID: Just as a side note, doctor, you had referred on page 828 -- that's page 6 of the witness statement and of the article at page 828:

"The numbers of deaths and significant neurological sequelae from hospital-acquired hyponatraemia in children receiving hypotonic maintenance solutions have increased in the past 10 years."

The references for that are 7 to 11 and if we go back to page 834 -- that's page 12 of the statement --

the references for that are, number 7, the 1992 BMJ article by Arieff, and number 8, Alison Armour's article about the Adam Strain case.

A. Okay, yes. Thank you.

Q. Just to raise the fact that Dr Armour's article about Adam is actually included within that systematic review.

A query has been posed during the break, doctor. You said that you would have expected repeat blood samples to have been taken after the ward round the following morning, and again I preface the question by saying that I know that you were not involved in that ward round. The question has been posed: if that post ward round blood sample had shown that the sodium had reduced further from 132, would you have considered that the fluid management should have changed with Claire? It is a hypothetical question.

A. Sorry, before I move on, I think I need to make one point of clarification. You said that reference number 8, Alison Armour's paper, was included in that systematic review; yes?

Q. Yes.

A. If we check on table 1, it gives the characteristics of the included studies. I'm just not sure it wasn't a general reference as opposed to one of the eligible studies. Just a point of clarification, but I don't

think it's that important.
Q. Could you answer that query about the post ward round blood test? It's a hypothetical question, but if that ward round blood test had shown a reduced sodium, would you have expected the fluid management to have been reviewed and changed?
A. In 1996?
MS WOODS: [Inaudible: no microphone] postulated rather than simply saying reduced, because we could be talking 131.
MR REID: Say it had been reduced below 130.
A. So hypothetically speaking, in 1996, had the results shown us a sodium less than 130, what would I have expected to happen? Is that the question, sir?
Q. Yes.
A. I think it's very speculative what I would have thought in 1996. I can tell you what I think now in 2012, I would have changed the fluids. But I really can't speculate what I might or might not have done at that time.
Q. I think that's all that can be asked.
You said in your witness statement at page 5, question 9, that there was no evening handover when the consultant and the resident on-call staff would have made contact. Would there therefore, doctor, have been evenings when you wouldn't speak to the on-call

consultant at all? Would that be true?

A. I think, with your permission, I'll give a little bit of background to handover in UK in paediatrics. Of course, it's the only thing I can comment on. It wouldn't have been routine in any of the hospitals that I worked in to have handover. The routine of handover came in around -- I can only comment on the hospital I was subsequently a consultant in -- around 2002. So in the mid-2000s. And the incentive for handovers was that doctors were no longer allowed to work long shifts. You'll have seen by my evidence that I worked from 9 am on the 21st until 5 pm on the 22nd, so approximately 36 hours.

So there was that continuity of care. It may have been by a tired doctor, but it was continuous. Then I think it was the European working time directives came in, and this ended up in the need to handover because of course people were leaving the hospitals, there wasn't that continuation. So the European working time directive came in and then handovers became a routine. Okay? So it was only at that time, in the vast majority of hospitals, I believe -- I could be wrong -- that a routine handover would happen.

Now, handover has many different meanings to different people; okay? So for example, handover means

was there a place, was there a time, was there a room we all went to to discuss the patients? As far as I can recollect, that was not the case. And in many places I worked at that time, that was not the case.

I think we also have to consider the downside of handover, so for example in most hospitals these days there would be two, if not three, specified times and places for handover, and that can take out two hours out of 24 hours, of a 24-hour cycle. If a doctor works, for example, 8 hours, that's two out of 8 hours, 25 per cent of their time is handing over patients. So there are pluses and minuses to both systems.

In the Royal at that time, my recollection is there was no specific place or time and there was no formal arrangement to go to one room and hand over.

THE CHAIRMAN: In that event, doctor, if you had -- let's not necessarily talk about Claire, but if you had a child overnight who was causing you increasing concern because she wasn't responding to treatment, was it an informal system by which you then spoke the following morning to a consultant or registrar to whom you were handing over, or did they just pick that up from the notes and the ward round?

A. I think I've said that I wasn't concerned about Claire in my 12 midnight review. So is this question,

Mr Chairman, in reference in general?

THE CHAIRMAN: Yes.

A. And your question was, was there an informal hand over? I believe so. From recollection, there would have been if you were worried about a child. But I think we have to remember that we would have been covering about six wards, okay, in the Royal at that time, including PICU. So if I was to decide to go and informally handover to all of my colleagues in each of those wards, and if I managed to keep that conversation to ten minutes, that would have taken me 60 minutes, so my consultants in the wards that I was based in wouldn't have been very happy if I was wandering around the hospital for an hour. So --

THE CHAIRMAN: So how does the oncoming team know that there is a child they should be particularly concerned about?

A. So that would have been done in a variety of ways. Again, I cannot recollect exactly, but it would have been done on occasions, you know, informally. I remember going and finding different people if I was particularly worried about a particular child. The SHOs might have handed over. I have read their evidence to say they handed over jobs to do. It would have usually been at the level you were at. So for example, a registrar to a registrar, consultant to consultant,

SHO to SHO.

THE CHAIRMAN: Thank you.

MR REID: Doctor, you said in your witness statement that:

"In 1996 there was no system of handing over patients between shifts as [you] recall. But the critically unwell patients who required immediate review would have been identified to us by the nurses on the ward."

The reference for that is WS135/1, page 19, question 34.

Did you consider Claire to be a critically unwell patient or not? Or would you have considered her to be a critically unwell patient?

A. In the morning or -- at what time?

Q. In the morning, at the end of your on-call shift.

MS WOODS: Mr Chairman, I think that's possibly a slightly unfair question given that we know that Dr O'Hare saw Claire for the second and final time at 12 midnight, and thereafter there was nothing drawn to her attention to suggest any deterioration in Claire.

THE CHAIRMAN: And I think the doctor just said in answer to my question that she didn't really regard Claire as critically unwell at 9 o'clock in the morning.

MR REID: Can I ask you this --

A. Sorry, I don't think I said that I did or did not regard

Claire as critically unwell at 9 am. I don't recall making that comment.

THE CHAIRMAN: I can check the transcript to see exactly what you said, but going back, partly on your memory and partly on the records, at 9 o'clock on the Tuesday morning, do you believe that she was critically unwell?

A. I've only got the records to look at, Mr O'Hara, and I have made no record at 9 am. I have, in preparation for this inquiry, looked at the nursing notes and I believe there was a note to say Claire was brighter on that morning, by one if not two nurses. I don't remember the exact reference. So neither the SHO nor I had been contacted about her. So I can't comment on how I would have judged her at 9 am on the 22nd.

THE CHAIRMAN: Thank you.

MR REID: Doctor, you also say in your second witness statement, page 2:

"As far as I can recall, there was no formal handover. Registrars may have informally handed over between themselves."

Then on page 5:

"This may have happened informally. For example, a particular doctor finding the doctor on a given ward and handing over their concerns with regard to a given patient."

I know you are talking without any real recollection, but given what's in the medical notes, what would you have expected you would have passed on, if you would have passed on anything, to Dr Sands, the oncoming registrar for Allen Ward about Claire's condition the following morning at the end of your shift?

A. Do you want me to speculate on what I might have said to Dr Sands on that morning?

THE CHAIRMAN: I think the first point is, based on the records, do you think that you would have necessarily said anything to Dr Sands about Claire?

A. I have no recollection if I did or didn't hand over.

THE CHAIRMAN: I understand.

A. I think I've ... Yes. I have said that it was not a routine for us to sit down together to hand over.

THE CHAIRMAN: Yes.

A. If I were to hand over, I would have said: this is a child that I wasn't 100 per cent clear about her diagnosis and I would like her reviewed on the ward round.

THE CHAIRMAN: Okay.

A. That's not what I -- I have no recollection, I have no note.

THE CHAIRMAN: I understand.

MR REID: And do you think you would have said anything about blood tests or fluids during that brief handover?
A. That would have been left up to the day team to do their assessment and make the decision. I wouldn't have supposed to tell them what to do; that was their own assessment.
Q. You were on Musgrave Ward for your normal shift on the 22nd October; isn't that correct?
A. That's correct, sir.
Q. If anyone from the Allen Ward team had come to ask you about Claire, would you have been available to consult with them?
A. Yes, I was available on Musgrave Ward.
Q. I've just two other issues to deal with, with you, doctor. The first is, if I can bring up 232-002-004, which is the report of Professor Neville. In the third paragraph on that page, it's page 4 of Professor Neville's report, he says:

"I think that a CT scan was required urgently [this is on admission] on the basis of a child having unexplained reduced consciousness. I would expect a paediatric registrar to discuss this patient with the consultant paediatrician and, whatever the rules about who has to agree a scan, it should have been performed that night."

The first question from that is: in what circumstances generally would you have contacted the on-call consultant?

A. In general, I would have contacted the on-call consultant if I had a patient that I wasn't happy with, who was deteriorating. Certainly if the patient was being admitted to PICU, I would have let them know about it. Usually, one has to stabilise the patient, make the admission, and then you let them know about it. So a child who was not behaving as I expected, who was deteriorating and had not responded to the interventions I had put in place.

Q. Then the follow-up, I suppose, is why would you then have felt that Claire didn't warrant contact with the on-call consultant?

A. I think, interpreting my notes, that I had made a plan at 8 pm to reassess her. At my reassessment, I think I was comforted by the fact that she was slightly more responsive and I felt it was a reasonable course of action to continue her fluids and review her in the morning.

Q. And the review in the morning, would that have been by yourself or by the oncoming Allen Ward team?

A. Again, interpreting the notes, that would have been by the oncoming team.

Q. Thank you, doctor. If I can ask you, when did you learn that Claire had died?

A. Sorry, can I just bring you back? You mentioned Professor Neville said -- we didn't go back to it -- a CT scan. Again, this comes back to the point of doing investigations. We would need then to go back to the differential diagnosis. And if we go back to Professor Neville's list of seven differential diagnoses, there's really only two of those on that that would have shown up with a CT scan, and that is a bleed, a haemorrhage, and a space occupying lesion, a brain tumour. Okay?

I would not have expected with a sodium of 132 for there to be any evidence of cerebral oedema. I didn't find any history that I felt was in keeping with a haemorrhage and I didn't find any history in keeping -- the average time that children present with a brain tumour is after about two months. It's not a three-day history, it's usually a bit longer. Not always, but that's the general trend.

So I think to think about doing a CT scan, we have to think why were we doing those CT scans, and sadly we now have more information and we do have the CT that was done subsequently and we do know that in fact she did not have a brain tumour or have a haemorrhage.

Q. You said you ruled out cerebral oedema because the sodium wasn't low enough. Of course, you would agree that if there had been any cerebral oedema, it would have shown up on the CT scan, as eventually Claire's cerebral oedema did on the 23rd October. Do you agree that cerebral oedema would appear up on the CT scan if it was present?

A. Yes, if a child had cerebral oedema and you do do a CT scan, it will show on a CT scan.

Q. When did you learn of Claire's death?

A. I think it was 24 October --

Q. And why do you say that?

A. -- 1996.

THE CHAIRMAN: Is that a recollection, doctor, or are you working that out from the likely sequence of events?

A. I know it is a recollection. I recollect Dr Bartholome telling me the day after she sadly died, which I think was the 24th. She told me about the night after she had her arrest on Allen Ward.

THE CHAIRMAN: Thank you.

MR REID: And you were working alongside Dr Bartholome in Musgrave Ward; isn't that right?

A. Correct.

Q. Did you have any involvement in any audits or discussions following Claire's death?

A. No, I did not.
Q. Would you have expected there to have been an audit or discussions following Claire's death in the Children's Hospital?
A. I mean, at that time, I didn't know that Claire's sodium was 121, I did not have that information. So I would have only very limited information of a child that I'd heard -- I heard the diagnosis of non-convulsive status was made next day and then I heard, sadly, that night that the events took place. So I wouldn't have had all the information to make a decision whether or not it was appropriate or not.
Q. In terms of the fact that a child had died in the Children's Hospital, would that not in itself have triggered an audit at that time in October 1996?
A. There was a morbidity and mortality meeting, which is a routine, but I really can't recollect the details of it, I'm sorry.
Q. Are you saying that you would have expected it to have been discussed at the morbidity and mortality meeting?
A. Exactly.
Q. And as one of Claire's treating clinicians, would you have expected to have been involved in any morbidity or mortality meeting that may have involved Claire?
A. Yes.

THE CHAIRMAN: Doctor, when you were asked a few moments ago about whether you would have expected an audit or discussions following Claire's death, you started your answer by saying, "I didn't know that Claire's sodium was 121, I didn't have that information". Now, I understand that because you were not involved in her treatment beyond 9 o'clock on the Tuesday morning. But does that mean that there were people who were aware that she did have a reading of 121, as there must have been? Does your answer mean that you would have expected those people to make sure there was an audit? If you're saying, "I wouldn't have been in a position to call for an audit because I didn't know she had a sodium reading of 121", does it follow from that that the people who did know that would have been expected to have an audit?

A. Any child dying is a tragedy and my recollection is that when this happened, they were discussed at the morbidity and mortality meeting as a routine. I have no recollection of attending a morbidity or mortality meeting about Claire. That's not to say it didn't happen; I have no recollection of it.

THE CHAIRMAN: Thank you.

MR REID: Just one last issue, which has been brought from the floor. I think it's really more just for the

record. If we can refer to your witness statement, 135/2, page 4, please. At (b) you were asked:

"Specify which measurement would have indicated in October 1996 that the electrolytes and in particular sodium were significantly hyponatraemic."

You answered:

"If the serum sodium had been below 130, this would have been significant hyponatraemia and triggered a change in management."

And I think you indicated in answer to my question that if a sodium result after the ward round had indicated a serum sodium of below 130, that you would have made a change in the management; isn't that correct?

A. That's correct.

Q. You say there in that statement that would have indicated in October 1996 -- it says:

"Specify which measure would have indicated in October 1996 ..."

Would you agree that that would also have been your opinion in October 1996 as well as now?

A. I'm sorry, I'm going to have to get the statement. I haven't got it. Can I just take a moment to look for that statement?

THE CHAIRMAN: It's your second statement, doctor, at

page 4. (Pause).

A. Yes, thank you, I have it.

MR REID: You can see the question:

"Specify which measure would have indicated in October 1996 that the electrolytes and in particular sodium was/were significantly hyponatraemic."

And your answer:

"If the serum sodium had been below 130, this would have been significant hyponatraemia and triggered a change in management."

I suppose the question is: if that post ward round blood test had been below 130 in October 1996, would you have changed the management?

A. Yes.

MR REID: Nothing further, Mr Chairman.

THE CHAIRMAN: Okay. Are there any questions from the floor that need to be asked? Mr Quinn, Mr McCrea? Anybody else before I come to Ms Woods?

Ms Woods, do you have anything to finish?

MS WOODS: No, thank you.

THE CHAIRMAN: Doctor, thank you very much. Unless you want to say anything further, we have no more questions for you from the inquiry.

A. There is one further issue, sir, that I would like to discuss with the inquiry, or I would like the inquiry to

give some thought to. That is the issue of -- I think for Claire's parents we really need to try very hard and establish what actually happened. I've read different witnesses' reports on their results from the CSF. There was a CSF sample and it's 090-030-095.

THE CHAIRMAN: Right.

A. This sample, as we can see, was dated ... I can't really see the date, but I think, from other people's statements, it was a post-mortem sample.

THE CHAIRMAN: Yes.

A. So it was taken -- it was post-mortem. And the results indicate that the serum -- the protein in the CSF was 95. The erythrocytes, which is the red cells, was 300,000, and the white cell count or leukocytes was 4,000.

THE CHAIRMAN: Okay.

A. I just think it's very important, because we are trying to get to the bottom of what happened in this case, that we bear in mind that the sample was taken post-mortem. We don't know where the sample was taken from, which part of -- where it was taken from. We don't know the conditions prior to it being taken. Was it in cold storage or not? And all of these things can change the findings. So if we particularly look at the protein, it says 95 grams per litre. Okay?

THE CHAIRMAN: Yes.

A. And the normal range is 0.15 to 0.45, so that's about 200 times what it should be. I am not a forensic microbiologist, I have had some sub-specialty training in infectious diseases, but that indicates to me there was a significant leakage post-mortem. I've read in some statements that -- I've read a lot of people who said they're not experts, but then I've also read that some people proceeded to use something that we would use in life to calculate that ratio. And I just think we have to be very careful when we're interpreting post-mortem CSFs.

I would say that all of the witnesses that I've read -- I think there were three of them -- all have prefaced what they went ahead to say with, "This is not my area of expertise". But I just wonder, should that be looked at in some detail, because I think it's important that we know.

THE CHAIRMAN: Okay, thank you very much, doctor. We will discuss at the inquiry if and how we can take that forward.

A. Thank you.

THE CHAIRMAN: And thank you very much for taking the time with your statements, but particularly today to link up with us from Malawi. Thank you very much indeed.

MR REID: I should say, Mr Chairman, the doctor is correct. I think the issue has been addressed by several of the expert witnesses, notably Professor Cartwright, who's the inquiry's expert in microbiology, but it will be looked at further by the inquiry legal team.

THE CHAIRMAN: Thank you very much. Ladies and gentlemen, that brings an end to today's hearing. Is it Dr Sands tomorrow?

A. Sorry, Mr O'Hara, on that last comment. I know it has been looked at by Professor Cartwright, but I think he does say he has no experience in the post-mortem red to white cell ratio, and he describes the high protein as a "rogue result". I'm not sure what that means in terms ... I do think it's important for this case that we try as best -- I know we have two expert pathologists who say there was no encephalitis. I think this microbiology is very important, and I'm not sure what a rogue CSF protein result is.

THE CHAIRMAN: Okay, thank you very much, doctor.

Mr Green. Dr Sands tomorrow morning?

MR GREEN: Yes.

THE CHAIRMAN: It might not be universally welcomed, but is there any substantive objection to starting at 9.30 to see if we can get through Dr Sands? If we can't, we can't, and we'll bring him back.

MR GREEN: It may well not be universally welcomed. I'm sure it will be welcome to Dr Sands. If you'll be good enough to give us a few minutes to contact him to make sure there's no particular logistical problem with that.

THE CHAIRMAN: Does anyone else have anyone insuperable problem about 9.30? We'll take it as 9.30 unless you come back and raise an issue. Thank you.

(4.40 pm)

(The hearing adjourned until 9.30 am the following day)

I N D E X