Thursday, 8 November 2012

(10.06 am)

THE CHAIRMAN: Good morning, ladies and gentlemen. The stenographer is unwell today, so today's proceedings are going to be recorded and we'll get a transcript hopefully at some point tomorrow, but for today we'll have to go back to the old-fashioned method of writing down notes as the evidence goes along. So you will not be getting a live note as we go along today. I hope you have all filled your pens. Mr Reid.

MR REID: Thank you, Mr Chairman. If I can call Ms Sally Ramsay, please.

MRS SALLY RAMSAY (sworn)

Questions from MR REID

MR REID: Have a seat. Just to begin, is it Mrs Ramsay or Ms Ramsay?

A. Mrs.

Q. Mrs Ramsay, thank you. Mrs Ramsay, you've made one final report for the inquiry, which is dated 14th June 2012, and there's a reference 231-002-001. Would you like to adopt that as your evidence before the inquiry?

A. I would.

Q. Thank you. If we can move just to your CV and

your experience and bring up 231-002-038 and 039 alongside that, please. We can see there that you've been a registered adult nurse since 1972, a registered children's nurse from 1974, and you were a nurse manager of the paediatric and neonatal intensive care unit at Guy's Hospital, London, from 1986, is that right?

A. I was.

Q. You've had various other nursing manager roles. You became director of nursing at Great Ormond Street Hospital for Children in 1994?

A. I did.

Q. You were in that job until 2002, and since 2003 you've been a self-employed children's nursing advisor, is that right?

A. That's right.

Q. Thank you. Can you just explain for us what do you do in your role as a self-employed children's nursing advisor?

A. Varied things over the years. I suppose helping people where they need some expertise in issues to do with the care of children, and so that's varied from -- and not always children. I have done some things with adults as well. I've helped implement clinical governance in a general

children's ward in a general hospital. I've written several guidance documents and standards documents for the Royal College of Nursing, and latterly I've been part of the team that's been reviewing the children's heart surgery centres. So it's been giving advice to people.

Q. If we turn over to page 40 we can see a number of your publications; the documents you've written for the Royal College of Nursing.

A. Yes.

THE CHAIRMAN: So you're not retired at all?

A. Not yet. Getting there I think.

MR REID: Can I ask, we're obviously concerned with nursing care in October 1996. How familiar are you with nursing practice in 1996?

A. Well, at the time I was Director of Nursing at Great Ormond Street and I had very close contact with the clinical areas because that was the major part of my role was to facilitate and, one could say ensure good nursing practice.

So I also throughout my career have tried to maintain some direct clinical expertise and so, as Director of Nursing, I did spend some time a couple of times a year actually as a staff nurse on the ward; I tried to keep a feel of it because

I was conscious, and I did have something published many years ago, called "up-to-date but out of touch" whereby it's very easy for people to talk about it and not really have a full understanding of how it feels to be a staff nurse.

So I tried to maintain some of that, but you can never go back to being that staff nurse really. So I feel that in 1996 I had a good feel of what was going on in a clinical environment, through some direct observation but also close contact with ward sisters and clinical staff.

Q. Thank you. We've heard the evidence to the inquiry of several of the nurses; that was mainly on 29th October and 30th October. Have you had the opportunity to see the transcripts of the evidence that the nurses gave?

A. Yes, I've read the transcripts.

Q. Just as an overall question, what would be your overall impression of the evidence that the nurses gave? What, after reading the transcripts, was your general impression?

A. My general impression was that although most of them couldn't remember very much of the events I felt there was some agreement with some of the

things that I'd said. When they'd been exposed to the same sort of evidence as I had, I felt that they'd seemed to me, in the main, to have come to some of the same conclusions.

Q. We'll come to each of those conclusions in turn. If I can also bring up 096-024-183, please. This is the expert nursing advisor report, in the circumstances surrounding the death of Claire Roberts, prepared by Susan Chapman for the Police Service of Northern Ireland, and this is dated 24th March 2008. As it says there, it's Ms Chapman's report she was asked to produce by the police. Have you had the opportunity to see that report?

A. I have seen the report.

Q. You'll be aware, if you can turn to the conclusions at page 191 of that document, her overall conclusion was that she finds only minor deficiencies in the nursing care given to Claire Roberts, and she would consider none of those to represent a failure in nursing care, given the diagnosis and management prescribed by the medical team. She goes on to note that it was an overall lack of recognition of the seriousness of Claire's clinical condition. Her level of

consciousness was monitored and recorded by the nursing staff, and it was the role of the medical staff to act on these results.

She was reviewed only seven occasions by members of the medical team before her transfer to intensive care, but at no time was additional monitoring, observation or treatment requested and, therefore, she found the care delivered by the nursing staff acceptable by the standards expected in 1996.

Would it be fair to say, having seen Sue Chapman's report, that you may be a little more critical in certain areas than Ms Chapman?

A. Yes. But I think that might be due to the approach.

Q. Firstly, do you know Sue Chapman?

A. I do.

Q. And you're familiar with her work?

A. Yes, yes. I've known her since she was -- she's a nurse consultant now but I've known her for a long time.

Q. You're saying there might have been a difference in approach. Can you explain that for us?

A. Well, her report was commissioned by somebody different to my report. I did read her report in

the beginning, but what I tend to do is look through all the papers to get my own view before I'm biased by anybody else's and then perhaps do a little bit of compare and contrast. And so her approach presumably, because it was done by the Police Service, may have been to see if there was anything that stood out in terms of major failings in nursing that could have contributed to Claire's death.

My approach was to go through everything, I suppose, with a critical eye, all the aspects of care, to then see what that added up to at the end, because there wasn't one major incident which I needed to focus on; it was a series of events so that was possibly a different approach.

Q. So if I can be clear from what you've said, do you think there were no major failings, as Sue Chapman has said in her report, but that you might be critical of some other elements?

A. Well, major failings. I have a concern that a child that was so sick was still in the middle of a general children's ward, and so the failure to notice that a child is sick in this case did have a very, you know, disastrous outcome. So I would say that was a failure, because I do have

concerns that she was still being nursed in the middle of a general ward throughout the day.
Q. I think there are two points I have understood from your report: (1) Claire should have been moved to one-to-one nursing at an earlier stage but is being nursed in the middle of a general ward, is that a reference to that she should have been moved to intensive care earlier or moved to a side ward?
A. Well, I think it could have been either. I think possibly at the time it was you're on a general ward, or you're in a PICU, because facilities for high dependency nursing weren't perhaps as developed as they maybe now because lots of general hospitals would have a high dependency area where they could have all the sick children together and have a few more staff looking after them. I think that there was a failure to recognise the level of dependency that she had, so she was just being nursed along with everybody else in a general ward. High dependency could have been provided for her in a cubicle or in a PICU environment.
THE CHAIRMAN: We'd better not jump ahead too much because I think you're going to be coming to

that.
MR REID: I might actually jump to that now. If we bring up your report at 231-002-031, it's slightly out of sequence but I think you've identified it as what you consider to be the major failing; I think we should address it now. You say there in the second paragraph, after quoting the source, that a coma score of 8 or below was generally accepted as a definition of coma. You say that you think a score of 8, combined with a need for complex intravenous therapy, should have prompted discussion between nursing and medical staff regarding admission to PICU and, given Claire's level of consciousness, diagnosed anti-epileptic treatment and level of nursing dependency, you believe she should have been admitted to an intensive care unit? This should have been at around 3.00 pm, when the coma score of 7, and midazolam infusion was planned to start shortly afterwards. However, you say, admission to PICU was usually a decision made by senior doctors and, therefore, you were unable to give an opinion on whether there was sufficient medical grounds to require such an admission, and you reiterate your opinion that her nursing care

needs at the time were above those that could be reasonably provided on a busy general ward. That's a fair summary of what you just said, is that right?

A. That's right.

Q. In fact, Ward Sister Pollock seems to agree with you, if we bring up her transcript of 30th October 2012, page 182. I asked her:

"From your experience and your look at the nursing and clinical notes, when would you have expected Claire to have been admitted to PICU?"

And she said:

"It's difficult to say. I'm aware that Dr Webb reviewed Claire on a number of occasions during the afternoon of the Tuesday, but when I look at a Glasgow Coma Scale of 9 at 1.00 pm, and then it is 7, at I think around 2.30, I'd be very concerned at that point. [Let me turn over the page.] There is a discussion around what level of care she did require, could that be delivered at ward level or did she require to be nursed in another area in the hospital or what should the plan of care be?"

And she goes on to say, in answer to the Chairman's question, that that would have been

intensive care.

First of all, can I ask you, what is the difference in the level of care you would receive in PICU compared to the general ward?

A. On a general ward one nurse would look after several patients. In PICU there would be, in the main, one-to-one nursing, or if the child is not ventilated then it could be that two children, with a high level of dependency, could be looked after by one nurse. So there would be more nursing and continuous nursing, so that even if the child's care was being shared with another child, there would be a nurse in that area all the time. Whereas, on a general ward, the nurse would possibly be off fetching, carrying, answering the phone, going to another child in a cubicle in the next bay, so the child wouldn't be within their sight all the time. And the other element would be there would be more sophisticated monitoring, probably.

Q. So on our first point, are you saying that physically there would always be a nurse in the room?

A. Yes.

Q. While on the general ward I think we've heard

that the majority of nurses had a four-bed bay and a two-bed bay; a maximum of six patients to look after. You would have a maximum of two patients to look after in paediatric intensive care.

A. I would think that would be the maximum, yes.

THE CHAIRMAN: But it's not just as simple as the nurses on a general ward looking after six patients, because they're also helping each other out from time-to-time.

A. Yes, yes.

THE CHAIRMAN: So the six is accurate but it's not as limited as that. In the end, the nurse actually does more than just look after six defined patients on a general ward.

A. Yes, because there would be other things, like phones ringing and people coming to the ward asking them, distracting them.

THE CHAIRMAN: Or two nurses administering a drug?

A. Yes.

THE CHAIRMAN: Okay, thank you.

MR REID: Do things like phones going off, or having to go and get a drug or administer a drug, does that not also happen in paediatric intensive care?

A. Yes, but the way that paediatric intensive care would have worked would be that people didn't usually leave the child. The child needed to be looked at and observed, and so there would be some additional help; a healthcare assistant or some sort of non-registered professional whose job it was to supply the people at the bedside with what they needed.

Q. So the nurse would always physically be there and then would seek assistance from someone to go off and do the other jobs?

A. Yes, or if they were in an open area and had to leave their child to go and get something, which sometimes you might have to go and get medicines and things, you would say to somebody nearby, "Can you just keep an eye on my patient while I go off to get X, Y and Z?"

Q. You also said the other thing, apart from just the fact that a nurse would be physically there all the time, was that more intensive monitoring could be done. What sort of monitoring do you mean?

A. Heart rate and respiratory rate monitor.

Q. Just vital signs or other ailments?

A. Well, vitals signs and blood -- probably blood

pressure.
Q. What about central nervous system observations?
A. Well, yes, they would be done, particularly for a child with altered consciousness.
THE CHAIRMAN: Isn't the fundamental difference in what's tragically lacking in Claire's case is that, if she had been moved into intensive care, it would have been a recognition that she was very seriously ill and the fact that she wasn't moved into an intensive care raises a major question about whether the severity of her illness was recognised?
A. Yes. I think that's fair.
MR REID: Can I ask you then about the criteria for moving into paediatric intensive care? First of all, you said at around 3.00 pm -- and Staff Nurse Pollock has said around a similar time -- I think you said the trigger for that really was the combination of the Glasgow Coma Scale and the medication being administered, the phenytoin and the midazolam. Would the phenytoin alone or midazolam be sufficient, in your opinion, to warrant admission to PICU?
A. Some of that depends on what the nurses were used to giving on that ward. So if they were

regularly looking after children who were in status, who were having phenytoin, then it might be that they could manage that, although I would still suggest that the Glasgow Coma Score was perhaps of a level whereby, if it had gone down any further, she might have got it. They might have known that she could need ventilating, and so would be better placed in an area where that could be facilitated.

So I think, depending on their previous experience, giving a medicine to a child that's fitting might have been within their area of expertise. I think it unlikely that the use of continuous midazolam was something that was done regularly at that time outside an intensive care environment.

Q. We will get to the medication later on, but I think the nurses generally said that they wouldn't have been that familiar, certainly, with midazolam at the very least and the administration of that. If we could bring up the timeline of 310-001-001, please. If we can highlight the time, in and around 3.00 pm please, and just drag it up, please. Thank you. So we can see there at around 3.00 pm there's been the

ward round, she's been differentially diagnosed with non-fitting status epilepticus, and then an additional diagnoses at some point of encephalitis and encephalopathy. She's been administered diazepam, phenytoin and then midazolam at around 3.25 pm, and there's a seizure at around 3.25 pm and she's been examined by the consultant paediatric neurologist. Are you saying that that's the key time, as far as you're concerned, when it reached that criteria for PICU admission?

A. Yes. Because my understanding is that there wasn't anything that said, "Well, this is a point in time but now it's going to get better", so it wasn't a momentary or a short expected phase. It was something where there wasn't an end in sight at that particular time.

THE CHAIRMAN: But that's around the time you think that she should have been moved to intensive care but that is, in terms of the nurses, their input into that is limited, isn't it?

A. Well ...

THE CHAIRMAN: I mean, they can raise flags or express concerns but they cannot move Claire into intensive care?

A. They can't physically remove her but they can certainly express concerns about her being on their ward. And there are means of escalating that if you're particularly unhappy.

MR REID: To build on that, if we can bring up Staff Nurse Field's transcript of 29th October 2012 at page 93. She's asked at the bottom:

"Did you consider one-to-one nursing at any stage?"

She says:

"I don't believe that I did, but that's not something that I would have requested or had any control over. That would have been something that the medical staff would have asked for in terms of closer observation for the child. That would have been facilitated, if you like, by the nurse in charge."

Have you seen that as a recurring theme throughout the nurses' witness statements, the fact that a doctor's intervention might have been required for an escalation in nursing care?

A. Yes.

Q. You're aware of that?

A. Yes.

Q. If we just concentrate on the intensive care and

one-to-one nursing at the moment. What do you think of the nurses general opinion that they would have expected something like that -- indeed required something like that -- to have been directed by medical staff?

A. I have to say it is not my experience that that is something that would be solely dependent on a doctor to order. I think the amount of time that we need to spend with a patient and how you facilitate the observations falls to a nurse to decide. I think there are times when you have that debate with medical colleagues, and perhaps there are times when somebody might express the fact that they think it's not necessary, but I would have said that that was a nursing judgment.

Q. In terms of that, is it a judgment of whether you as the nurse speak directly to the doctor or is the judgment that you decide, "Well, maybe I should bring this to the nurse in charge of the ward or the ward sister"?

A. Well, I think you would have to talk to the ward sister, because it's about the allocation of resources and the person in charge would have a comment to make with regards to that.

Q. So is the ward sister the first port of call if

you think that your patient requires greater resources, greater nursing care, is the ward sister the first port of call for you as a nurse?
A. Yes, but it would also be the other way. If a ward sister has got a child that is sick on their ward, then they would be having a close look at what was needed.
Q. I think Angela Pollock said in her evidence last week that she would have wanted to have been informed of any drops in Glasgow Coma Scale, any changes in medication and so on, and in Claire's case I think she says, if you bring up page 187 ...
THE CHAIRMAN: From the same day?
MR REID: Sorry, from 30th October 2012. I asked her: "Have you ever been in a situation where a nurse informs you of what's happening with a patient and you decided you need to step in as the senior nurse and take over the management of that patient?"
And she said, "Yes, I have". She was asked about 5.00 pm, when her GCS was 6, whether she would have taken control of nursing at that point, and she said, "It's quite likely I would have done so". In those circumstances, what

would you expect of the ward sister?
A. Well, to be discussing with the nurse at the bedside what her observations were and what had been going on, so a bit of history about the patient. Having some understanding of what the plan of care, both medically and nursing, was aiming to do. And making their own judgments of what was going on, assuming that a ward sister has got a lot more experience to bring to the situation perhaps than the nurse at the bedside and then consulting with whatever medical staff there were. And also -- sorry, if I could also add, and looking for any lack of understanding on the part of the nurse with regards to the parameters within which she was working, or what she needed to observe or things that she needed to do.
Q. So I think you said that the normal system would have been that you, as a staff nurse, would have contacted your ward sister and brought the patient to their attention, and if they thought it warranted it, then the ward sister would speak to the doctor, is that correct?
A. Probably. I say probably because if there was a doctor in the vicinity then the nurse could have

a dialogue with him, and some of it depends on what the physical presence of the ward sister is at that particular time.

I would have thought that if there was somebody -- a ward sister -- in charge of that ward at the time that they would have been, or should have been, aware of who the sick children were in order to pay attention to those sick children and to periodically check up on them; go and ask what was going on.

Q. Well, as you know, the difficulty we have in the case is that Ward Sister Pollock doesn't recall whether she was present that day and there's no evidence of who the ward sister might have been on that particular day. So say, the ward sister is unavailable to the staff nurses, for whatever reason, what responsibilities do you think the staff nurses have to contact the doctors and discuss resources with them?

A. Well, things shouldn't just stop when the ward sister isn't there, and so it would have fallen to either the staff nurse at the bedside or the person who was in charge of the ward to talk to the doctors.

THE CHAIRMAN: Am I right in putting this into the

overall context that, while you are to a degree more critical than Ms Chapman was, you also refer at least twice in your report to the fact, to put it in terms, while there were some failures in nursing care there were at least seven opportunities for the doctors to act more decisively than they did in Claire's interests?
A. Yes, I don't think that they were unaware of her condition and I think some of the judgments about what was going on, I think the nurses should, from the observations, have known that she was sick. But I don't think they were getting much in the way of comment to indicate that from the people who were doing the medical assessments.
MR REID: To go back to Sue Chapman's comment at 96-24-191. We've already gone through paragraph 59 that it was the role of the medical staff to act on these results, and she was reviewed on at least seven occasions by members of the medical team. If you turn to the timeline at 310-001-001, we can see that there was a ward round with a doctor; there's an examination by Dr Webb; the re-examination is now in question but we know that a doctor administered the phenytoin and the midazolam. A doctor administered the sodium

valproate; Dr Webb attended and Dr Hughes attended at 5.30 pm and at 9.30 pm, and then Dr Stewart attended at 11.30 pm.

In those circumstances, do you think that the nursing staff, knowing that the medical staff had been on several occasions, could have come to the conclusion that, "Well, the medical staff seemed to think that the nursing care standard is fine at present. Why should we do anything different?"

THE CHAIRMAN: It's not quite that.

MR REID: Sorry.

THE CHAIRMAN: Surely the question is: could the nurses have thought, "Because the doctors are there so frequently that it's not the nursing care of standard that's sufficient; it's that Claire's condition is under control"?

A. I think they could have thought that. Yes, definitely.

THE CHAIRMAN: And if the nurses get the message, expressly or impliedly, from the doctors that, "Although this girl is sick things are under control" it becomes a bigger ask of the nurses to become more proactive and to say to doctors, "Are you sure she's being cared for properly? Are you

sure she's responding? Are you sure she's really not very ill?"

A. Yes.

THE CHAIRMAN: There's a degree in it, isn't there? A question of degree?

A. Yes, yes. And of course some of it is your past experience helps you sometimes in situations like that. So if you've seen something similar before, or if you have a tendency to challenge things, then maybe you would do that but I think that in general, as you said -- and I think I might have alluded to that in my report -- I think they probably had a false sense of security that all was okay even though, when you look back on it, all was not okay.

THE CHAIRMAN: Yes, I mean, that's really drawing out your point about the fact that the doctors were coming and going so much.

A. Yes.

THE CHAIRMAN: The trouble is they were coming and going so much but without effecting an improvement in Claire's condition. I got the impression, from what some of the nurses said, that they might be a bit less deferential or reserved now in 2012 than they would have been in

1996, and they said -- I think this is also mentioned in your report -- that the system is less hierarchical now. Is that accurate?
A. Yes. I think there's been a movement on both fronts. I think doctors are more team players these days along with the nurses, and nurses are a bit more confident in challenging things.
THE CHAIRMAN: That's not much consolation that Mr and Mrs Robert can take out of anything that's been heard here over the last few weeks, but if there was any consolation would it be that what happened in Claire's case would be less likely to happen now, at least from the nursing end, because the nurses would be more likely to express their concerns, if they had those concerns?
A. I think so. But also I think possibly people might be more willing to listen.
THE CHAIRMAN: We know from this case, and we know also from Alan Strain's case that you also reported that, to the extent that there was any review or investigation afterwards, it entirely excluded the nurses.
A. Yes.
THE CHAIRMAN: Is that likely to happen these days?

A. I think it's highly unlikely.
THE CHAIRMAN: Thank you.
MR REID: While we're still on the paediatric intensive care point, Mrs Ramsay, would you say that the resources available in PICU were the same in 1996 as now or were less than now?
A. Less.
Q. Would you accept that it was more difficult to get a PICU bed in October 1996 than it would be now?
A. Not necessarily, but for different reasons. I think in 1996 it wasn't a highly -- well, the reports hadn't come out and been implemented. It wasn't a highly recognised speciality and so I think people struggled for resources in there. I think probably now people recognise the value of PICU and so there's a greater demand perhaps, although there might be more resources in the speciality. So I think it was under pressure then and it's probably under pressure now but for slightly different reasons.
Q. So both the supply and the demand have increased?
A. Yes.
Q. Several of the clinicians have said that, in October 1996, one of the criteria for PICU

admission would have been artificial ventilation and that, generally, it would be much more difficult for a child who wasn't being artificially ventilated to meet the criteria for paediatric intensive care. What would you say about that?

A. I think that's possibly a valid argument, and the high dependency areas weren't particularly well developed so it was either general ward or PICU. But I would have thought there needed to be some consideration of whether a child might be on the verge of needing ventilation and, although it isn't within my area of expertise to say at what point she might have done with a Glasgow Coma Score of 6, I think it remained a possibility that she might be on the edge, particularly with having midazolam of needing ventilation. So I think do you do it proactively and put somebody in an environment where everything's there if that is needed, or do you wait until the child collapses and then rush them into a PICU?

Q. We will return to midazolam because, as we'll hear from Dr Aronson later, midazolam can reduce the respiratory function, isn't that correct?

A. Yes, that's my understanding.

Q. So are you saying that, in the absence of artificial ventilation, it would have been more difficult to get someone admitted to PICU in October 1996 but it would not have been impossible?
A. I think it would have been possible, but it required a discussion because it needed people to prioritise the use of their resources at the time. But also to then determine whether the environment that the child was -- if they couldn't go into PICU you then have to make a judgment on whether the environment they're in is being made as safe as it possibly can be.
Q. If I can change tack and ask you about hyponatraemia in 1996. What, as far as you can recall, would have been your awareness of hyponatraemia and any dangers related to it in October 1996?
A. Well, I suppose my difficulty is that I was originally a sister in a PICU where we saw a fair number of children with low sodiums, and I was also personally aware of inappropriate ADH so I had knowledge. But I think on a general ward, and I know from -- I went back to some clinical practice as a staff nurse in 2003, I don't think

general nurses on a general ward would have known anything about it.
Q. Even in 2003, prior to the National Patients Safety Alert, staff nurses on the ward would still be generally not that aware of ...
A. Yes.
Q. Would they not be generally aware of hyponatraemia itself or just the dangers related to it?
A. Well, I suppose, most nurses would know what hyponatraemia was but I don't think they would have known what might cause it. They would know because blood results come back and a child's got a low sodium and somebody initiates some treatment to correct that, and I don't think that they would have known perhaps much more than that.
Q. Would they have known to bring it to a doctor's attention quickly, for example?
A. Well, if they were taking blood results over the telephone then they would then inform the doctor of those blood results. Whether they would make a judgment that this sodium is low, I think is possibly unlikely.
Q. Just on that subject, in terms of blood testing,

you might have seen from the transcripts I asked several of the nurses whether they would ever take the initiative and say to a doctor, "Do you think we should have any blood tests?" for example at the ward round. I think the overwhelming majority said, "No, we wouldn't have done that. It would have been a doctor's decision to take the blood samples". Does that reflect your knowledge of what was happening in October 1996?

A. Yes, yes.

Q. So for example, at the ward round they had looked at Claire and diagnosed some treatment but blood samples hadn't been mentioned. You wouldn't have thought it incumbent on the nurses to say, "Would you like a new blood count, doctor?" or something of that nature?

A. No, I don't think so. I think where the nurse would possibly have prompted is where it was a situation with a well-recognised, known protocol for "this happens, that happens and that happens" and they think that the houseman has forgotten. So it's the "we usually do so-and-so". But I think in a situation like this, which is a one-off-type situation and not a standard problem

with a child then they wouldn't.
Q. So for example, if there was a ward round protocol that said, "Make sure you check fluids, bloods, electrolytes and things like that" the nurse would have been making sure that those were checked off?
A. Yes.
Q. And if something hadn't been done they would ask about that?
A. Yes.
Q. In the absence of that you wouldn't expect them to?
A. No.
Q. If I can ask you then about the nursing care plan; if we bring up 090-043-145 and 146 please. Those are two pages of Staff Nurse McRandal's initial nursing care plan on Claire's admission to Allen Ward. You're familiar with those sheets?
A. Yes.
Q. First of all, can I ask you what in nursing is the purpose of a nursing care plan?
A. Well, it has several dimensions to it. One of them is guide the care that's going to be delivered so it's a plan of what somebody's going

to do. Secondly, it's a way of seeing whether things have been successful, but it's also a communication tool so that anybody coming along can see what care that that child is having and then, retrospectively, you can see what care the child received.

Q. In that way does it share many of the same characteristics as the nursing notes themselves or the clinical notes?

A. Well, the nursing notes would be part of the care plan, because there's the bits that you see in front of you that identify the problems and the goals and then the written part is the evaluation that's telling you whether these things worked, tell you any variations in the child throughout the course of that shift, and documents any relevant events. So the evaluation is part of that whole, what we call, nursing process, assessment, planning, implementation and evaluation.

Q. So it's almost inaccurate for us to separate the nursing notes from the nursing care plan because, effectively, they're one and the same?

A. They're all part of the same thing.

Q. You said that it's a communication tool to let

others know the care that the patient is receiving. In general, is that referring to the nurses who are coming on after that nurse, or does it also refer to the nurses that are on at the same time?

A. It's both, because a nurse could be going past the bedside and notice something, or called upon to do something, and so you need to have a quick look at the care plan to see who the child is, what's going on, and so it acts as an indicators of that child's situation. And then it's for the next people coming on the next shift because you can't possibly hand over all the information verbally. And people's ability to retain information is sometimes limited, and so they need something to go back to, to see what is happening or what they should've been doing, and the more junior you are then perhaps you need the guidance of the care plan.

Q. How often would you review the care plan?

A. Well, people would say that you should try to do it on a continuous basis, but sometimes that is logistically quite difficult for people, because they get caught up in the here and now. So I think the practice has been, just before the end

of the shift, for people to write up their evaluation and change the care plan, with people often staying afterwards in order to complete the paperwork.

Q. I was asking Staff Nurse McCann about that, and we were looking at the priorities of things to be done. And obviously there are the actions that a nurse needs to do right at that time: medications, bloods and so on. Does a nursing care plan fall a little down that list, in terms of the priorities that a nurse has?

A. I think on a day-to-day basis this has been a longstanding problem with care planning, that people do find it a chore sometimes, and perhaps with nurses whose training didn't train them to think in this way. So perhaps people, like myself, where we did it differently. Years ago it used to be that you just wrote a narrative of what had happened during the day. You didn't have to do all this planning. I think that nurses who've trained since the 1990s would find this easier to do, because that's the way they've been taught to deliver nursing care, so ...

Q. I think that Staff Nurse McCann said -- as you did -- that normally she would wait until things

quietened down, maybe over the shift, and that was the opportunity they might have taken to update the care plans then.
A. Yes.
Q. She said that was why she didn't get round to reviewing the care plan on the evening of the 22nd and the 23rd October.
A. Yes, because while you're delivering care, you don't really need to read what you're delivering, because you've got it in your head and you know what you're doing, so I would say that the majority of people at the time were doing it in the way that she described.
Q. Although, as you said earlier, that then leaves the problem of those on the shift at the same time as you don't have the opportunity to see that updated care plan?
A. Yes.
Q. Is that a problem that's encountered then?
A. Yes.
THE CHAIRMAN: Is this an equivalent of the police complaining they have to spend too much time doing documents and not enough time out in the streets?
A. I think so. There has been a lot of controversy

about nursing care planning, and in the main it hasn't been done very well over the years.

MR REID: Well, let me ask you this, do you think the importance of the care plan outweighs the effort that's needed to draw it up and update it, or do you think it is an unnecessary use of time during a nurse's shift?

A. My view -- and I think the view of the regulator as well -- is that care planning and evaluation is an indicator of good nursing care. Now, I think one of the difficulties is that the amount of time that it takes to do it effectively has not been taken account of, in working out how many people you need to look after a group of patients, so it then became an add-on as opposed to an integral part of delivering care.

THE CHAIRMAN: Is that any closer to resolution or is that an ongoing problem?

A. I think it is likely to be an ongoing problem. I think also maybe the tools that people have for care planning aren't meeting their needs. I think there has been some development in terms of computerised care planning, but I have some personal criticisms of that. But I think people are working on it.

THE CHAIRMAN: Thank you.
MR REID: Well, let's just look at the actual care plans then in Claire's case. First of all, Staff Nurse McRandal said in her evidence the care plan would normally be completed within 12 hours of admission. Would that reflect what you think the position was in October 1996?
A. Well, the guidance said that it should be done within 24 hours, so 12 hours is good going by that standard.
Q. If we can bring up your report at 231-002-019, please? If we go to the third paragraph there, your general opinion is that:
"The care plans reflect the identified problems associated with the diagnosis of seizures and vomiting, and the nursing actions listed were comprehensive and were prepared in a timely manner."
And I presume that's still your position?
A. Yes.
Q. However, you add that you believe that more frequent observation of some vital signs should have been made, and you elaborate on that at page 3 of your report. If we just bring that up 231-002-003. (Pause) It might be the wrong

reference. But I think you said that overnight the temperature, pulse and respirations were recorded four hourly, and initially these observations were slightly elevated but, by 6.00 am, they were in normal limits, and you consider that hourly recordings were indicated. Can you just explain why you think that hourly recordings were indicated?

A. Well, it's my understanding that they thought that Claire had had a seizure and, okay, at night time you would expect a child to be asleep, but my understanding is that she wasn't communicating normally. Four hourly observations just didn't seem very frequent for a child who's had one fit, supposedly, who possibly could have had another fit, and so four hourly didn't seem to me very often to be going and checking things.

Q. If we bring up Staff Nurse McRandal's note at 090-041-040. (Pause) See there she says:

"Nine-year-old girl. History of mental handicap and severe learning difficulties, admitted via casualty with a history of vomiting this afternoon, slurred speech, drowsiness, pallor and query seizure."

Is that what you're referring to?

A. Yes.
Q. And you think in those circumstances, because of the possibility of the seizure, there should have been more frequent observations?
A. Yes.
Q. Staff Nurse McRandal has replied to that to say that, having vital sign observations on a more frequent basis, again, would only have been done if directed by medical staff. How would you respond to that?
A. Well, I must say that it is not my experience to have ever had vital signs directed by medical staff.
Q. And why do you think that has been your experience?
A. Because I felt that as a nurse I was best placed to make judgments on how frequently I needed to look at somebody and, in particular, my level of expertise was probably far greater than the houseman, and so I felt myself better able to make the decision.
Q. Because you would be the one doing the observations?
A. Yes.
Q. And that you'd be the one there with the patient

more often?
A. Yes.
Q. And you had more experience than the house officer?
A. Yes.
Q. You feel you can make a better judgment call?
A. Yes.
Q. I think you've said that some of those vital signs were a little slightly elevated, but by 6.00 am they were within normal limits. Is that, to some extent, you saying that that should've been done but it's really of little consequence?
A. Yes, I think it should've been done but it doesn't appear to have made, to me, any difference, the fact that they weren't done because by 6 o'clock it seems that things were reasonably okay.
Q. In general, in terms of Claire's vital signs, removing the central nervous system observations for the moment, in general her vital signs did seem to be stable throughout her admission until her arrest at 2.30 on 23rd October. Is that a fair summary of her vital sign recordings?
A. Yes, I think so. They weren't anything that was so glaring that you'd shout.

Q. (Pause) We've already touched upon it, but it seems to be a recurring theme that different elements of the nursing care were felt to require medical direction. Do you have any comment, in general, just about that? You've said some things already. Do you have any comment, in general, about the fact that the nurses seemed to require so much medical direction for a variety of different elements?

A. Well, it sounds to me as though that was the way that things worked at the time, and I can't be sure as to why that would be but possibly custom and practice. That's how it's always been, that this is what you asked the doctor or the doctor had the last say.

THE CHAIRMAN: Speaking on a general level then, you've heard that things have changed significantly since then, and the local nurses have said that in their evidence here over the last week or two. But do I take it from your last answer that you're expressing a little bit of surprise that they were quite as dependent on direction from doctors in 1996, as perhaps comes over in the transcript?

A. Yes, I am, because nursing is always evolving,

and this was a children's hospital that professionally has a good reputation, and the nurses there were professionally -- in particular the senior nurses, that I know from the past, were very engaged in wider nursing circles, and so I'm a little bit surprised, I suppose, that at ward level people come across as being a bit more dictated to by the doctors, or dependent on the doctor's decision.

THE CHAIRMAN: Thank you.

MR REID: If I can then bring up the fluid balance chart at 090-038-133, please. (Pause) First of all, I think you've said in your report that you think that the fluid balance charts appear to generally show an accurate recording of fluid intake, would that be correct?

A. Yes.

Q. Just while we're on the intake section, is there anything you would note about anything to do with the intake of fluids on those charts?

A. Well, apart from the fact that it's just a continuous total, so that you haven't got written down readily to see what the hourly volume was. You've got to calculate it. But it does seems as though that when the recordings were done they

weren't done on the actual hour, so it isn't a consistent 64 ml each hour that is being recorded. The volumes vary.

Q. If we bring up 135 as well, please.

THE CHAIRMAN: That is inevitable, Mrs Ramsay, that you don't?

A. Yes, it is, but some of these -- well, I think I did a little bit of sort of working it out -- seem to show quite a bit of variation.

THE CHAIRMAN: Yes.

A. But, yes, there is an inevitability because you can't get to every patient on the hour.

MR REID: Two things on that. First of all, although you say it is an accurate recording of fluid intake, all you see is a cumulative total of the fluids, is that what you mean?

A. Yes.

Q. And you would have liked to have seen the individual fluid per hour?

A. Well, the common practice that I have experienced is that you would put what the level started at, and then what the level finished at after the hour, and then what the difference was and then have a cumulative total.

Q. Yes. So for example, if we bring up the PQ fluid

balance chart at 090-058-208. If you zoom into the top left-hand corner of that, please. Thank you. Is that what you mean, the fact that there's a number that was ticking down and a number ticking up?

A. Yes. And you wouldn't necessarily have separate columns. You put one figure over the top of the other.

Q. And the second point you were saying there was that there obviously seemed to be some discrepancy between the times of each hour.

A. Yes.

Q. The Chairman made the point, obviously, that if you have several children receiving IV fluids and it comes up to the hour, you can't check the fluid balance of each and every one of those at that time.

A. No.

Q. But what variance of time would you consider reasonable?

A. Well, some of that depends on how many other children you've got to look after and whether or not they've got IVs, but probably sort of five/ten minutes each side of the hour.

Q. Yes. If we then look at the output, and we will

leave this 135 up there, we can see urine is noted as "PU", as in episode of urine. And during Claire's care more than only once is an indication of volume written as "large" at 11.05. What would you say about the measurement of urine on those fluid balance charts, as regards October 1996?

A. The way that it's described would have been common practice at the time. The use of "large" to indicate what the volume is would've been common, or to use plus signs to indicate volume. So I would say that this is probably the way that urine output was indicated for the majority of children.

Q. Would you consider that to be an accurate measurement of urine?

A. No.

Q. And why is that?

THE CHAIRMAN: It doesn't tell you.

A. It doesn't tell you and it's guesswork, and it's subjective.

MR REID: Yes. Let's look at now. Would you consider that now to be acceptable customary practice?

A. I think probably some of it depends on what's wrong with the child, but a child with an

intravenous infusion people have said for a very, very long time accurate measurements. I think what's happened is that people's definition of "accurate" has got a little bit distorted over the years, so I think a child for an intravenous infusion then this chance recording is not acceptable now.

Q. So you wouldn't expect it with every single child, but a child who's receiving intravenous fluids you would expect a measurement of urine?

A. Yes.

Q. And that would be by weighing nappies or collecting urine, I presume?

A. Yes.

Q. Or if they have a catheter, then checking that?

A. Yes.

Q. You may have seen the evidence of Staff Nurse McRandal and Mrs Pollock regarding practice on Allen Ward in the children's hospital at present, which is that in not every case of a child who is receiving IV fluids would their urine be measured in that way, and they would still maybe record that as "PU". How would you assess that as reasonable practice or otherwise?

A. I would say I would be surprised, in the light of

these events, in the light of the publicity. And my understanding is that there are guidance. But I also understand that the guidance indicates that there's a clinical judgment in this, and so it isn't an absolute. It isn't that every child on an IV must have its urine measured. But I would say that I would be surprised.

Q. Well, certainly, let's say in the hospitals that you're familiar with, in wards where children are receiving IV fluids, would you expect, of the staff nurses there, that they measure the urinary output of children on IV fluids?

A. Now I would.

Q. If we bring up 090-003-133. (Pause) I just ask you just as a general point, something I asked Staff Nurse McRandal. Claire's on IV fluids, and it seems to be that there is one episode of urination between 10.30 and the next episode at around 11.05 pm the next night. Would you consider that to be a common occurrence, or an uncommon occurrence?

A. So the timeframe is 10.30 pm at night until ...?

Q. If we bring up 135, please. See on the left-hand side that the IV fluids were begun at 10.30 pm. There was an episode of urination at around 3.00

am, and the next episode of urination is at 11.05. Is that common or uncommon?
A. Well, bearing in mind that -- and I wouldn't be able to describe the physiology -- a lot of people don't pass urine at night, and so that seems to be reasonable.
Q. And another query on the left-hand side. It seems that Claire was vomiting on several occasions or six recorded episodes of vomiting there overnight. She's described the next morning as having slept well. If a child was vomiting on a regular occurrence, would you consider that to have been sleeping well overnight?
A. Well, not really, because she was disturbed six times in order to have a small vomit. But she presumably wasn't very awake when this happened and she wasn't sitting up and vomiting into a bowl, so she was having small vomits, which were possibly while she was half asleep.
Q. Would you expect anybody to be notified about the fact that there were several episodes of vomiting overnight?
A. Yes. And I've thought about this and I think probably, at least on the ward round, that would

be one of the things that you would say that: "She's been vomiting overnight".

THE CHAIRMAN: This document, that we're looking at now, that would be available on the ward round, wouldn't it?

A. Yes.

THE CHAIRMAN: So it is something that should be picked up?

A. Yes. They should all have been available at the end of the bed for anybody to look at at any time.

MR REID: (Pause) If I can move then to the ward round the next morning. As you may have gathered from the evidence, it is Staff Nurse Field that says that Kate Linskey, who had been a full staff nurse for only a short period of time, she believes that she was the nurse on the ward round. Staff Nurse Linskey can't recall whether she was or not. In general, in your experience of ward rounds in October 1996, what level of nurse would normally be on the ward round?

A. The most senior person on duty.

Q. Would that be the ward sister if she was available?

A. Yes, the ward sister or the person who was deemed

to be in charge.
Q. In terms of Staff Nurse Linskey's experience, she seemed to be one of the less experienced members who were on the ward at the time. Do you have any comment to make about her level of experience and being the nurse on the ward round?
A. My understanding is that she wasn't registered as a children's nurse, and so she might have had experience, through having been in that environment for a while, to be able to pick up things, pass on information, but not necessarily have the knowledge and expertise to contribute to the discussion.
THE CHAIRMAN: I think she appears to have been the longest qualified nurse, in the sense that she was a state enrolled nurse from 1981. But she wasn't the most experienced children's nurse?
A. Yes.
THE CHAIRMAN: Again, is there a balance to be struck there. Can you see why she went on the ward round?
A. Well, yes, I can because when she was a longstanding enrolled nurse, part of that team, she would have been valued by her colleagues because of the expertise that she'd developed

through being there for a long time.
THE CHAIRMAN: Okay.
MR REID: If we look at Staff Nurse Field's note of the ward round. Bring up pages 090-040-140 and 141 together, please. (Pause) Thank you. It is a little small, but you might be aware that the diagnosis that was noted by Dr Stevenson of Dr Sands' ward round was non-fitting status epilepticus. Are you aware of that?
A. Yes.
Q. It seems at some point after that that Dr Sands added the diagnosis in the note of encephalitis and encephalopathy. Are you aware of that?
A. Yes.
Q. And there has been some debate about whether encephalitis was actually mentioned on the ward round, but Dr Sands certainly says it would have been. Would you have expected the nurse, who is making a note of the ward round, to have noted either encephalitis or encephalopathy on the nursing note?
A. I wouldn't have expected that person to have put it into the care plan, because the person on the ward round was not the person who ultimately had the responsibility for writing the case plan.

But to pass on what the current thinking was, then I think that would have been a reasonable thing for her to have done

Q. As in to pass it on to the nurses caring for Claire. And that nurse who is caring for Claire, would you expect them to write that in the notes?

A. Yes, and if I could just add that I'm a little bit surprised that the nurse caring for Claire wasn't there when the doctors were looking at her, because she was the one with the most knowledge.

Q. On a general ward round there's a nurse, as you say, a more senior nurse, accompanying the doctor on the ward round. Would you generally expect the nurse who is taking care of the patient to then be present whenever her patients are being seen?

A. Yes, but I think there's probably ... this has a 1996 element to it and so these days I think it would be more common, perhaps, than it was then.

THE CHAIRMAN: So would that be in addition to the sister?

A. Yes, because I think the sister's role would be to oversee the lots, co-ordinate, but the individual nurse would have the in-depth

knowledge of the child because she'd been looking after them, and would nowadays be expected to contributed but probably less so in 1996.

THE CHAIRMAN: Thank you.

MR REID: Now, you have said previously you would have expected the care plan to be reviewed probably at the end of each shift.

A. Yes.

Q. I think you have also said in your report previously that you would expect it to be reviewed if there was a change in diagnosis or a change in condition. Is that right?

A. Yes.

Q. At the ward round then the diagnosis changes from that of a viral illness to that of non-fitting status epilepticus, with possible encephalitis and encephalopathy. Would you expect then, on the basis of that, that the care plan should be reviewed?

A. Yes.

Q. If it had been reviewed at that stage, how would you have expected it to have been changed?

A. The key nursing element was that Claire had altered consciousness, and so that needed to be a feature because, regardless of what her medical

diagnosis was, her nursing care needed to focus on the fact that she had altered consciousness, and what the possibilities were for that in terms of: what would you look for if it was getting worse? What would the indicators be? What things should you be noting? So I think it was the altered consciousness and what the potentials are for a child with altered consciousness, because you would also be looking at their breathing, were they fading into unconsciousness to the point whereby their breathing is affected. And a child who is unconscious might not be able to maintain their own airway, so you then have to look at the way they're positioned in their bed in order to make sure that their airway is clear. So I think the altered consciousness is the overriding nursing need.

Q. I think, indeed, in your report at page 21 -- that is 231-002-021, and 020 as well, bring that up, please -- there you list a number of the different problems and goals that you would've liked to have seen changed in Claire's care plan. First of all, what effect do you think not changing the care plan, along those lines, may have had?

A. Maybe it didn't emphasise the fact that she was unconscious, because she could've looked as though she was just asleep and justifying the level of consciousness by the medicines that she was having, or the fact that she was thought to have had a fit and was, you know, post having had the fit. So it didn't emphasise that this was a child with altered consciousness and so it then brought in all the other possible consequences, or risks associated with your consciousness level being reduced.

Q. Would it almost be fair to say that the fact the unconsciousness wasn't noted in the care plan, does that mean also then the seriousness might not also be considered?

A. Yes, I think that's possible.

Q. One of the elements you say there in the final section is:

"Possible aspiration due to reduced consciousness. The nursing goal: prevent aspiration, and the nursing intervention: pass naso-gastric tube."

Staff Nurse Field in her evidence said that, again, this would be another element where they would not pass a naso-gastric tube unless the

medical staff had requested it. Would you have any comment to make about that?
A. Yes, a naso-gastric tube needs to be sanctioned by a doctor. It isn't something that nurses would readily do unless it was part of some protocol: you know, "Child admitted with X always has a naso-gastric tube". But I think that, bearing in mind that she had been vomiting, her consciousness level was reduced, so she might not have been able to forcibly vomit and so there was the potential for her to aspirate. There needed to be the discussion. Now, at the end of that discussion, somebody might have decided that passing a naso-gastric tube could have compromised her airway, and so it was best not to do it at that point. So the doctor would have had the final decision, but I don't think anybody had the discussion.
Q. Yes. So it's not that perhaps a naso-gastric should definitely have been passed, it's that the nurse should have discussed it with the doctor and it should have been considered?
A. Yes.
THE CHAIRMAN: And this is exactly where you're getting into the absence of the sister, the ward

round being done in conjunction with the nurse who is there and not the nurse who does the care. We're getting more removed from pinning down what exactly should be done with Claire?

A. Yes.

THE CHAIRMAN: Thank you.

MR REID: You said that you think the care plan should have been reviewed and amended at this stage because of Claire's change in diagnosis and the fact that she generally was unconscious, and Staff Nurse Field, I think to be fair, has accepted that she believes that she should've maybe reviewed the care plan on the basis of the change of condition. Unfortunately, of course, we don't have any evidence from Staff Nurse Ellison, and Staff Nurse McCann says that simply it did not reach that stage where she had the time to perhaps review the care plan. By that time Claire had gone off to intensive care.

In terms of any other changes, changes of the day of the care plan, if we bring up 310-001-001, please. (Pause) Just by itself thank you. We talked about at the ward round how the care plan might have been changed after that. At what other stages during the day do you think that the

care plan maybe should've been reviewed or changed?
A. Possibly when she'd had that seizure, because that then became something definite, whereas before there was the possibility, so she had actually had an actual seizure; when the various medicines started, like the midazolam, when that infusion started, because that brings with it possible complications. So when the midazolam started. I think they're the ones I can think of at the moment.
Q. And then, as you say, at the change of shifts as well.
A. Yes.
Q. I will go further into the areas of the seizures and the medication after the break. One last point just before we break.
THE CHAIRMAN: We don't need a break.
MR REID: Oh we don't need a break at this point.
A. Can I have a glass of water?
THE CHAIRMAN: Unless you particularly want one, Mrs Ramsay.
A. No. I'm fine.
THE CHAIRMAN: We have been breaking for the stenographer, but we don't need to.

MR REID: I will go to this point before I move on to the medication. The neurological observations were begun at 1 o'clock on 22nd October. I presume you would have expected the care plan to be amended to reflect that as well?
A. Yes.
Q. If we bring that page up. It's 090-039-137, please. (Pause) And if we just look at the respiratory rate section, please. It's just at the bottom, "Respiratory rates". (Pause) If you note there, there seem to be a few lines and dots but there are certain areas where the readings are missing. Would you have any comment to make about the fact that some of the respiratory observations are missing on that part of the chart?
A. One is that it's fairly comment for respiratory observations not to be recorded, but respiratory observations in a child who is unconscious are particularly important. And so the fact that there are long periods when no respiratory rate was recorded is an omission in record keeping.
Q. If we just draw that up to the full form, please, and zoom in on the GCS scores, please. (Pause) Would you be quite familiar with taking central

nervous system observations for the purpose of the Glasgow Coma Scale?
A. In the past, yes, not recently.
Q. First of all, in terms of the scores that were taken on 22nd and 23rd October, how would you consider the competence of how that was done in that form?
A. Well, the questions are there and the ticks have been put beside them, so ...
Q. So generally reasonable?
A. Yes.
Q. I presume that there would be different times when you were taking a Glasgow Coma Scale result, and you would be taking it maybe an hour after a different nurse had taken a result. From your experience, what did you find about the differences between the subjective views of each of the different nurses, when it came to assessing someone for a GCS result?
A. I think some of it depends on the expertise of the person that's doing it, and possibly you then get more expertise of the individuals, then you get greater consistency. But if your assessment varies from the previous one, then you would either re-check it to see which one of you is the

closest to it, or get somebody else to come and check what you've observed, because there is some subjectivity to these assessments, and some level of expertise in terms of interpreting what you're seeing in front of you.

Q. So you might double check it yourself; you might bring another member of staff. Would the ideal situation be to grab whoever it was who did the previous reading and see if they thought there had been a deterioration?

A. Yes, but also for some of these things you can ask a parent's view as well, because the parents are the constant, and so they might have been there when the previous person did things, and so asking, "How did Claire respond last time?" would give you an indication of what the other person was seeing when they recorded what they were recording.

Q. Let me ask you about that. A child is on IV fluids or is getting hourly observations. You always have to come to that child once an hour. Would it be regular any time you come to see a child to check on anything that you as a nurse would say to the parent, "Well, how is she at this point?"

A. Yes.
Q. So you would be getting that feedback from them on an hourly basis if you were doing hourly observations?
A. Yes.
Q. And you said that if there's a difference in score you would maybe go and check that with someone?
A. Yes.
Q. Would that be any difference in score or just a significant difference?
THE CHAIRMAN: Scores as low as this surely?
A. Pardon?
THE CHAIRMAN: When the scores are as low as this you're going to be worried?
A. Yes.
THE CHAIRMAN: If the scores are higher and are not causing concern?
A. Yes, if they're better then it's all to the good and you probably wouldn't give it a second thought. You'd think: "Oh this treatment is working. Things are on the mend". But if the scores were worse, then you would want to go and check with somebody that you were reading it correctly.

MR REID: (Pause) We can see there that there are drops from 3.00 pm, from 9 to 7; 4.00 pm from 7 to 6; at 9.00 pm from 8 to 6, and then it stays at 6 from then on. If you had seen a drop in the GCS score, and you had maybe checked that with someone else, but you were still satisfied that there had been a drop, what would the next stage be? Would you inform anyone, for example?
A. Well, assuming you'd had the discussion with another staff member on the ward, then one of those people should call the doctor to check that that was okay, that they were happy that the score was down to 6. Because if you don't do it at 6, do you then do it at 5 or do you just wait until things have got down the bottom?
Q. And let's say that you're the senior nurse and you're told by someone else that the Glasgow Coma Scale has dropped, firstly, do you go and see the patient?
A. Yes.
Q. And if you're also satisfied that there's been a deterioration in the condition do you inform a doctor?
A. Yes.
Q. And would you then expect them to attend the

patient as soon as possible?
A. Yes.
Q. And would you expect any drop in the Glasgow Coma Scale to be noted in the nursing notes?
A. Yes.
Q. And you've had an opportunity to see the nursing notes. Would you say that each of those drops is reflected in the nursing notes?
A. I can't remember offhand.
Q. Well, I'll bring them up for you then. If we can go to 090-040-141, please. We can see there Staff Nurse Ellison's note. She says:
"Continuous on hourly CNS obs, GNS 6 to 7."
I think later on she says:
"Very unresponsive, only to pain, remains pale."
And then if we go to the next page, which is at 138. (Pause) There is no note of the GCS other than on the right-hand side. Staff Nurse Lorraine McCann at 11.00 pm notes Glasgow Coma Scale of 6. So if we bring back up the CNS chart at 090-039-137, please. (Pause) So we have that one note of Staff Nurse Ellison saying: "GCS 6/7" and we have that one note of Lorraine McCann at 11.00 pm saying: "Glasgow Coma Scale 6". Would

you have expected the drops in the GCS to have been further noted in the notes then, the notes that were made?
A. I don't think I would've expected somebody to have done the observations and immediately gone and written it in the evaluation, because that isn't how people tended to do things. They tended to do a summary of things at the end of the day. And, of course, the trouble with that is it is a summary. It's not a blow by blow account of what's gone on. But bearing in mind there seemed to be references to other things, like change in temperature, I think it's surprising that there aren't other references to the Glasgow Coma Score, considering being unconscious was her main problem.
Q. Can I ask about that. If we look at the chart we had before which also has her vital signs. If we just zoom out of that. Several of the nurses and doctors have described Claire's condition in the evening of 22nd October as "stable". I think the Chairman has asked them on that occasion: "Do you mean stable per", but would you have considered her condition to have been stable in the evening of the 22nd?

A. (Pause) Well, she was stable but sick.
Q. And how sick would you have considered her to be?
A. Well, from the coma score and her lack of responsiveness, then she was very sick. But I think from a nursing perspective they could have thought that she was sick but stable.
Q. So you think that --
THE CHAIRMAN: "Stable" doesn't actually communicate anything very much here, does it?
A. No, no, but --
THE CHAIRMAN: For instance, you could be in intensive care and in a stable condition, but so seriously ill that you have to be in intensive care.
A. Yes.
THE CHAIRMAN: Yes.
A. But it is a term that is used, and I think it perhaps indicates that somebody isn't considering that within the next half an hour something drastic might happen to you.
THE CHAIRMAN: Thank you.
MR REID: If we can bring up 090-026-075, please. This is the original drugs prescription chart. I'm just going to ask you a few things about this. Firstly, we've heard that when it comes to IV medication that the first dose would generally

be given by a doctor rather than a nurse. Does that correlate with your understanding of practice in October 1996?

A. In lots of places, yes.

Q. And that sometimes a second dose might be given, an IV by a nurse, but with the stronger drugs it would still be a doctor's responsibility to give them, for example, phenytoin?

A. I think it's quite likely that some nurses might only have been giving intravenous antibiotics, from the second dose onwards.

Q. Because it is self-taxing(?), for example?

A. Yes.

Q. We have also heard a difference of opinion on double signing of drugs. In that I think Staff Nurse Pollock said that the practice at the time was that either a doctor and a nurse signed it or two registrants would sign off the drug, and we heard Dr Hughes say that in a lot of cases it was simply that a doctor signed alone. What would be your experience of how drugs were signed off in October 1996?

A. From a nursing perspective, it would've been common practice for two people to have checked, but not necessarily signed the drug. So there

might just have been one signature but usually there had to be a second checker. My experience, doctors did their own drawing up and giving of drugs and didn't have them checked by a nurse.
Q. Was that simply what happened? Were there any policies that said differently at the time, or was that simply what happened?
A. I think that's what happened. I don't recall any policies at the time that described what medical practice should have been in relation to administering and checking drugs.
Q. When you say in locations that double checking was done. You said that somebody would check the dose. Would that sometimes just be the nurse drawing up the drug for the doctor who'd prescribed it?
A. Sorry, can you repeat that?
Q. You said that sometimes there would be a second person double checking the dose, on occasion. Would that sometimes just be the nurse double checking the doctor?
THE CHAIRMAN: No (overspeaking)
A. No, in my experience, I wouldn't have said that nurses were regularly checking what the doctor was giving if he was then going to give it.

MR REID: Okay.
THE CHAIRMAN: If the doctor was going to give it, the practice was, I understand from you, he would take responsibility or she would take responsibility for administering that drug?
A. Yes.
THE CHAIRMAN: If it was to be administered by nurses, it would be checked by a second nurse but not necessarily signed for by a second nurse?
A. Yes.
THE CHAIRMAN: Thank you.
MR REID: If we can look at some of the individual drugs that were administered to Claire on 22nd October. If we start with phenytoin. How familiar do you think that staff nurses on a general ward, such as Allen Ward, would have been with a drug such as phenytoin in October 1996?
A. I think that it depended on whether they regularly admitted children with epilepsy. They would probably know what phenytoin was because it's been around a long time, and they would've given it to children orally. So I think they would have had some knowledge of the drug.
Q. And if you as a staff nurse were unfamiliar with a drug, would you check anywhere to find out more

about the drug?
A. Yes, I would think that all wards had a British national formulary there, for people to go and look up what the drug was and what its side effects were.
Q. In what circumstances would you, as a staff nurse, check the formulary for a drug?
A. If this was something you weren't too sure about, hadn't come across before, because you should have an awareness and a knowledge of the things that are happening to your patient, so that you know what to look out for.
Q. So it is a case it's not just the dose, or something of that nature you're checking, you're checking to see what might happen as a result of the administration of this drug?
A. Yes, and also to inform yourself, because parents ask questions so you need to have some information to impart.
Q. You don't want to look as if you don't know what is going on?
A. No.
Q. So in terms of the phenytoin, what as a nurse would you be considering you might have to do if you knew a patient was receiving phenytoin?

A. Well, you'd want to know what it was being given for and were there any immediate side effects to it, which could affect you as a nurse and the nursing care that you gave, and what the likely outcome was.
Q. Would you want to have a cardiac monitor running during phenytoin administration?
A. I think the guidance is quite clear on saying you should have a monitor there. Yes, because my understanding is that if you give it intravenously then you can get cardiac arrhythmias.
THE CHAIRMAN: That is for the initial dose, is it?
MR REID: Yes, and I think the --
THE CHAIRMAN: Preferably for it to continue but essential for the initial administration?
A. Yes. I think that's what it says.
MR REID: Obviously all of these issues will be canvassed this afternoon with Dr Aronson. Sorry I'm asking you questions about it when we have Dr Aronson waiting in the wings with it, but I'm trying to get it from a nursing point of view. Because, in terms of the cardiac monitor, we can see at 090-040-138, that there does seem to have been a cardiac monitor in situ at the

administration of the phenytoin at 11.00 pm or 11.30 pm, whenever it was administered. But there is no note of the same at the administration at 2.45 pm in the afternoon. If there was no cardiac monitor in situ during that infusion, would you be critical of that fact?
A. Yes, I would because it should have been there. I have to say I don't know how critical I would be of the nurses, because this was a medical procedure and not something nurses would've necessarily had experience of.
Q. Well, would you have expected it to be noted that a cardiac monitor was in situ, as it's noted there by Staff Nurse McCann?
A. Could you repeat that?
Q. Staff Nurse McCann notes that a cardiac monitor was there for 11.00 pm. If one had been there for 2.45 pm, would you have expected that to have been noted in the notes?
A. Yes.
Q. If we go back then to the chart at 090-026-075, the next drug that Claire receives. She has also received diazepam at 12.15 but the next drug she received was midazolam at 3.25, and we think that dose may have been 12 ml. It is written as 120

ml there. As a nurse, what would you have expected? Firstly, would nurses have been familiar with midazolam in October 1996?
A. In a general ward environment I seem to think that it would be unlikely.
Q. In those circumstances would you consider that consulting the BNF would, at the very least, advisable?
A. Yes.
Q. We know some of the possible side effects of midazolam, and Dr Aronson will go into those later on. In terms of the side effects what would you as a nurse be looking out for in the period after that?
A. Reduced level of consciousness and depressed breathing.
Q. If you were unfamiliar with midazolam, would you be expecting a doctor or a senior nurse to say to you, "These are the side effects. Look out for these things"?
A. Yes.
Q. Would that be the doctor or the senior nurse or either?
A. I think it could be either but also you, as an individual, if you've not come across it before

would want to seek out the information to enable you to look after the child effectively.
Q. Finally then the sodium valproate, would that have been familiar to nurses on general ward in October 1996?
A. If they were used to looking after children who were having seizures.
Q. Would there have been any particular side effects you would be looking out for that these would involve?
A. I'm afraid I can't remember off the top of my head.
Q. As a nurse, if you were aware of all of these different drugs, the fact that Claire is receiving all these different drugs, would that raise any concern or alarm with you?
A. Well, it's an indicator that this is a child whose condition isn't under control, and that various things are having to be tried because she's not regaining consciousness or she's still fitting.
THE CHAIRMAN: It raises your level of concern about the child?
A. Yes.
THE CHAIRMAN: You would expect that to prompt the

nurse to keep that child under closer review?
A. Yes.
MR REID: One moment, Mr Chairman. (Pause) If we then go to the record of attacks observed at 090-042-144 please? You're aware of the sheet of attacks observed, Mrs Ramsay?
A. Yes.
Q. The first incident that's recorded on there is a record written by Mrs Roberts of:
"Frequently strong seizure at 3.25, of duration of five minutes."
She stated afterwards "sleeping". It seems from the evidence that Mrs Roberts witnessed the seizure and then mentioned it to the nursing staff. The nursing staff asked her to fill in this particular document.
If you had been the nursing staff on at that time, at 3.25, and you heard about the seizure from the mother, what do you think you, as a nurse, would have done as a result?
A. I would have asked the mother to describe it, and I would have recorded it noting that it was observed by the mother and not observed by the nurse.
Q. Would you have recorded it in the nursing notes?

A. Yes.
Q. It would have been recorded on this sheet in the nursing notes?
A. Yes, because the nursing notes are the ongoing permanent record and these charts have a habit of getting lost over time. So that's not seen as being the permanent record.
Q. Would you have informed a senior nurse or doctor?
A. Yes.
Q. Is it that you would inform the doctor if a senior nurse was not available or would you inform both?
A. I think, I think that it's best to go through the senior person so that the doctors, the general feeling, was you didn't want lots of nurses on a ward bombarding the same doctor when he was only next door or something. And so it was more effective use of people's time if you could channel it but also you would want to keep that person informed of what was going.
I'm a believer in sharing information, not keeping information to yourself, and then having shared it somebody would decide who was going to phone the doctor.
Q. That point is reflected in your report at

231-002-024, and if I can go to 231-002-030 please, at this point in your report you are discussing the chain of command, I think is what you've just said. You said in the second paragraph of this the wards, in your experience:

"Operated with a chain of command. When a nurse was concerned about a child she would share this with the nurse in charge and/or the junior doctor if he/she was present. In most cases, it would be then for the junior doctor to contact the registrar possibly prompted by the nurse, and the registrar or junior doctor would contact the consultant.

"However, if the nurses felt their concerns were being inappropriately ignored then contacting the consultant was an appropriate action."

How often in your experience in the mid 1990s would staff nurses contact the consultant directly?

A. I would think rarely.

Q. How often would they contact the registrar directly?

A. Probably quite frequently because the registrar would have had a higher presence, and so have

developed a relationship possibly with them, but it was usual to talk to the houseman first often because they were the people who were most readily available.

Q. In 1996, if there was a junior doctor you had to book into, and you were unhappy with what they'd said or if you thought they made a mistake, what would be done then in the ward?

A. Well, you shared that with somebody and somebody would talk to the registrar.

Q. Would it then reach the consultant?

A. I think it's unlikely that you would go straight to a consultant. You would go through the registrar.

Q. If we go on to the next paragraph in the report, you say in the second sentence the nurse had a duty, in your view, to ensure that a doctor was aware of any changes in Claire's condition, and you list there at the bottom the things you think the doctor should have been aware of. The numbers are 3.10 and 3.25 seizure we've discussed, at 5.00 pm the failure to pass urine for six hours, 7.00 pm when the blood pressure was 130 over 70, at 9.00 pm when the coma score was at 6, and at 9.00 pm the episode of screaming

and raised pulse rate.

You said that the nursing record shows the doctor was informed of the episode at 9.00 pm. This is not confirmed by an entry in the medical record, and it seems that for some of others that the doctor wasn't informed.

What would be your general opinion of the nursing care, in terms of the fact that it seems that maybe a doctor may not have been informed of those particular incidents?

A. Well, it's not really very good if you've got some significant events and they aren't being passed on to somebody else, because it then means people who are directing her care don't have the full picture of what's happening.

THE CHAIRMAN: None of this is ever quite straightforward, is it, because for instance the 5.00 pm failure to pass urine for six hours but we know that Dr Webb saw Claire at about 5.00 pm-ish and I think Dr Sands as well. They were there looking after Claire and Dr Webb was coming back, for instance, for an update on the information on Claire's condition, is that particular point about failure to pass urine for six hours something he would have picked up?

A. Well, he would have seen it from the fluid chart if he looked at the fluid charts.
THE CHAIRMAN: Yes, that's right.
A. But then if there was a nurse present then you would say, "She hasn't passed any urine for six hours".
MR REID: Yes, okay, but we're a bit unsure about who was where and when. The coma score of 6 and the 9.00 pm episode of screaming, it was Dr Hughes who told us a few days ago that she was there at about 9.30pm and she was called partly because of Claire's condition, so that information was available for her to pick up. In fact she was specifically called to see Claire, wasn't she? I think there's a belief she said she was attending Claire to check the phenytoin levels, for one thing, and to administer medication.
THE CHAIRMAN: I understand your point whether each of these specific issues was referred individually by a nurse to a doctor but, as it happened in Claire's case, perhaps apart from the 3.10 seizure and the blood pressure at 7.00 pm, there were doctors attending to Claire at about 5.00 pm and soon after 9.00 pm.
A. Yes.

MR REID: Before we move on to the final topic which is communication with Claire's family, can I ask you about the issue of consultant responsibility? I think in your report, I'll just bring it up, it's at 231-002-018, you state at the top: "The identity of a child's consultant was usually recorded on the nursing records, and I know that Claire's consultant was Dr Steen. It would not have been usual to make a specific reference to this during the nursing handover, however I believe the nurses could have concluded that Dr Webb had taken over her care. Claire had neurological problems. Dr Webb was a consultant neurologist and spent a length of time examining Claire and interviewing her mother, whereas Dr Steen did not visit Claire."

You'll have seen the evidence of the different nurses and the doctors over the last few weeks of the inquiry, and it seems that their general impression was that Dr Steen was the named consultant but that Dr Webb was certainly providing advice at the very minimum.

Can I just ask you why you think that the nurses could have concluded that Dr Webb might have taken over her care?

A. Because, as I've said here, I think he was the one that was visible and she had a neurological problem.
Q. What would you have expected to have been done if the consultant care had changed from Dr Steen to Dr Webb, from a nursing point of view?
A. Well, good practice would have been that somebody would tell you that that child was now being cared for by Dr Webb. You would then change the bit on the care plan that says who the child was admitted under, and there would have to be changes to the information system so that the hospital record showed who was the child's consultant.
Q. You would have expected not only for there to be a note in the nursing notes but also for some of the forms which the assigned consultant is noted to have been changed formally?
A. Yes, but I think that it probably was a bit more lax than that.
THE CHAIRMAN: Maybe you could comment on this, was it a situation where the nurses would have been sure that Dr Webb had taken over?
A. No.
THE CHAIRMAN: You wouldn't change the identity of the

responsible consultant on the nursing care plan unless you were clear that there had been a change in consultant responsibility?
A. No, and you'd probably do it following on from something being written in the medical record.
THE CHAIRMAN: Yes.
A. So "Now under the care of Dr Webb" would prompt the nurse to then change some nursing.
THE CHAIRMAN: Yes, but that was written in to the record by Dr Webb or by a junior doctor to say that fact.
A. Yes.
THE CHAIRMAN: There's a difference between you. The comment which is highlighted on the screen at the moment is your conclusion from the papers that you could understand if the nurses had concluded that Dr Webb had taken over Claire's care, but that's something short of saying that they would have known that he'd taken over and therefore should have altered the documentation.
A. Yes, yes.
THE CHAIRMAN: Thank you.
MR REID: If a consultant neurologist had maybe taken over the care of Claire, would you have expected, in 1996, for Claire to have been transferred say

to the paediatric neurology ward?
A. If there was a bed available then that would seem the logical place for her to have been.
Q. But it happened on occasion that a paediatric neurology patient was on a general ward, because there wasn't enough room in the paediatric neurology ward?
A. Yes.
Q. If I can then move to communication with Claire's parents and that's in your report at 231-002-032?
Can I ask you just in general, from your reading of the nursing notes, do you think there was sufficient notation in the nursing notes of what was communicated to Claire's parents?
A. In retrospect probably not, but I think at the time people didn't write very much about the conversations they had with parents, other than if there was something specific that was of concern to the parents or concern to the nurse in having had the discussion with them.
So I think it wasn't unusual to have comments that the parents were there or the parents had gone home or something but not much detail.
Q. I think you say that actually in your report there, you say:

"The most entries in nursing evaluations are just concerning whether Claire's parents were attending or not, and one entry shows 'Parents concerned as Claire is usually very active'. [But you state] There are no records giving even brief details of information shared with them and any discussions they had with the doctor."

Are you saying that although the practice at the time that not much was recorded, that there was still an insufficient recording?

A. Yes, I think so. I don't know if --

THE CHAIRMAN: It's the next paragraph.

MR REID: Over the next one, yes, I was going onto the next paragraph. You say:

"It is my opinion that as a minimum there should have been a record of the information given to Claire's parents, their understanding and concerns."

You give a useful example:

"Parents anxious that Claire is not responding as usual. Seen by Dr X who's advised them of likely brain problems. Medicines have been explained and parents appeared to understand."

You consider that to be the minimum?

A. Yes, because often there was a communication

record sheet where people could specifically document communication issues predominantly with, with parents, so yes, this is my view that, although something was written, it wasn't enough.

Q. We've discussed already the fact that nurses generally are on the front line of communication with the family since they're there the most often, though, of course, whenever the doctors attend you would hope that they would explain certain elements of the condition and the treatment to the parents that would be fair to say?

A. The doctor would explain.

Q. Yes, but the nurse would be the first point of call but the doctors would explain things whenever they are present.

A. Yes.

THE CHAIRMAN: Just one moment. Mr Fortune?

MR FORTUNE: Mrs Ramsay has just mentioned there should be or may have been a communication sheet.

A. Yes.

THE CHAIRMAN: That's in her report. There is sometimes a document of that nature.

A. Yes.

MR FORTUNE: Is there any particular example in the

records that would actually go under that title, as opposed to nursing records or relative counselling records?

THE CHAIRMAN: From my reading of it, the closest we have is the relative counselling records but that comes at a later stage after Claire's collapse.

A. Yes, it would have been a similar sheet to that but usually labelled "Communication record".

THE CHAIRMAN: But it's not on the records we have. I can build on that, and thank Mr Fortune for his point. Would you have expected a pro forma sheet, such as that to be present in the nursing records?

A. Not necessarily. It was something that some people had and others didn't.

MR FORTUNE: Thank you.

MR REID: Was it (overspeaking)

A. It wasn't regarded as an essential.

THE CHAIRMAN: Has it subsequently developed as an essential or not?

A. Yes, I think, I think they're in fairly common use these days.

THE CHAIRMAN: Let's make sure there aren't two separate points here. Is one point that in some hospitals there would have been a separate record

sheet for communications with the parents but, even if that was not the position in the Royal, you would have expected that the nursing records would have recorded something along the lines, which you have under the third paragraph under section 4.3.4?

A. Yes.

THE CHAIRMAN: Thank you.

MR REID: One of the key events obviously in Claire's case, it's just after 9.00 pm, Claire's parents are about to leave Allen Ward, after speaking briefly to the nursing staff to tell them that they were leaving. That's at around 9.00/9.15 pm.

At that point, from your impression of the notes, can you see any indication that the nurses appreciated the seriousness of Claire's condition at that stage?

A. No, because my understanding is that there wasn't a discussion about "We're now thinking of going home", it was a sort of chance good bye as they passed somebody at the desk.

THE CHAIRMAN: No, it's a bit more than that. I think Mrs Roberts went to the desk to say her husband and their sons were there with her, but she went

to the desk to say specifically that she was going home.
A. Right.
THE CHAIRMAN: I think that's right. So she went for that purpose.
A. Yes, but I was thinking in terms of the nurse picking up on it.
THE CHAIRMAN: Yes (overspeaking) what the nurse's interpretation was?
A. Yes, yes.
THE CHAIRMAN: I see, but I'm not sure, just to check you've picked this up, as it happened when she was there a phone call came in from a relative in Scotland asking about Claire's condition and in essence Mrs Roberts was on the phone saying "Well, look, you know, she's okay. We're about to go home".
A. Yes.
THE CHAIRMAN: Now if that --
MR FORTUNE: The inquirer was a nurse, if you remember, sir.
THE CHAIRMAN: Yes, sorry. The relative was a nurse who was actually a --
A. Yes.
THE CHAIRMAN: If that exchange was overheard, even in

part, then that would confirm that the nurses in the Royal were not conscious of the state that Claire was in at that time.

A. Yes, so I think the answer to the question is that they weren't sufficiently worried about her to keep the parents there.

MR REID: Do you consider that they should have been?

A. Yes.

THE CHAIRMAN: That rather begs the question, but you may or may not know this but one of the family's big concerns is whether the doctors had picked up on how ill Claire was, never mind the nurses. I'm sure it shouldn't be as hierarchical as this but if the doctors were not alert to how serious ill Claire was, then the nurses would be at a lower level of alertness themselves, wouldn't they?

A. Absolutely.

THE CHAIRMAN: So even though the Glasgow Coma Scale score is low, even though she's pretty much unconscious -- and we now know what was just a few hours away -- at that point the nurses would not have been alert to the extent of the danger that Claire was in.

A. No.

THE CHAIRMAN: Because if the doctors who see a patient don't give you that strong indication then the nurses are more likely to miss it too.
A. Yes.
THE CHAIRMAN: Yes.
A. Yes.
MR REID: Let me ask you it this way -- sorry.
THE CHAIRMAN: Sorry.
MR CAMPBELL: [inaudible: no microphone]
THE CHAIRMAN: Yes.
MR CAMPBELL: With reference to the evidence of Dr Sands, transcript page 233, I think day 48.
THE CHAIRMAN: Okay. Do you have a date, Mr Campbell?
MR CAMPBELL: Sorry?
THE CHAIRMAN: Do you have a date? So it's Dr Sands is it?
MR GREEN: 19 October.
THE CHAIRMAN: Thank you.
MR CAMPBELL: It's 233, line 18 and also 235, line 7.
THE CHAIRMAN: Okay.
MR CAMPBELL: In which he's talking about a gap and his acceptance that he should have had a conversation with the nurses to communicate the extent of his concern.
THE CHAIRMAN: Yes, but that is slightly premised in

Dr Sands had left at around 5.00 pm, or between 5.00 pm and 6.00 pm, is that right?
MR CAMPBELL: But he was the main medic on the ground in the ward. Dr Webb is in and out, I think on two occasions through the day.
THE CHAIRMAN: Yes.
MR CAMPBELL: But Dr Sands was in effect in charge of Claire's care in the ward that day.
THE CHAIRMAN: Right, so this was the point in the transcript, Mr Campbell, is it, on page 233 is ...?
MR CAMPBELL: I think it's line 18.
MR GREEN: I have to say, I should put it on record that I do not accept the proposition that Dr Sands was in charge in the ward that day.
THE CHAIRMAN: I understand that, and I understand this may be a slightly loose way of describing what was going on. Yes. Okay, so do you get the point that's been made, Mrs Ramsay? I'm not sure I'm quite picking it up from the transcript.
The question at line 14 is was Claire actually the sickest child in the ward and Dr Sands says:
"Yes. Looking back, and having seen now the notes, that's my impression."
So this is Dr Sands looking backwards and

saying that Claire was actually the sickest child on the ward.

MR REID: Mr Chairman, maybe Mr Campbell is relying on the live note that transcends reference rather than the official transcripts?

MR CAMPBELL: [inaudible: no microphone] I checked it earlier on, on the laptop in front of me here.

MR GREEN: The official transcript reference is 233. The relevant questioning begins at line 6:

"Then in relation to the other children on the ward whose care you have had during the day, where would you place Claire?

"A. I would have said at the top of the list in terms of children who were unwell. That's to the best of my knowledge having looked at Claire's chart and looked at some of the other patients. Bits of the other patients' charts that we've seen."

THE CHAIRMAN: Yes.

MR GREEN: Then he goes on to accept, in answer to the question:

"Was Claire actually the sickest child on the wards throughout the day? [This is line 18 on 233] Again, looking back and having seen more of the notes [then there's a pause] well, I suppose

that's unfair because I haven't seen all the notes from the patients on the ward. That's my impression".

THE CHAIRMAN: Yes. Do I take it, Mr Campbell, that what you are doing here is emphasising the point that I was asking Mrs Ramsay about, about the level of awareness which the nurses would have had of the extent of Claire's sickness?

MR CAMPBELL: That is the point I'm getting to, Mr Chairman, however there is a difference in the transcript section which has been referred to just now and the section that I wish to draw the attention towards.

THE CHAIRMAN: All right.

MR CAMPBELL: That is a question for Ms Danes.

THE CHAIRMAN: What page are you on now?

MR CAMPBELL: I'm on the live, the laptop version so to speak.

THE CHAIRMAN: I think we're all on that. No? Sorry, we're not, okay.

MR CAMPBELL: Page 233, line 8 was the question. The second portion of that question reads as follows:

"Now for Dr Stevenson and the nurses, they are the touch point or the contact point with the parents, so if they don't fully understand it,

absent yourself or Dr Webb coming and specifically discussing it with the parents, then it's difficult to see how the parents will be accurately informed about the condition of their child. Would you accept that?

"A. I think there may have been that gap in understanding."

Then slightly further on, it's 235, line 7 and the question starts at line 5:

"What discussion do you think you should have had with the nursing staff at that time before you went off duty?

"A. As one of the clinicians there I think I should have been part of the discussion with the nursing staff to say that this is a girl we're concerned about for these reasons."

Those are the points, Mr Chairman. In fact, there was a gap, and Dr Sands was accepting that there was a gap between his belief about Claire and his communication of that to the nurses.

THE CHAIRMAN: All right, it's then -- sorry.

MR GREEN: Sorry, that's only a partial part of the picture. If we go to page 238 on the transcript for that day, and to line 17. I'm not going to read out all the preamble, the context is whether

Dr Sands did enough to make sure the nurses understood.

The question at line 17:

"Q. Did it not fall to you to make sure they understood that?

"A. That's before Dr Webb's visit.

"Q. Yes.

"A. I think again I would have expressed my concerns to the nursing staff and told them I thought Claire was very neurologically unwell, and said we needed a neurologist to see Claire because I'm not sure what's going on here. I suspect this may be but I don't know."

The question over the page is put and elicits the answer that my learned friend, Mr Campbell, has just put. I simply raise the point at this stage because while it was accurately quoted by Mr Campbell, that sort of partial quotation can be apt to mislead unless the full picture is put.

THE CHAIRMAN: Okay. Your point is that there was a run in to the question in the reference that Mr Campbell made?

MR GREEN: Exactly. Where Dr Sands indicated that he thought he had expressed to the nurses that Claire was very neurologically unwell.

THE CHAIRMAN: Right, and in terms, that piece of Dr Sands' evidence is him explaining to them why he's going to look for Dr Webb?
MR GREEN: Yes.
THE CHAIRMAN: Let me pick that up with you, Mrs Ramsay. Then Dr Webb, who would not normally be around this ward, he is brought in and the nurses would have seen him there at different points. That in itself would indicate there was something more that needed investigating with Claire, would it?
A. Yes.
THE CHAIRMAN: The nurses would pick up on that, and so you've got his intervention and you've got the drugs he prescribed and you've got the Glasgow Coma Scale, and you've got her unconsciousness. Really what that feeds into is maybe resetting the context for the question, "To what extent should the nurses have been alert to how seriously ill Claire was as Tuesday afternoon moved into Tuesday evening and Tuesday night?"
A. I think they should have been alert to it because there were all those indicators, but I think that jointly between them and the medical staff nobody was having that conversation and maybe they felt

she did go some long periods without seeing a doctor, I think, and so that was interpreted that she might be sick but things were jogging along.

THE CHAIRMAN: Another way to look at it is this, to the extent that there could possibly be any criticism of the nurses for not saying to Mr and Mrs Roberts at about 9.00 pm, "We don't really think you should go home without speaking to a doctor", and for the doctor to explain how ill Claire was, the doctors had been coming backwards and forwards during the day.

There was Mrs Roberts there constantly, for long periods Mr Roberts was there. The grandparents were there. Let's set aside their sons for the moment. There were many occasions during the day when any one of a number of doctors could have sat down with Mr and Mrs Roberts to explain things.

A. Yes.

THE CHAIRMAN: If that hadn't been done, and it appears not to have been done, then the question is to what extent would it be fair to be critical of the nurse at around 9.00 pm for letting the Roberts' leave without advising them of the seriousness of Claire's condition?

A. I think if there was situation where the nurses knew something but the parents didn't, then they had a responsibility to ensure that the parents were in the picture. And so I think that would have been the sort of conversation you've just described of getting a doctor to come and see the parents before, before they left and that would have given them an opportunity to decide whether or not they should leave.

So I think that they probably didn't know what the parents knew and so couldn't have that particular conversation. I think that there were opportunities for nurses to find out what the parents knew.

THE CHAIRMAN: Okay. Sorry, Mr Quinn, am I right in understanding that Mr and Mrs Roberts hadn't spoken to a doctor from about 5.00 pm?

MR QUINN: That's correct. Yes, that is correct.

THE CHAIRMAN: Thank you. (Pause)

MR QUINN: Just to remind everyone, and put it onto the record, the purpose for Mrs Roberts going to the nurses' station was twofold. One, that was to say, "We're going to go now, is that okay?", and check with the nurses. The second one was to ensure that the nurses were aware that Claire's

bed sides were up, because she might have been in the habit of getting out of bed. So that was something specific that was said to the nurses. From my recollection -- I haven't checked the record -- Mrs Roberts I think may have spoken to her cousin, or certainly said there was some indirect conversation with the cousin in Scotland who was on the phone who was also a nurse.

THE CHAIRMAN: As I remember the evidence that call came in, and it happened it was taken by the nurse at the station and who was able to hand the phone straight to Mrs Roberts because she was already there.

MR QUINN: That's correct. That is correct. The nurse would have known what Mrs Roberts was telling her cousin in that she was reassuring her cousin in Scotland that Claire was fine.

THE CHAIRMAN: Yes, yes. Okay, thank you.

MR REID: Mr Chairman, there are a few things that just arose with the transcript. Just to put on record as a practical note, the Transcend(?) live note uses different referencing from the official transcripts which are available for bringing up, and so it would be useful if any of my learned friends are referring to the transcripts that

they refer to the official transcripts as much as they can, because that's the version that we can bring up and so hopefully we don't get the --

THE CHAIRMAN: Those are the transcripts which are found on the inquiry website?

MR REID: Yes.

THE CHAIRMAN: Yes.

MR REID: Because the difficulty is that the Transcend note has additional words and so on added to it and so the page numbers and line numbers are different. Normally the page numbers are higher than those that appear on the Transcend software.

THE CHAIRMAN: Okay.

MR REID: It's just to put that on record.

THE CHAIRMAN: Thank you.

MR REID: I take your point, Mr Chairman, not to load too much on Staff Nurse McCann and the night nurses because there may have been communication during the day but let's just finish off the issue at around 9.00 pm.

At that point, the nurses who were caring for Claire would have been aware of seizure 9.00 pm, would have been aware of her Glasgow Coma Scales and the medication she was receiving.

They would be aware of those things, is that

right, Mrs Ramsay?
A. Yes.
MR REID: Claire's mother then comes to the nursing station and says, "We're thinking of going now. Can you please make sure that the bed sides are up because I don't want Claire falling out of bed?" At that point, even if they hadn't been made aware of the seriousness of Claire's condition by the doctors, do you consider that maybe the nurses with the knowledge that they had might have realised of their own initiative that Claire's condition was serious?
MR MCALINDEN: With this question I think it would be appropriate for the witness to be made fully aware of the description of the 9.00 pm event, as given by Mrs Roberts, because it certainly significantly differs from the cold written description in the notes?
THE CHAIRMAN: (overspeaking) very short note on the attack sheet, yes?
MALE SPEAKER: Yes.
MR REID: Yes, would it be fair Mrs Roberts described it, if I recollect properly, that she thought it was Claire trying to wake up out of her sleep effectively? The note on the record of attacks

observed says, "An episode of screaming and raising of arms."

Mrs Roberts considered it at the time as Claire trying to wake up from her sleep and being restless somewhat in her sleep.

Given that GCS score and the medication that was being received, do you consider that the nurses at around 9.00 pm should have been aware of the seriousness of the condition regardless perhaps of whatever they'd been told by the doctors?

A. Well, they should have been aware that she was sick and in all likelihood the sickest child on the ward.

MR REID: In that situation, if the parent comes up and says, "We're thinking of going now", do you think that the nurse should have contacted a doctor to say that the Roberts were leaving?

A. I'm not too sure whether informing people that parents are leaving is something that you would do. I think if you openly have a child that everybody knows is sick and they're going, you would check with the doctor that there isn't something that he wants to say to them before they go.

So I suppose I'm struggling to give you a clear view on that one.

THE CHAIRMAN: If I can come back to your answer a few moments, but your point was that you don't know what the nurses might not have known the extent of the Roberts' existing knowledge?

A. Yes.

THE CHAIRMAN: In other words, the nurses might not have known to what extent, if any, the Roberts had had been sat down at 5.00 pm by Dr Webb to explain things?

A. Yes.

THE CHAIRMAN: Okay.

MR REID: If we can then look --

THE CHAIRMAN: Sorry, just to make a point. It's just one of the many awful aspects of Claire's case that her parents did go home in the circumstances that they did, and it would be very, very easy to write this bit of the report because that should not have happened.

The question I'm struggling with a bit more at the moment is whether, in fact, there's blame attached to a particular nurse or nurses for that.

It's a more defined aspect of the very obvious

and simple point, which is that Mr and Mrs Roberts should not have left with an entirely mistaken understanding about Claire's condition.

A. Yes.

MR REID: In terms of Claire's care in paediatric intensive care, a note from your report that you've no criticism of her care in paediatric intensive care, is that correct?

A. Yes.

MR REID: We then move on to the aftermath of Claire's death. I asked each of the nurses whether they had been involved in any audit or investigation or discussion following Claire's death, and none of them could certainly recall any audit or investigation or discussion.

Would you have expected any discussion among nurses following a child's death in October 1996?

A. I think the situation was not unusual.

MR REID: I presume you mean the situation that there was no discussion?

A. Yes.

MR REID: The situation that a child had died after being on a general paediatric ward for just over 24 hours, was that unusual?

A. It, it would have been unusual but I think

possibly the elements that meant that there wasn't any great discussion would be that there doesn't appear to have been recognised error at the time.

If a child had died as a result of a clear untoward incident, then I think even in 1996 something would have happened to reflect on that.

A child dying and somebody giving an explanation of that, where people aren't thought to have failed, then wouldn't necessarily have prompted any discussion amongst the nurses.

MR REID: If I can speculate for a moment, if say, for example, it had been considered that it had been thought in October 1996 that Claire had suffered fluid overload, would that be something that might be discussed among the nurses on the ward?

A. Only if the fluid overload has resulted from an inaccurate administration of the IV. So if the nurse had set the pump at the wrong level and so too much had gone in over too short a period of time then that would have led to a discussion. Or not necessarily a discussion, I think the person who had set the discipline.

Q. Effectively there would only have been a discussion with nurses if there was a, so to

speak, definite iatrogenic reason for the death of the child?
A. Yes, that is my opinion.
Q. Would there be discussions if there was a possible iatrogenic reason for the death?
A. I think at the time, no.
Q. Only in definite circumstances?
A. Yes.
Q. What would you -- sorry, Mr Fortune has a point.
MR FORTUNE: Rather than have an exercise in speculation, could my learned friend not go back in time and indeed deal with the contents of the relative counselling record which is 090-028-088 and use the contents of that now for a discussion about any discussion between nurses after the death, but in particular we would invite my learned friend to ask Mrs Ramsay about the contents of that document and whether there are any similar records that are to be found in PICU because during the day there must have been a constant attendance by the parents and at least one consultant in PICU at all times, whether that was Dr McKaigue, Dr Taylor or indeed anybody else, because these documents would form the basis, surely, for any audit or discussion later

between nursing staff and clinicians.
MR REID: I think you have said, Mrs Ramsay, already that the relative counselling record is the only sheet that the inquiry or you have seen that solely concerns communications with the family; would that be fair to say?
A. Yes.
Q. Picking up with Mr Fortune's point that there may have been some sort of constant communication between the nursing staff in PICU and Claire's parents throughout 23rd October would you expect any record of that to have been taken in October 1996?
A. Where specific information had been imparted then good practice would be that you would make a note of that, but I do not think -- I wouldn't have expected a sort of verbatim record of -- so --
THE CHAIRMAN: Surely that depends on the circumstances in which you move into PICU? If you are, let us suppose we have child who is terribly injured in a car accident and that child is taken into PICU and that is the point of the treatment starting, then you would expect or sorry would you expect then that the PICU record would show discussions with the parents about

what the state of the child's health was, how much at risk she was of dying and things of that nature? I am asking for a contrast because in this case when Claire went to PICU and her parents were there and called to the hospital in the early hours of the Wednesday morning they were in effect told at that point that there was nothing more that could be done. There wasn't revealing(?) then was for the brainstem tests, but there was no updating to be done or no, "We will come back to you and tell you in a few hours if there is a change in condition or see how she responds to treatment". In fact when they arrived in PICU they were told that Claire was in real terms "dead"; is that not right? There is not in fact the extant of any exchanges which a parent has with the consultant or nurses in PICU?
A. I am not sure that I am fully understanding the question in order to give a response.
THE CHAIRMAN: Yes, I am sorry. I understood the intervention from the floor from Mr Fortune who represented Dr Steen was to the affect that the record that you have now in front of you is the only record we have of discussions with Mr and Mr Roberts through the, although it is dated 22nd it

is actually 23rd October, okay, and he was raising a query about whether there might have also been discussions in PICU with the consultant in PICU or with the nurses in PICU, right, because there do not appear to be any records of such discussions?

A. Well, a record to show that the parents had been spoken to by consultants I think most of the information because it is very negative would have had to have been imparted by a doctor and then reinforced or nurses explaining things. So, yes, some sort of record of what their understanding was, although it says here that they understand the explanation. There were several hours, were there not, after she was admitted and so their state at the time possibly to have written that down, so there is not a lot of detail there or any detail. So, yes, it would have been good practice to have written some more of it.

THE CHAIRMAN: Okay and when you say good practice to have written more of it, is that in these relative counselling notes or in PICU or both?

A. In the -- well, the relative counselling notes that's from PICU, isn't it?

THE CHAIRMAN: It's not.
A. My understanding was that I thought that was an attachment to the intensive care documents. There should have been both because intensive care was a totally separate environment with totally separate records and the people looking after her there, needed to keep their own ongoing account of what happened during the day.
THE CHAIRMAN: Okay, Mr Quinn, could I ask you, could you find out from Mr and Mrs Roberts if they had any discussions with the consultant in PICU as opposed to Dr Steen and Dr Webb?
MR QUINN: Yes.
THE CHAIRMAN: Thank you very much.
MR QUINN: I have consulted with Dr McKaigue, in relation to that issue and his evidence would be that he had no communications at all with Mr and Mrs Roberts.
THE CHAIRMAN: Okay, sorry, Mr Ferguson, just --
MR QUINN: We will find out.
THE CHAIRMAN: Yes, if you found out, but just --
MR QUINN: My recollection, from my instructions, are that they at least spoke to Drs Webb and Steen.
THE CHAIRMAN: Yes, just Mr Ferguson is going to ask in case -- did you hear that Mr Ferguson?

MR FERGUSON: Yes.
THE CHAIRMAN: Thank you.
MR REID: Okay. I also seek guidance from Mr Fortune as to whether he is making the point that the note is part of the other(?) notes, or whether he is saying that these occurrences actually happened on the ward rather than in PICU.
(Pause)
MR FORTUNE: I'm not quite sure who goes first, but so far as this note is concerned it is part of the PICU records and clearly the entries were made at a time when Claire was in PICU. What we have asked is whether there are any other records similar in nature, however described, that relate to discussions between Mr and Mrs Roberts and any other consultant during the course of the time that Claire was in PICU.
THE CHAIRMAN: Okay, so this note that we have of the relative counselling record is part of the PICU record, as you understand it?
MR FORTUNE: Apparently so, sir.
THE CHAIRMAN: Okay, that's fine.
MR FORTUNE: As you look at the record it is clearly an incomplete record on the right-hand side and indeed it is difficult to work out whose writing

it is.
THE CHAIRMAN: Yes, okay.
MR QUINN: There was no other contact with any other consultant other than Drs Webb and Steen.
THE CHAIRMAN: In a sense that's not unexpected because of the state that Claire was in there is in effect what the parents were being told there's nothing more that could be done for her, so it's the contrast between that situation and the one I described of a child being brought into PICU after a car crash where you do have direct contact with the consultant?
MR QUINN: Yes.
THE CHAIRMAN: Okay, thank you.
MR REID: Can I just bring you, Mrs Ramsay, to something in your report 231-002-033, please. This is just about PICU and you write at that section:
"The nursing care plan is of an appropriate standard. There are records giving details of the discussion between the doctors and Claire's parents. I believe these are a satisfactory record."
I think you've said perhaps would maybe have liked a little bit more in the record; would that

be correct?
A. Yes, I'm sort of reflecting on what led me to say this. The document we've just seen I saw in the context of being a PICU record and I felt that things had been described. What I can't recall is whether throughout her stay in PICU there was any record of discussions that nurses were having with parents that maybe portrayed what information had been given to them or what had been said to them or what their fears and anxieties were and I'm afraid I can't recall that, but they would have been some expectations that if there was a nurse looking after her, which there would have been, and she was interacting with the parents then there would be some record to reflect that interaction.
Q. Would you expect that even if there wasn't a sheet that had the purpose of recording that sort of discussion?
A. Yes, yes.
Q. For example, would you have expected that in the general PICU nursing notes?
A. Yes, because of the distress of the situation and the fact that the parents would have been there all the time and so it's just a part of the

totality of nursing care that you're looking after the parents as well and so you would then record some of that.

Q. If we can go back to the very first point of Mr Fortune's intervention where he wanted me to put some of the detail of 090-028-088 to you. I think you said already that only in a definite iatrogenic case that you would have considered an order for discussion usual in October 1996. We can see from this chart, and I'm not going to go through everything, but there was an explanation that Claire had swelling of the brain and could possibly be brain dead and then the third paragraph the brainstem tests showed Claire's brain had died and that her brain had swollen and when it was asked why the brain had swollen it was explained that it was probably caused by a virus. In those circumstances would you have expected any sort of audit or discussion with nurses?

A. No, because from a nursing perspective it would have been assumed that she has just died of an illness.

Q. You said that it was unusual that a child would have died on a general ward and it wouldn't be a

usual occurrence anyway in October 1996. If you're the ward sister of that ward and a child died what would you expect of them following that death?
A. Well, as the ward sister, if I hadn't been there I would have expected somebody to have told me when I got back and informed me of the circumstances, and possibly if I'd understood that if somebody had portrayed to me that a child had been admitted and then died, but hadn't gone on to say that there were thought to have been any contributing factors to that, then I would probably have just accepted that and left it.
Q. You might have gone back to the ward and found out a child had died and maybe taken a nurse aside and just asked what happened in that case?
A. Yes, you would hope or you would expect people to give you some sort of feedback, and also having a child die is a traumatic event for the people caring for them and so you would want to pick up on that and what the impact on people had been of having had a child die.
THE CHAIRMAN: Can I ask you, that's what the ward sister would do with the staff nurses?
A. Yes.

THE CHAIRMAN: Would you expect the ward sister to make any inquiries of the doctors?
A. At the time?
THE CHAIRMAN: Yes.
A. No.
THE CHAIRMAN: No. Okay.
MR REID: Mr Chairman, I have nothing further for Mrs Ramsay at present. Perhaps if we take a small --
MR QUINN: This may short circuit events rather than canvass questions. There is just one issue that I wanted to raise. If we could have up document 231-002-032 which is page 31 of Mrs Ramsay's report. I just want to read out for the record the penultimate paragraph on that page reads:
"Nurses should have ensured the parents understood that the diagnosis, its implications and treatment needed. They should have explained the medicines, what they were used for and any potential side effects. The parents should have been told while the observations were being made and given explanations on the ongoing process."
Could then go up the transcript from 31st October, which is Mrs Roberts' evidence, and go to page 128 of the transcript of the 31st and then look at what Mrs Roberts has said and I

would like, through yourself, Mr Chairman, if the witness could be asked about this so that it's rounded up and on the record and I will read out what Mrs Roberts' evidence is in relation to her leaving at 9.15. She said --

MR FORTUNE: Can we have the documents up side by side, Mr Quinn?

MR QUINN: Yes, we can do. I am going to put up the next page as well, Mr Fortune, which is page 129, so if those three pages can be put up together and what Mrs Roberts has said is that:

"Obviously then around 9.15 explaining to the boys that we'll have to get home and Claire is sleeping; that is her settled. So we get ourselves sorted and Alan and the boys go back and I go up into the nurses' station. I can just visualise popping my head in and saying, 'Nurses, that's us away for the evening. Claire seems to be settled and sleeping. I still have a picture of Claire waking up and jumping out of bed', and they just said that, as long as the bed sides are up all very quickly, she'll be okay and between the general chat, goodnight, a phone call came through and I was handed the phone and it was my cousin from Scotland who was a nurse herself and

a mother, but she had heard about Claire through my auntie that day. Her mummy lives beside us and I again said, 'Och, Claire is fine. She's just had an unsettling few days and seems to be sleeping and Alan and I and the boys are going home'. 'Did the nurses say anything to you?' Mrs Roberts, 'Not one thing. Just okay, Mrs Roberts or just, okay, see you on the morning'".

In the context of that exchange and what the witness has said at page 31, the penultimate paragraph, is that enough information to be giving when parents are going home? I am asking that through the tribunal?

MR REID: It's page 32, if that can be brought up.

THE CHAIRMAN: The discussion we've been having, Mrs Ramsay, which has been taken up with you, is what the nurses have said before the Roberts left, particularly with Mrs Roberts going over specifically to say that she was leaving and to watch out for the bedside. Do I read the highlighted paragraph on the right-hand side of the screen as meaning well, although this is all very unfortunate really the nurses should have done more?

A. Well, the parents appear to have known very little which suggests to me that there wasn't an ongoing dialogue, as I've described here, whereby nurses were giving them information and checking up on their understanding. And it is my view that, if you are caring for a patient with the parents sitting there, you talk through the things that you're doing and why you're doing them and ensure they've got the understanding. So, I think that that situation wouldn't have just happened at 9.00 pm. It would have been an ongoing issue throughout the whole of her time there. The bit that does occur to me is who were the people to whom Mrs Roberts said they were going? Were they people who had been looking after her during the day who hadn't gone off duty, or were they people who had just on duty and so might not be fully appreciative of what was going on.

MR QUINN: The evidence on that, sir, would be and I may stand contradicted on this, was that we seem to have pinned that down to the nursing handover when there were perhaps two or maybe three nurses at the handover. So you may have had staff from -- and the nurses have identified this -- you may

have one person giving the handover to two other nurses coming on seems to be what the consensus of opinion was in relation to that, and I'm just rather concerned at someone saying, "Och, Claire's had a few unsettled days" doesn't really translate anything and the nurses should have picked up and said to them, "Hold on a minute, it's not just a few unsettled days. Here's the picture. That's what we're concerned about".

THE CHAIRMAN: It's the nurses who are on, and we know from 310-016-001 that the nurses who were on from 8.00 pm were nurses McCann, Murphy and Maxwell. They had come on at 8.00 pm for the nightshift, having taken over from nurses Ellison and Taylor who were there from 2.00 until 8.00 pm, is that?

MR REID: Yes, that's correct.

THE CHAIRMAN: Having in turn taken on, so there's a serious of nurses through the day. So if the nurses who were on duty at 9.00 pm, when the Roberts were leaving, didn't know how serious Claire's condition was then they may not have been properly informed at an adequate handover at 8.00 pm?

A. Yes.

THE CHAIRMAN: Yes, but I mean there's also a general

point about the extent of which anybody was really on top of what Claire's condition was?
A. Yes.
THE CHAIRMAN: We've heard evidence from Professor Neville on that over the last few days, yes. Okay, look you want to --
MR REID: Check if there are other questions, Mr Chairman.
THE CHAIRMAN: Yes, I am going to rise in a few moments. Mr Reid will check whether there are any more questions from the floor to rounded up and ask you, but just before I do, can I ask you about one thing which has, maybe this would be common knowledge to you from your experience over many years in nursing, but one of the things which has emerged from this hearing is that on Monday night into Tuesday and Tuesday night into Wednesday in the Children's Hospital in Belfast there was a registrar and the senior house officer with responsibility for the children who were already in the hospital which would be about 114 or so and responsibility then for patients coming into A&E, children coming into A&E to be seen. Does that level of medical cover shock you or is that just that's what happened in the mid-

1990s?
A. Yes, I thought that that seemed to be a low level; well, a very low level actually.
THE CHAIRMAN: The doctor who told us a day or two ago, Dr Stewart, I think said he was overwhelmed by the amount of work he had to do through a night and he was the SHO on this evening.
A. Yes, I was surprised when I read that the number of patients that he'd had responsibility for, because you can sometimes have a situation where there's a resident registrar and a junior doctor who pick up on things that have happened where somebody else isn't available to deal with them, but to have somebody having to rush around all those patients I thought the number seemed very low and I had been trying to think back in my days when I was a manager for a similar situation and I think there would have been more housemen about and possibly one registrar resident available and then registrars on call at home.
THE CHAIRMAN: We're told now that there are fewer patients, but that there are three registrars. I think it was Dr Bartholome who said that there are now three registrars for about 90 children overnight and A&E which is clearly much better

than one registrar and one houseman for everybody?
A. Yes and the other thing that's changed over the years is that the role of the night sister has changed and so a lot of hospitals now have nurse practitioners on at night working in a team with a couple of doctors and between them they deal with the issues throughout the hospital because the nurses would be putting up drips and nurses would be making assessments of patients. So there has been a general drift towards having more people available at night.
THE CHAIRMAN: Okay, thank you.
MR FORTUNE: Before we leave that can be take Mrs Ramsay back to 1996, and to a reminder to her that this is not just a district general hospital, but the regional centre for treatment here in the province. Are you saying that you would have expected there to have been two registrars and two senior house officers? You talk about a resident registrar.
A. What I'm saying is that I think there should have been more people onsite because although it wasn't a standalone children's hospital, it was a hospital within a hospital, but the other people,

the adult people, wouldn't have come in to support the children's service, I wouldn't have thought, and it does sound to me as though two, a resident registrar and a resident houseman, seemed to be a very thin covering of people for the number of children that were in that hospital; part of the hospital.

THE CHAIRMAN: I picked Mrs Ramsay up as saying possibly a second registrar, but definitely more house officers?

A. Yes, yes.

MR FORTUNE: This sounds as though we're about to move into governance?

THE CHAIRMAN: It is, but Mrs Ramsay is here and I just wanted to get her view on this, but this will certainly go into governance. Mr McAlinden?

MR MCALINDEN: Mr Chairman, just in relation to the number of SHOs present in the hospital, I think we may have lost sight of the fact that there was a surgical SHO as well as a medical SHO in the children's hospital and there also was an SHO assigned to the Accident and Emergency Department.

THE CHAIRMAN: Are you saying three SHOs?

MR MCALINDEN: Yes, there definitely was a surgical

SHO and a medical SHO and an A&E SHO.
MR REID: Can I ask Mr McAlinden whether the surgical SHO was present after 10.00 pm because according to the rota that we have of the night it seems there was a medical SHO between 5.00 and 10.00, surgical SHO between 5.00 and 10.00 and then what was deemed to be the overnight SHO and that was Dr Stewart. From that rota it only seems that the surgical SHO clocked off at 10.00 pm?
MR MCALINDEN: My recollection of Dr Stewart's evidence is that he would not have been dealing with surgical patients. That he would have been dealing solely with medical patients and I will take specific instructions, but my impression is that there was a surgical SHO, a medical SHO and one present in the Accident and Emergency Department.
THE CHAIRMAN: Okay, well, maybe we'll definitely pick it up at governance.
MR FORTUNE: It may also, sir, have been this situation; registrar, second term SHO and first term SHO. Does that make a different if that was the case?
A. I really don't think that I --
THE CHAIRMAN: Yes, it's an extra body at least, yes.

MR FORTUNE: It is an extra body, but of course you've got to bear in mind the relative experience or inexperience of a first term SHO.

THE CHAIRMAN: Yes, okay, are there more questions for anyone to pick up or can we let Mrs Ramsay go?

MR REID: Mr Chairman, I do believe Ms Anyadike-Danes is behind the scenes and may have a question or two for Mrs Ramsay, so I would just like to check with her --

THE CHAIRMAN: We will come back in five minutes and we'll get lunch at about 1.15 pm. Thank you.

(1.04 pm)

(A short break)

(1.08 pm)

[inaudible: no microphone]

THE CHAIRMAN: Right. Mrs Ramsay, now that your evidence has finished, thank you very much for your time and you're free to leave.

A. Thank you. Thank you.

(The witness withdrew)

THE CHAIRMAN: We'll start at 2.10 pm, okay?

DAVID REID: Thank you, Mr Chairman.

(1.08 pm)

(The short adjournment)

(2.03 pm)

THE CHAIRMAN: Ms Danes.
MS ANYADIKE-DANES: Thank you very much. I wonder if I could call Dr Aronson, please.
DR JEFFREY ARONSON (called)
Questions from MS ANYADIKE-DANES
THE WITNESS: I am Jeff Aronson.
THE CHAIRMAN: Have a seat, please, Doctor. Thank you.
MS ANYADIKE-DANES: Thank you very much indeed. Dr Aronson, can I ask you, do you have your curriculum vitae there?
MR ARONSON: Not in front of me.
Q. I think we'll get you a copy then. I wonder, Mr Chairman, if I could confirm whether everybody else has a copy of Professor Aronson's curriculum vitae? Thank you.
THE CHAIRMAN: Everybody but the author.
MS ANYADIKE-DANES: Yes.
A. It is imprinted on my mind. Okay.
Q. Here it comes now.
A. Thank you. Very useful, thank you very much.
Q. Before we turn to that, Dr Aronson, you have provided one report for the inquiry, is that correct?
A. That's right.

Q. That report starts at reference 237002001 -- not to be pulled up, but that's its reference -- and you provided a number of publications with it. It's dated June and July of this year, is that correct?
A. That is correct.
Q. Do you adopt that report, subject to anything that you may say in oral hearing? Do you adopt that report as your evidence?
A. I do.
Q. Thank you. Then I wonder if we could turn to your curriculum vitae and we can see at -- perhaps we might pull this up -- 311035002, that's the first page of it, and your current appointment is as a reader in clinical pharmacology.
A. Correct.
Q. That is at Oxford University, and you are also an honorary consultant in clinical pharmacology and an honorary consultant physician at the Oxford University Hospital. Could you, just for the laypeople, explain briefly the discipline of clinical pharmacology?
A. It's a discipline that bridges between basic pharmacology, which is the study of how drugs

work, what they do, often in cells or whole animals on the one hand, and the actions and uses of drugs in people on the other, encompassing such matters as how the drug works; what indications to use it for; how to determine doses and dosage regimens; how to administer it, in what forms and over what periods of time; what adverse effects and reactions may occur; what interactions with other drugs and extending also to policy of use, drug regulation, cost-effectiveness, advice and indeed anything to do with medications.

Q. Thank you very much. When you say that you are also an honorary consultant, does that mean you have any clinical work at all, you attend the ward?

A. Yes, yes. I have been a consultant physician now for the last 30 years or so, specialising -- if it is a specialty -- in what is called general internal medicine, in addition to my more focused speciality of clinical pharmacology.

General internal medicine involves the management of patients who present to hospital with a wide range of medical conditions, indeed virtually anything that does not have surgical

intervention indicated, so cardiovascular disease, such as heart attacks, cardiac arrhythmias, respiratory disease such as pneumonias and bronchitis, nervous system disorders such as strokes, epilepsy, migraine -- the whole range -- gastrointestinal disorders such as bleeding from the gut, inflammatory bowel disease, the whole -- a very wide range of general medical conditions, and I deal with them in one of three ways. One is either to deal with them myself if the case is sufficiently simple for a general physician to handle or I deal with it in collaboration with the specialist consultant, whom I may -- whose advice I may ask, or in the third case, I may hand over the care completely to a specialist. There is a wide range of problems to deal with.

Q. But in the light of your work as a general physician in terms of internal medicine, are you therefore also looking at the prescription calculation and administration of drugs in relation to some of those conditions?

A. Indeed. That is my main interest, if you like, in the conditions. Although I am responsible for taking care of a patient from history-taking,

examination, investigation, diagnosis and management, my main specialty is in -- at the management end and the monitoring end of therapy rather than in the preliminary phases of the whole management process.

Q. I understand. If we just go over that page to 003, it would seem that you first became a consultant in 1980, would that be right, or thereabouts?

A. That's right, yes.

Q. If we stay with that page and look at your research interests and publications, we see that you are a guest editor or were a guest editor of the British Medical Journal, the issue on Balancing Benefits and Harms in Healthcare, and also the British Journal of Clinical Pharmacology, and in relation to that in the December 2004 Clinical Pharmacology: Past, Present and Future, and that was dated 2006. Then it goes on to deal with adverse drug reactions, and that was February 2007, and medication errors in June 2009. Before I go to where you are editor-in-chief in relation to other publications, because of when you became a consultant, how familiar would you be with the

practices in 1996?
A. Well, I was a consultant from 1980 and in the 1990s -- 1996 specifically -- I was a busy ontake physician on call, in those days one month in three, taking sick patients, anything from 20 to 40 patients at a take 6 or 8 times a month. So that would have been my experience at that time.
Q. Then if we go on down that list, where we see that you are the co-editor-in-chief on the Meyler's Side Effects of Drugs, and that is the 14th edition of that, and then you go on to be the editor of the Side Effects of Drugs: the International Encyclopaedia of Adverse Drug Reactions and Interactions. Is that a particular interest of yours?
A. It is. Well, in fact, at the moment we are heavily involved in preparing the 16th edition, which involves taking the 6-volume 15th edition and adding material that has accrued in the annual volumes, which are published every year over the last ... last 5 years, so there is an extra 5 volumes' worth, 5 years' worth of material to be incorporated into the 15th edition, and that's a major task in which we're involved at the moment.

Q. Then to refer back to the point that you were making about 1996, if we go over the page again, we see that you were involved in the Adverse Drug Reactions Bulletin for 1996, and that seems to be continuing, so that's to present day?
A. Yes. Yes, in fact, I was having dinner with the editor of the Adverse Drug Reactions Bulletin only last week and talking about planning future editions.
Q. Then in terms of your membership of committees and learned societies, you are President Emeritus of the British Pharmacological Society, and that's 2010, and is that a position you hold currently?
A. Yes. Well, it merely means that I was president, so it's --
Q. You hold on as an honorary position, if I can put it that way?
A. Yes.
Q. Yes, and then you're a member of the Advisory Board of the British National Formulary --
A. Yeah.
Q. -- and that's something you're currently a member of?
A. Yes. I was for some time a member of the Joint

Formulary Committees of both the British National Formulary and the British National Formulary for Children, and when I stepped down from those committees, I was appointed a member of the Advisory Board for the BN -- the British National Formularies.

Q. You also were until, I think it is, 2010 a member of the Advisory Board of the National Patient Safety Agency.

A. That's right.

Q. With specific reference to medications.

A. Yes.

Q. Then in terms of the university, you're the Associate Member of the Department of Pharmacology, and I think that's a position you still hold.

A. Yes.

Q. You have been Head of Department of Clinical Pharmacology?

A. Correct.

Q. Then just finally to deal with your membership of academic societies, that's to be found at 005. You're a Fellow of the British Pharmacological Society 2004, and then as you have said before, you have been President and now currently

President Emeritus, and a Fellow of the Royal College of Physicians, and you still are.
A. Yes.
Q. Then just finally in terms of teaching, which we find at 006, you've engaged in undergraduate and post-graduate teaching activities and that includes lectures on drug therapy to clinical students and also bedside and seminar-teaching on drug therapy and clinical medicine to clinical students and so forth, and also at weekly grand rounds, and it says, "student grand rounds". What are student grand rounds?
A. Well, the grand round is a meeting at which all the physicians in the hospital meet to discuss cases of interest to help diagnose, to learn, an educative meeting, and it's held once a week. Usually two or three cases are presented. A few years ago, the Medical School decided to institute a similar meeting for the students, which is run in exactly the same way, but by the students, and so instead of all the physicians meeting, all the students meet, they present cases and discuss them.
And each time a grand round is held, a senior member of the hospital is invited to come along

to comment on the case, and I found that actually a very useful way of teaching clinical pharmacology and therapeutics to the students, to go along to their grand round and comment, because every case, whatever it is, in whatever specialty, medicines are almost always involved, and so this was a good opportunity for teaching. And the student grand rounds actually are of a very high standard. The students take great care and they spend a lot of time preparing their case presentations, and they are very educative for seniors as well as the students.

Q. And to bring a multi-disciplinary approach to particular cases?

A. Indeed.

Q. Is this something that's unique to your university, or are you aware of it happening at other universities?

A. I don't know. Students have meetings and educative meetings everywhere. I don't know if the grand round idea has been taken up elsewhere.

THE CHAIRMAN: Just before you move on, when did the weekly grand rounds start in terms of how many years ago?

A. Sorry?

THE CHAIRMAN: For how many years have you been doing weekly grand rounds?

A. Oh, since I came to Oxford, 1973.

THE CHAIRMAN: Thank you.

MS ANYADIKE-DANES: It says on the final page of your CV, before it goes into your publications list, that your current research interests are:

"Methods of classifying, detecting and reporting adverse drug reactions, including systematic reviews, meta-analysis and the use of anecdotal reports in collaboration with others."

A. Yes.

Q. So that's what you're engaged in at the moment?

A. That's what my main research is currently. I do take part in other activities. We've just published, for example, the results of a large clinical trial in Sri Lanka on the prevention of adverse reactions to anti-snake venom, for example, with my colleagues there. And I am also currently working with other members of my department in Oxford, which is the Department of Primary Care Health Sciences, on outcomes of treating diabetes, for example. So there are other interests, but my main research focus is on adverse drug reactions.

Q. Thank you. I wonder if we can now move to this case specifically, and if you can help us at the outset with some of the drug administration terminology, if I can put it that way, and the first is as we look through the clinical notes and also the drug prescriptions, we see, for example, references to a "stat dose". What is a stat dose?
A. "Stat" is a term that doctors use, short for the Latin word "statim" which means "immediately".
Q. Immediately?
A. Immediately, forthwith. If I say, "Give this drug stat" -- it's not a term I often use, but it is used -- then I mean, "Give it now. Don't hang about, give it straight away or as soon as you can".
Q. Perhaps if we use an example, and we can see what "forthwith" might mean in those circumstances. The direction in the clinical notes and records in relation to phenytoin, and one finds that from Dr Webb at 090, 022, 054 -- this is just for the sake of making sure we have understood what you said -- and if you see his suggestions, the first of those is starting, "IV phenytoin 18 milligrams per kilo stat" and then it's going to be followed

by a subsequent infusion, but if we just leave with that. So that is a direction that he makes, having seen Claire. It's not entirely clear when he is writing that. It's recorded at 1400 -- well, it is known to be 2.00 pm on the Tuesday, but presumably he would have spent some time actually examining the child, so we're not quite sure what the 2.00 pm relates to. So we have that piece of information.

We also know that it was administered at 14.45, so depending on what the 1400 hours relates to, there's a period of something up to 45 minutes before it's actually administered. Does stat encompass that?

A. Yes, I would that is "stat-ish". How soon is soon?

Q. Yes.

A. Forty-five minutes, perhaps a little on the long side, but not unreasonable. It takes time for communication of instructions, for drugs to be found, for solutions to be made up, for arrangements to be made to deliver the dose and so on. Yes, that's not unreasonable.

Q. And if the 2 o'clock had been when he actually came to see the child, then there'll be a period

of time when he was examining the child and so on before that direction or suggestion would have gone out?
A. Indeed.
Q. So that's that. What about a "loading dose"? What is that?
A. If you give a dose of a drug at regular intervals, it takes time for the drug to build up in the body to a therapeutic amount. If you remember the old mathematical problems --
Q. Sorry, by "therapeutic amount", do you mean an amount to be effective?
A. An amount to be beneficially effective.
Q. Yes.
A. If you remember the old mathematical problems that many of us were given at school, you turn on the tap in a bath and the tap runs at 1 litre per minute and the drain drains the bath at 100 millilitres per minute. How long does it take for the bath to fill? Well, if the bath is a litre big, then it is going to take at least ten minutes, because you're running it at 100 millilitres per minute, but you're also losing fluid at the same time, so it's going to take longer. In other words, it's going to take time

before the amount of water in the bath actually reaches the top and starts to overflow. I don't want to wait for that. I want a bath stat, so I pour a litre of fluid straight into the bath. That's the loading dose. It fills the bath up immediately. Now, I have left the drain open because I don't have a plug, so I will lose fluid all the time, so I leave the tap on just to top it up. That's the maintenance dose. So the loading dose is filling up the system, the maintenance dose is replacing losses as they occur. I can do that continuously by leaving the tap turned on or I can do it intermittently by turning the tap on from time to time. Either way, it's a maintenance dose, maintaining the amount of drug, within limits.

Q. Yes. If you do it intermittently, depending on how long it takes for the effectiveness of the drug in the system to diminish, you can work out whether you will have a fluctuating level --

A. Indeed.

Q. -- or whether you will have a continuous effective amount.

A. That's correct, and the longer you leave between maintenance doses, the more fluctuation there is

in the amount in the body. As you can see, you will lose more of the fluid from the bath the longer you wait, and you'll have to put more in. So the ideal circumstance to maintain a constant amount of water in the bath is to give a constant infusion, leave the tap running. If the drug -- if the drain is very slowly draining, just a trickle, then you can afford to wait and top it up every so often.

So, for example, we're going to talk about phenytoin, no doubt, phenytoin -- the drain for phenytoin is very, very small. It's a trickle, it disappears very slowly, so you only have to put some in every so often. You don't have to keep it infusing every minute or every hour. You can wait 12 or 24 hours, but for a drug like midazolam, the drain is quite big and it drains quite quickly. It's much better to give a continuous infusion to maintain the amount of drug in the system, and that's exactly what you see in the dosage regimens.

Q. And a "bolus", what is that?

A. Bolus, right. Well, bolus is the Latin word for a ball and, for example, when you swallow, when you're chewing your food, you form a ball of food

and it's called a bolus, and you swallow that bolus. Over the back of the tongue, there is a ball of food going down your gullet. An embolism, pulmonary embolism, is a ball of clot being flung into a pulmonary artery and blocking it. So a bolus is a ball.

If I throw you a ball, I can throw it hard and fast. If I inject a drug, I can inject hard and fast. That's the bolus. It's the amount of drug in the syringe that I'm injecting, as if I was throwing you a ball. Now, I can throw the ball up in the air very high and you might have to wait a few seconds before you caught it, but still it would happen quite quickly. So I can give a bolus dose, zap, instantly, or over a few seconds if I lob it in, as it were. That's a bolus. It's done pretty much instantly.

Q. And is that the idea, because you want to have a pretty quick reaction to that drug?

A. No, it's just easy to give it that way. Generally there are very few, if any, drugs that one wants to put in fast because you need to put it in fast. There was one drug some years ago for which that was a direction, and it's defunct. One doesn't do it for the sake of speed, one does

it because it doesn't matter and get it in as quickly as you like.
Q. Oh, I see. So it would be the other way round, you'd have a contraindication to giving a drug quickly?
A. That's right, so giving a drug slowly is because you don't want to give it quickly. You don't give it quickly because you don't want to give it slowly, it's not that way round. So the difficulty is for a drug that would cause adverse reactions were you to give it quickly as a bolus dose.
Q. So if you give it slowly, you can see what is happening and adjust things if you're getting a response that you don't particularly want?
A. It depends on the time course over which you give the drug. Generally speaking, if you don't give a bolus, you give it by what one can term loosely as infusion, which means giving the drug intravenously. We're talking all about intravenous administration now, not other routes, although you can infuse drugs in other ways, but let's just stick to intravenous. By infusion, I mean over some period of time. Most people by infusion mean that you put it in bottle and let

the drug drip in but in-between that and a bolus you can give a give a drug by syringe but slowly. I would call that by slow injection rather than infusion, just to distinguish it.

Q. Or a slow push? We've seen some of that in the (overspeaking)

A. Yes. That's a term that's sometimes used. It derives from American habits, slow push, but yes, that describes what I am calling a slow injection indeed and, of course, it's precisely what you're doing. You're on the end of a syringe and you're pushing the barrel of the syringe in so it's a slow push. Usually you do that because you want to avoid an adverse reaction.

There are some drugs, for example, if given too quickly can cause release of histamine into the system which causes your blood vessels to dilate and your blood pressure to fall, a thing called the Red Man Syndrome. You get vassal delectation, blood vessels dilating, a lot of blood comes to the skin, you turn red and your blood pressure falls because the blood isn't going elsewhere. You avoid that by giving the drug slowly and there are other examples of that.

Q. Thank you.

A. But if you want to maintain an effect of a drug, as I was describing before, a constant effect, then that would be a reason for giving a drug over a long period of time not because you're worried about avoiding adverse reactions in this case but because you want to maintain an action for a long period of time and you, therefore, give the drug by long infusion, slow infusion, which then keeps the amount of drug in the body up at a steady value.

Q. Keeping that amount at an effective level, a therapeutic level, I think you said, is that connected at all with the notion of a drug's half life?

A. It is. The reason is that if you give a drug by continuous infusion without giving a loading dose it takes time to reach the steady state -- as I described for filling the bath. You can appreciate that the time it takes relates primarily to the size of the drain. The faster the fluid drains the longer it will take you to get up to steady state while you're filling the bath. So the time it takes during an infusion to get to steady state when the amount of drug is steady and at therapeutic level depends on the

half life of the drug. Conventionally, the teaching is usually that it takes about four half lives to reach a steady state.

So within one half life you reach half of steady state, within two half lives you get three-quarters of the way; that is 50 per cent plus 25 per cent, a half of the difference. The next half life you get another 12.5 per cent of another half and so on. So after four half lives you're at 93 per cent of the way to the maximum and that's good enough. So with a drug that has a long half life like phenytoin you want to give a big loading dose to get you up to that value and then maintain it because if you just give an infusion or regular maintenance doses it'll take four or five half lives and with a drug like phenytoin that could be many days.

Q. In terms of the effects of combinations of drugs is that is also influenced by whether those drugs are at their therapeutic level, if I can put it that way, or their half life?

A. Perhaps just to finish the story about half life before I answer your question -- when you stop giving a drug it disappears with a half life and half of the drug in the body will disappear in

one half life so that half of the effect that you have will disappear. It's not quite as simple as that because the effect, concentration effect relationship, is in fact logarithmic rather than linear but you can see that if you're losing a drug quickly you will lose its effect quickly. If you're losing it slowly you will lose the effect slowly. That's the basic principle. How much of the actual effect you lose is more difficult to calculate because of the logarithmic nature of the effect concentration relationship but the basic principle is that the half life determines how soon the effect dissipates.

Q. Before I ask you then to answer the combination question, if we stick with single drugs, apart from just the chemical compounds of the drug and the known research about what its therapeutic levels are and what its half life is and so forth, are there individual things in the patients that affect the length of time the drug remains at a therapeutic level?

A. Yes. Firstly, there is natural inter-individual variation. We're all different. We're different sizes, different weights, different ethnic origins, different sexes; all of these things

cause variability in the individual response to a single dose. If I gave everybody in this room the same dose of drug and measure the plasma concentration at the same time after that dose they will be widely different. So there is individual variation just because of the way we are different from each other naturally. In addition to that people who have impaired kidney function or who have impaired liver function may not clear the drug as quickly as somebody else. So the size of the drain in these cases -- if you have kidney failure, your drain is smaller, you don't get rid of the drug as quickly as you should and the drug will take longer to build up and longer to disappear. Similarly for drugs that are cleared by the liver, which many drugs are -- impaired liver function. There are many other susceptibility factors which alter people's responses to drugs, how many receptors you have for a particular drug. The receptor is a protein usually in the tissue to which the drug binds and on which it acts to produce its effect or it might be an enzyme or a transport protein or some mechanism, some intrinsic moyati in the body which the drug targets for its mode of action.

So everybody may have different numbers of receptors, different amounts of enzyme, genetic differences play a part. Many different factors lead to huge variability in the population.

Q. But what you're trying to do, I presume, is to tailor the drug and its effects, therapeutic effects, to the individual patient that you're treating?

A. Ideally.

Q. So if that's what you're trying to do and there can be these variations and you really can only know what's going on, I presume, by testing. The way that you said if you were to test us all, even having given us the same drug, we would have different concentrations of that drug if you were to test our blood.

How important is it when you are embarking on quite an extensive drug therapy to be testing the child or the patient, as it may be, to see exactly what is happening?

A. People are nowadays calling this personalised medicine. I prefer to think of it as individualising therapy. For every patient one tries to choose a dose and a dosage regimen, in other words the size of the dose, 100 milligrams,

say, and the frequency with which it's administered, the route of administration, the duration of therapy, the formulation that you choose. One tries to choose these in order to maximise the benefit to the patient and minimise the harm or risk of harm.

This individualisation is actually quite difficult because in many cases there are not good ways of determining how effective a drug has been. Ideally you want to measure the outcome of interest. If you have asthma then you might count up the number of attacks of asthma you have in a month or a year before and after the treatment and see if it's altered. If you have epilepsy you might count up the number of seizures you have. You might even go so far as to note the intensity of the seizure, did it last five minutes, one minute, did it happen at night, during the day, and so on. One might try to make an assessment of the outcome of interest.

If on the other hand you have depression it's very difficult to judge how well a drug has worked. We all feel depressed from time to time. How do you judge that you're better or worse? It can be done but it's much more subjective and

difficult. So if you have objective measures that you can record then that's the ideal way of monitoring therapy.

Q. For the kind of drug therapy that was being administered to Claire, what are the objective measures for how effective that is being for her condition?

A. Let's assume, just for the sake of discussion, that she did indeed have non-convulsive status epilepticus then it is very difficult because measuring brain function in those circumstances is hard. We're laying aside the question of whether she had encephalitis which might have altered her brain function or some other condition that we don't understand. Let us just assume that she has status epilepticus and we want to monitor it. If she's having fits we can see her fits and if she's not fitting then we can count that as a success but this is a condition, uncommon, non-fitting status, how do you measure it? Well, I think the best way of doing that is an electroencephalogram, an EEG, and you should do it before treatment and then sometime after treatment to see whether it has been modified by the treatment. So that is a way of measuring the

outcome of interest. It's difficult. It's not ideal because EEG, electroencephalography is not a straightforward process, it's subject to a lot of variability and interpretative difficulty but experts in it are very good at that kind of thing and they could, if it were in place, use that as a test of judgment whether the drug had had an effect.

Q. That would be so, would it not, even if you had a combination of drugs which might otherwise be rather difficult to work out the interactions between them but if you're looking at an EEG, which is monitoring the activity in the brain, irrespective of that combination you would, presumably, be able to see whether it was having any marked effect on that?

A. If the end point of using all of these drugs was a common end point then, yes, they would add up and you could get an overall measure of the effect of a combination of drugs such as was used in this case.

Q. I understand.

A. Now if you don't have such an end point the next thing to do is to use what I would call a pharmacodynamic end point rather than a

therapeutic end point. So measuring the number of fits is a therapeutic end point. That's what the patient is interested in; am I going to have a fit and can you stop me from having a fit? That's the therapeutic end point.

If you can't measure the therapeutic end point then you want to measure, if you can, some pharmacological end point that relates to the therapeutic end point. If the drug works, for example, by altering sodium in the body, sodium transport across cells or potassium or whatever, you might want to measure, if you could, the activity of that system. That's not for fits but it's a measure of what the drug is acting on. In this case you can't do that, there are no tests of pharmacodynamic measurement.

To give you an example in diabetes; people with diabetes measure their blood sugar. That's not the therapeutic end point, people think it is, but it's not. The therapeutic end point of treating diabetes is to reduce the risk of damage to the eyes, damage to the kidneys, that's the long term outcome. We believe nowadays, although the data are difficult to interpret, that controlling the blood sugar leads to such an end

point but controlling the blood sugar from day to day is a pharmacodynamic measure of the action of insulin or other drugs. That's an example of a pharmacodynamic end point which is related to the end point of interest, prevention of the complications of diabetes but is not the true end point itself; it's a means to an end. But in these cases you don't have such a measure.

Q. That's what I was going to ask you. But for these particular drugs that were being administered there isn't a way of looking at the means to the end so does that mean that the only reliable way of seeing how effective they were was to have carried out an EEG?

A. I think so. There are other, however, indirect ways of doing this which are commonly used. So if you can't measure the therapeutic end point and you can't measure the pharmacodynamic end point the next best thing is to measure how much drug is there because at least --

Q. In the system?

A. In the system.

Q. How do you do that?

A. So at least you can say, "At least I know now that there's a certain amount there and I can

predict from what I know about the drug that that amount should be associated with the likelihood of a therapeutic benefit". Ideally, again, you would want to measure the concentration at the site of action, which is the brain in this case, but you can't do that so the next best thing is to measure the amount of drug in the blood, the plasma or serum concentration.

Q. Is this the sort of reason why, for example, they wanted to know what the phenytoin levels were?

A. That's correct.

This is not available for all drugs and in the case of the drugs that Claire was given the only one for which it is regularly available is phenytoin but it is the most important one for which that measurement should be made and it is despite the fact that it is at a distance from the therapeutic effect. The amount of drug in the blood and the actual outcome in the brain are quite a long way away from each other despite that actually measuring the plasma concentration, or the serum concentration, is quite a good measure of therapeutic outcome and is an even better measure of the risk of toxicity or adverse effects. There's a very good correlation between

high plasma phenytoin concentrations and specific adverse reactions to the drug. So measuring the phenytoin concentration in the blood, whether it's plasma or serum, it varies from place to place and it doesn't matter, is a useful way of monitoring therapy and tailoring dosage requirements.

Q. Thank you. I want to ask you in turn about the drugs that were prescribed and administered to Claire, particularly the anti-convulsant, so that will be the diazepam, the phenytoin, the midazolam and the sodium valproate, being the four main ones. We have prepared a schedule to look at the overlapping medication timeline, which may be of assistance, to look and see what was happening, and that is 310-020-001. I understand that a version of this went up yesterday, which was my error, because that was a draft and this is actually the correct version. I think it has now been substituted in the system. The reason for that is because we didn't have the information on the half life which is the very characteristic of these drugs that you have been describing and their significance.

Just if I quickly show what's on this, I mean

it's a timeline, so you can see the time across the top and those balls, coloured balls, they're the bolus and underneath them is the time when that was administered. Then the dotted lines are the half lives and if you've got a solid line that's an infusion. Then just to try and keep this correlated with what was happening -- those red vertical lines they indicate the seizure or those episodes that are recorded on the record of "attacks observed". Then you have, towards the right-hand side, two vertical lines which show when the brain stem death tests were carried at 6.00 am and 6.25 pm. So that's what this is showing.

But the purpose is, when I ask you about what might be the interactions of this, so that you can help guide us as to what's in the system, if I can put it that way, and to look and see to what extent that fits or doesn't with any other presentation of Claire, predominantly these episodes.

So I wonder if we could start first with diazepam and you can see that that was administered at 12.15 rectally. It was a dose of 5 milligrams and I think in your report you say

the onset of action is 10 to 30 minutes, and I think that's at 237-002-008 -- you don't have to pull it up -- but that's where I think you say that. What exactly does that term mean "the onset of action"?

A. The diazepam has been given rectally so it's been inserted through the anus into the rectum in a solution which is then absorbed through the rectal wall into the rectal veins which drain directly into the systemic circulation. If you take a drug orally, swallow it, it goes in, down your gullet into the stomach where it stays for a variable period of time, 15-30 minutes, an hour, 2 hours, sometimes longer. It then has to pass into the small bowel before it gets absorbed. It then passes through the liver which may metabolise it. All these things take a long time. If you give the drug into the rectum it gets rapidly absorbed into the rectal veins and straight into the systemic circulation without having to go through all that delay. Then it has to pass across the blood-brain barrier from the blood to the brain, attach itself to receptors and have an action. So this takes a bit of time but not nearly as long as it would if it was

being given orally.

If you give intravenous diazepam you bypass the absorptive process altogether and you will get a very rapid response, maybe ten minutes. If you give it rectally it will probably take a bit longer, maybe 20-30 minutes or a bit longer still but that's the order of magnitude of the time it takes for these processes to occur.

Q. When you say the "onset of action" do you mean the reaching of a therapeutic level?

A. Not necessarily.

Q. So it may not yet be at its therapeutic level?

A. It may not be. It depends on whether the dose is right.

Q. But it would be doing something?

A. It would be doing something. You don't know whether the dose of 5 milligrams is right. A dose of 5 milligrams is written in the book. This is the BNF from September 1996, so this is the relevant document. You'd look it up in the book and the book says 5-10 milligrams, let us say, well that's the dose that has been determined during development of the drug and clinical trials and other matters of that sort and it's a ballpark figure, huge variability from

individual to individual. You never know what the right dose is but you start in the recommended range and you usually start at the lower level of the recommended range because you don't know what the patient's response will be. So you don't know if it's going to have the effect you're looking for but you expect it to start to have some effect and you should then be monitoring that effect, looking to see what happens, and as best you can judge what the response is if there are ways of doing that and, as I said before, that can be very difficult.

Q. When you say you should be looking to see, who are the persons, in your experience, who have that responsibility?

A. For me it's the doctor who gives the drug and I say "gives" very loosely. It might be the doctor who prescribed the drug or it might be the doctor who said, "Let's do this" or who actually writes the prescription or the doctor who gives the drug. In my view it's the doctor responsible for the case who is in charge of looking after the patient who should go back and see, "Did this drug have an effect?"

Q. Should it be a doctor who is giving it and

watching?
A. If the doctor is the one who has prescribed the drug, and that is usually the case, then it should be the doctor responsible for prescribing it or giving it. If, in the case of a nurse, who is a prescriber, then it's the nurse prescriber who's responsible in my view although a nurse may want to defer to another specialist, a physician, who is there, for help with that if she feels uncomfortable or unconfident about it. In my view the individual who has been responsible for prescribing the drug is responsible for making sure that the drug has had an effect or what effect the drug has had or is responsible for delegating that task to somebody in his or her team. It might be a junior hospital doctor if the consultant has recommended the prescription.
Q. It would seem, in this case, that it was actually given by a nurse and we can see that and the prescription sheet, 090-026-075.
A. All right, but it was prescribed by a doctor.
Q. It would seem so. It's right down at the bottom -- perhaps just blow that up a little bit, see just across there. Yes, and it does appear to have been prescribed by a doctor but nonetheless

given by a nurse.
A. All right. I would expect the doctor to be interested in whether that medication had worked or not and to what extent, if it was possible to determine, and in this case I think it's actually very difficult to determine.
THE CHAIRMAN: Although there is a note but it comes along to say that it is noted that -- well, there's some dispute about this but it is noted that there was some improvement.
MS ANYADIKE-DANES: Yes, that's in the medical notes and records. It's at 090-022-053. This is Dr Webb's note and there's a note:
"Appeared to improve following rectal diazepam at 5 milligrams at 12.30 pm."
So somebody had observed and that's recorded.
A. Yes, it doesn't say in what way the improvement occurred or why he thought that that was so.
THE CHAIRMAN: What would be the detectable sign of improvement?
A. In this case I think it's rather difficult to know. We don't know what the diagnosis was. We're assuming, for the purposes of discussion, that it was indeed non-convulsive status epilepticus but we have no evidence of that. We

have no way of knowing whether that condition changed in any way from the point of view of the activity of the brain because something is happening in the brain that is not being transmitted to the body.

Normally what happens in epilepsy is there is an abnormal electrical storm in a part of the brain. It starts in one area, a little storm of electricity, and then in the most common form of epilepsy -- that I see at any rate, called tonic-clonic seizures, it becomes generalised. It spreads to the rest of the brain; the whole storm affects the brain. This is translated into jerking of the arms and legs, clenching of the teeth, biting of the tongue, incontinence, losing your urine, these are the manifestations of the electrical storm in the brain. That you can see and if the individual was having a fit of this sort and no longer had a fit then that's good news, you've observed what appears to be a beneficial effect. Of course it might be coincidental with the administration of the drug but one assumes in such cases that it is due to the medicine rather than coincidentally abating but one doesn't know that for sure.

MS ANYADIKE-DANES: If it's non-fitting status epilepticus you don't have that.
A. You don't have that in someone who is not fitting so exactly what one measures in this case is not clear to me and I think you'd have to ask the individuals concerned and better actually asking a paediatric neurologist what they think the signs would be. As a general physician I find it difficult to know what those signs might be.
THE CHAIRMAN: But, doctor, this note was written by Dr Webb and this was the first time he had seen Claire so he couldn't have had a before and after perspective and so far as we know he was not accompanied at 2.00-ish pm, when he examined Claire, by the doctors who had seen Claire in the ward round. So the only possible source of information about an improvement would have been a nurse who had been on the ward that morning and had seen Claire, and was able to tell Dr Webb somehow around 2.00 pm that there appeared to be some improvement.
A. But he uses the past tense, "appeared" to improve which suggests that someone has said, "We gave her the drug and she improved, we thought", rather than "appears to have improved" which

would imply that he had seen such an event but I don't think I can comment really more than that.
THE CHAIRMAN: But the point you're making is, I gather, that it's actually a bit hard to know what the detectable improvement was?
A. Even, I think, and as I say, this is really a question for a paediatric neurologist and the people who are on the site but for me it's hard to imagine what a nurse might have noted that suggested an improvement in her state. Maybe she was restless and became less restless, that's possible, but that's not evidence of improvement in state, that's evidence of sedation. So I am speculating and I don't know.
THE CHAIRMAN: Thank you.
MS ANYADIKE-DANES: Just on the characteristics of diazepam, what is the half life of diazepam?
A. Diazepam itself has a relatively short half live but its action is mainly mediated through a metabolite, a compound to which it is altered in the liver, called desmethyldiazepam which unusually, because usually metabolism results in drugs that have shorter half lives, in this case has a longer half life and is active. So the main duration of action of the drug is mediated

by its active metabolite which has a half life of, on average, of about 30 hours, something like that, quite long.
Q. So that metabolising effect actually extends what is otherwise a relatively short period?
A. Relatively short. In fact diazepam has many metabolites that are active and various drugs were discovered as a result of studying the metabolites and some of the metabolites which have shorter durations of action were subsequently marketed as drugs in their own right.
So diazepam is complicated but the overall duration of action is related mainly to the longest acting metabolite, and that has a half life of around 30 hours on average. Pull back up with that overlapping medication timeline of 310-020-001 and we see this at the top there; that broken line for rectal diazepam actually extends right up until the second brainstem death test.
A. And that is at least 30 hours.
Q. Yes. Now, having a half-life of that length of time, what does that actually mean in terms of what it is doing in the body or what it could be doing in the body?

A. It tells you that the drug is there, some drug is there and for the first half-life, more than half is still there. That doesn't tell you what it is doing, as I said before. Maybe 5 milligrams wasn't enough to have an effect; we don't know, but it does tell you at least that some of the drug is still there and, of course, the longer you go on, the less drug is there and so the less effect it's having. How much of an effect it's having is impossible to say but clearly, the higher the dose, the bigger the effect. Perhaps it's worth noting at this point that doubling the dose only increases the duration of action by one half-life, so if you want to prolong action, you are better to give repeated small doses than big doses. That's just in passing.

Q. I think Professor Neville, who is the inquiries' expert on paediatric neurology, has been asked about the diazepam improvement. I think we could find that at page 169 of the transcript on 1st November. I am afraid that's one of those documents that doesn't come up for you, Dr Aronson; I am sorry about that. I think it starts at line 17. So you can see when Dr Webb says he is under the impression that there has

been some improvement as a result of the administration of rectal diazepam, what is the significance of that in terms of trying to work out what was wrong with Clare and how best to treat her; the answer is:

"I would say it wasn't dramatic. In other words, she didn't drop off to sleep and wake up and was talking again, so it wasn't as clear as that."

If you go over the page:

"I think it was just an improvement in the sort of level of responsiveness which I think means that it didn't really help a whole lot."

Unfortunately, we put Professor Neville in the position of trying to speculate also because he, of course, knows no more than you do about what the circumstances in which people are describing an improvement but, doing the best he could, his impression was it actually probably hadn't helped very much at all. I'm not asking you to comment because I'm not sure you can comment any further yourself but that was just for the benefit of those who wanted to know what he said.

A. I think he's saying pretty much what I said which is that you can't really tell. Whether his

interpretation is correct or not, I don't want to comment.

Q. No. Then in your own report when you're dealing with diazepam at 237-002-008, this is to do with prescribing diazepam at all in those circumstances and you say, in a child, you might prefer to choose benzodiazepine with a shorter duration of action than diazepam. Why would that be?

A. No. I say in an adult I would consider the use of a benzodiazepine to be appropriate although one might prefer to choose a benzodiazepine. This is interesting because we're talking about 2012 and 1996.

Q. Exactly.

A. My feeling actually in 1996, as well as today, but my strong feeling today is that it's preferable in these circumstances to choose a drug with a shorter duration of action if you can because you're more in control of what's going on. You can switch it on and off much more quickly than if you give a drug that has a duration of action that is very long and that's it. You can't do anything about that. You have to wait.

Q. Because it's in the system and you can't get rid of it.

A. Because it's in the system and you just have to wait for it to dissipate. My own view is that -- and nowadays, if you look in the current edition of the BNF for Children, you will see that midazolam is the recommended treatment for status epilepticus even though it is not currently licensed for that reason. If you look in the British National Formulary for 1996, you will see that diazepam is recommended and, in fact, interestingly it says that lorazepam may also be helpful because it has a longer duration of action. That was the view in those days.

Now, my own view at that time, and I know because I used to use quite a lot of this particular drug, was that I would have tended to use a drug called clomethiazole, which was also listed in the 1996 edition as a shorter acting drug and for the reasons that I have given, but my experience was generally that patients with difficult epilepsy who would come under my care would already have been given diazepam as a first measure and that is what the 1996 Formulary recommends; diazepam as a first measure to treat

status epilepticus.
Q. So although your preference would've been for a shorter acting drug, even in 1996, and although there are indications currently that one wouldn't perhaps use such a long acting drug, in 1996, you couldn't say it wasn't appropriate to prescribe diazepam in that dosage.
A. Indeed it was the recommended first line of treatment, so not at all inappropriate. My own preference, as I say, was in the context generally of seeing patients in whom diazepam had already been used and had proved ineffective. My next choice would, in those days, have been clomethiazole. Nowadays, I think, probably most people's choice would be midazolam.
MR FORTUNE: Just picking up something Dr Aronson said, diazepam in 1996 was licensed. Dr Aronson has said that even in 2012, midazolam is not licensed for status epilepticus in children. Could Dr Aronson explain what the term "licensed" means in these circumstances in case anybody else thinks that using a drug non-licence or off-licence is, in fact, anything other than therapeutic?
A. Drugs are licensed in the UK by an authority

called the Medicines and Healthcare Products Regulatory Agency, the MHRA. The process whereby licences are issued involves the submission to the MHRA by the drug company involved of large amounts of data on the pharmacology actions, uses, effects of the medication for which they are seeking a licence and which will have accrued generally, on average, over about ten years of work.

The MHRA then looks at the data and if it awards a licence, then the terms of that licence are regulated by law and the licence has to contain certain pieces of information about the medication. Anybody who wants to read the licence can access the licences in a system known as the Summaries of Product Characteristics. These are regulated by EU law and have a certain format.

One of the sections is labelled "Indications" and in each Summary of Product Characteristics, or SMPC, that section details the licensed indications. Diazepam for anxiety, for example, is a licensed indication and so on. These are indications for which the MHRA is convinced that there is enough information to say, "You may use

this drug for this indication".

Now, I should also explain that there is a term of "the label". This is an American term but it has come to be used widely. "The label" is a description given to the whole licence and in addition to indications, the label, the whole description includes information such as the formulation to be used, the dosage to be given, the dose form, the dose in which it's to be given, the frequency and so on. If you go outside of those instructions, then you are said to go "off label", so you haven't changed the indication but you've done something else that is different from the way the drug is described in the label.

Now, in children, this raises enormous difficulties because the vast majority of studies on new drugs are carried out in adults. When a drug is licensed for the first time, there is generally little or no information about its use in children. If you look through the BNF for Children, it is liberally studded with the statement, "Not licensed for this indication". Many of the uses of medications in children are not licensed because the appropriate clinical

trials have not been carried out to satisfy the regulatory authorities and indeed the drug company has probably found it too difficult, time consuming and expensive to go to the trouble of applying to the authority for a licence in children and just doesn't bother. It markets the drug and the drug is not used by paediatricians but, of course, paediatricians build up a lot of experience. They carry out trials of their own, they have observations in their own clinical experience and even though the amount of experience they have and the trials they've carried out may not be sufficient to be presented to the licensing authority to obtain a licence, nonetheless, the paediatricians may be sufficiently confident to use the drug unlicensed for such an indication.

For midazolam, for example, that is the case. It is recommended for status epilepticus but the text says -- if I can find it:

"Licensed use; injection not licensed for use in status epilepticus."

Yet, if you look at the section on the treatment for the management of this condition, it says that you can use buccal midazolam or

intravenous lorazepam. Now, it says "buccal midazolam" because the intravenous formulation is not licensed but, and you can ask a paediatrician this, I would not be surprised if intravenous midazolam was used nowadays, in some cases, off-licence, to manage status epilepticus.

MS ANYADIKE-DANES: Doctor, the upshot of this is just because it isn't licensed for children, doesn't mean it's not a beneficial therapy and that many paediatricians are using it to good effect. It doesn't mean that.

A. That is correct. In fact, I suspect that, more often than not, unlicensed indications are the rule rather than the exception in paediatric practice; very common at any rate.

Q. Yes. I am not going to take you to them but, for the sake of reference, you have included, attached to your report, the Summary of Product Characteristics. The one for phenytoin can be found starting at 237-002-038 and the one for midazolam can be found at 237-002-045.

A. These are, of course, current SPCs and not 1996.

Q. Yes and that changes presumably over time.

A. It does. It changes regularly; year on year it changes in sometimes very subtle ways.

Q. You then, I think, said that at page 237-002-008 of your report that, in your view, it's desirable to obtain an EEG before treating suspected non-convulsive status epilepticus. At all, do you mean, by anti-convulsive medication?
A. Yes.
Q. Why is that?
A. I might have even said, "Highly desirable".
Q. Yes.
A. Some might say mandatory.
Q. Mandatory.
A. Some might say that. I wouldn't say that because there might conceivably be circumstances in which one would want to treat but could not get an EEG and that would be a clinical decision that one would make. That's another reason why one might want to choose a short acting drug because if you don't have an EEG on which to base your diagnosis, you feel that, in the circumstances, it is important to treat nonetheless, you might give a short acting drug to hold the fort for the time being and then, when the effect of that had worn off, then at more greater leisure get the EEG. So highly desirable might be the way to put it.

Q. Why do you consider it to be desirable?
A. Because in this case, I don't think, and again this is for a paediatric neurologist to state an opinion, but my experience with non-convulsive status epilepticus in adults, which is very limited because it's not common, is that you cannot make a diagnosis comfortably without an EEG because there's no outward sign of the storm that's going on in the brain in terms of physical output as a fit.
THE CHAIRMAN: Professor Neville took the view that this was a possible diagnosis but rather low on the list of possibilities and that influenced him in advising that an EEG should have been obtained before that was taken as the condition being treated.
A. That implies that this is not a case in which he felt that urgent treatment was necessary. He felt that was Possible but unlikely. There was no rush to treat the putative diagnosis. Therefore, wait until you can get an EEG that would confirm or deny the diagnosis.
Q. But meanwhile, you could be testing other things on a differential diagnosis?
A. Well, you could, indeed. If you had a

differential diagnosis, you could be instituting other investigations such as a search for viruses that might be causing encephalitis, for example.

Q. If then we could move on to phenytoin, the first administration of phenytoin is at 1445. That's 635 milligrams and it's given by an IV stat so that's a bolus dose. We see that at 092-022-054 in the clinical notes and it's, "Dr Webb has seen the child", as we've just taken you to. Then he suggests three things and the first relates to IV phenytoin as (inaudible) there:

"Start on IV phenytoin 18 milligrams a kilo stat, followed by 2.5 milligrams a kilo, 12-hourly."

Then:

"Will need levels 6 hours after loading dose."

So that's how it comes to the SHO where you can see his note just below. The first part of it, if we stay with the loading dose part, is to attempt to translate that. As is now known and he recognises, he ended up with an arithmetical error at 632.

But if I can first ask you the question I've asked you in relation to the diazepam: the onset of action I think you put in your report was 30

to 60 minutes. I think -- I advise that's not to be pulled up -- at 237-002-009. This seems quite a wide range of onset of action, particularly when you say that:

"The onset of action doesn't necessarily mean you've reached the therapeutic level."

So why is there such a wide range?

A. Well, this is from reported data in the literature, and I suspect that it reflects the intrinsic variability. The drug has to pass into the brain. It has to attach to whatever mechanism it acts on, something to do with ion transport in the neurons, I suspect. And that has to be translated into a downstream action and the activity of the brain cells. And these things do take time, and there will be variability from individual to individual. And so that estimate that I have written there is based on a literature estimate of reports and clinical trials and the like.

Q. Though you do later on in that page -- and maybe this is worth pulling up -- at 237-002-009 as to how to give a dose like that. You said:

"To give a dose of 635 [it's just under "(e)" at the top] one would use 12.7 milligrams in such

a solution. You would give it intravenously. [Then you say to get at the rate of it] In other words, over no less than 9 minutes."

Why is it that you have to give it in that way, so far as you're concerned?

A. Well, that's the -- that's based on the recommended rate, as published in the British National Formulary for 1996, and I don't think that's changed. The reason it should be given slowly is because there is a risk of abnormal rhythms in the heart if it's given more quickly. This drug acts on electrical tissue in places other than the brain. And the main part of the body in which there is important electrical tissue is in the heart. The wiring of the heart is electrical and, if you give phenytoin too quickly, there is a risk that you may cause abnormal rhythms in the heart.

Q. Is that why you need to manage it with an ECG while you're doing it?

A. That's right.

Q. But when you say it should be "no less than 9 minutes", is that something that, if you are having a very junior doctor prescribe it from your direction, it should be stated so that

there's no error if it can have that sort of effect?
A. Yes.
Q. That should be included in the note?
A. Yes.
MR COUNSELL: I wonder if Dr Aronson would be able just to clarify that, the question and the answer perhaps?
MS ANYADIKE-DANES: Yes.
MR COUNSELL: I wonder if Dr Aronson could deal with this. If the instruction's coming from a more senior doctor -- the note of course is recorded here by a very junior doctor -- is Dr Aronson saying that the instructions as to the speed with which it should be given should be given by the more senior doctor?
A. I think that whoever is making the decision about the prescribing should give that instruction. These words are ambiguous, "prescribing", "prescription". "Prescribing" could refer to the mental processes that lead to the instruction or it could refer to writing the prescription. "Prescription" could refer to the act of writing the prescription, but it could also refer to the prescription you take to the chemist. So these

terms are very vague and ambiguous in some ways. To me, prescribing involves the act of thinking about it and the act of writing it down. Both of those things are prescribing. If I say to my junior staff, "I want you to give this patient 300 milligrams of phenytoin intravenously" -- whatever the does is, doesn't matter -- I would say, "And I want you to give it over a period". I wouldn't say over "no less than ...". I would say, "Give it intravenously over 15 minutes", let us say, and that would be my definitive instruction. I would then expect them to write that down in the notes, "To be given phenytoin X milligram per kilogram (or whatever it is) over 15 minutes by intravenous infusion".

MS ANYADIKE-DANES: If we pause there and we go to Mr Counsell's question, does that mean, therefore, that it was for Dr Webb to have included that instruction in his note?

A. If he was the one who was recommending the prescription, the prescribing of that drug, then I would say yes, he should have either said that or said something to the effect, "... and look it up".

Q. Yes.
MR SEPHTON: And would that apply [inaudible: no microphone] if Dr Webb thought he was giving the instruction to a registrar rather than an SHO?
A. I think it would apply to whomever he was giving the instruction.
MS ANYADIKE-DANES: This is in the interests of clarity?
A. Indeed.
Q. Thank you. So then if we --
A. And precision actually --
Q. Exactly what I meant.
A. -- precision.
Q. Precision. Then if we stay with that loading dose and to see how the direction "IV phenytoin 18 milligrams per kilo stat dose" turns into a prescription, if I can put it that way, or a written-up prescription for it to be administered.
A. ... you might say.
Q. Yes. So the calculation is there at 090-022-054 but we don't want to pull it up. He simply calculates 18 times 24 and gets the incorrect answer. But where it gets prescribed is, if one goes to 090-026-075, there at the bottom, "This

is the once only" because it's going to be a stat dose so that would be once only. The second line, you can see the "635". The time it's administered is 2.45 pm by IV and the signature bar of the SHO and his initials, indicating that that has actually been given at that time.

I wonder if you can help then. Given the half-life of phenytoin and given when it was given, when does it reach a therapeutic concentration in her system?

A. If you're giving a loading dose intravenously, then the concentration -- and it's given over, say, 10 or 15 minutes, then the concentration will rise quite rapidly during the infusion. So that may be quite a high concentration because the drug is restricted to the blood at that point. So it rises to a high concentration and then starts to fall as the drug is distributed throughout the tissues. And then it reaches a phase when it is declining very slowly and that is the half-life. So the shape of the curve is rather like a nose with a tail on it. It goes up like a nose like that, and then tails off and disappears with the half-life we've discussed.

So within -- the distribution time probably --

the distribution time of the blood is one minute. The cardiac output is 5 litres per minute. The total blood volume is 5 litres. So within one minute the drug is uniformly distributed through the blood, and so the peak concentration will occur for intravenous administration at that point. And then depending on the time it takes to distribute throughout the tissues, which may be quite a long time, it will then fall from that concentration to a steady disappearing concentration. So it might be half an hour/an hour, that sort of order.

Q. Claire's phenytoin levels were actually checked. The blood for those levels seems to have been taken at 9.30 pm that evening, although they didn't come back to about 11.30 pm. But in any event, the result of her phenytoin levels from those bloods was 23.4, and I think elsewhere in your report you said that's a rather high level.

A. It is.

Q. But bearing that mind and from what you've just described as to the way the drug acts, can you express any view at all as to what her likely phenytoin levels would have been by 1525? I should say the reason I am asking about that

particular time is that is the first seizure that Claire is recorded as having, the first visible one that she's recorded as having.

A. 1525/1530, that sort of time, is about three-quarters of an hour after the intravenous infusion. By that time, I would expect that we would probably be in the terminal(?) phase that I described. And since the drug has a very long half-life, it wouldn't change much between 3.30 pm and nine o'clock when the sample was taken. So if it was 23 milligrams per litre at 9.00/9.30 pm, I would reckon somewhere between 25 and 30 as an approximation at 3.30 pm that afternoon. It's about that figure but it wouldn't be far off that sort of range.

Q. If it were at that level of concentration in her body at that time, is it possible that it could have contributed to that seizure?

A. Well, very occasionally -- and it isn't common -- it has been reported anticonvulsant drugs, anti-epileptic drugs, including phenytoin, can cause seizures rather than relieving them. These are known as paradoxical seizures and the mechanism is not understood. It is therefore possible -- although I couldn't be sure about it and if you

ask me to say on the balance of probabilities what I thought, I couldn't say as much -- it is possible that a seizure at 3.30 pm could have been due to phenytoin toxicity.

THE CHAIRMAN: So it's possible but not probable?

A. I'd say that, yeah.

MS ANYADIKE-DANES: In fact, given the other things that might have been going on with Claire, I think Professor Neville's evidence is it's really impossible to unpick those things and to see to what extent this could have been the cause because there were other factors that could have brought it about. So you can say nothing further than "It's possible"?

A. That's right, and I'm sure he's right. There are so many other factors in this case that one can't attribute individual events to individual factors.

Q. Can I just ask: because phenytoin is one of those drugs that you've described can produce paradoxical effects -- and paradoxical, presumably means precisely the opposite to what you're intending to do. You're intending to produce a sedating effect, if I can put it that way, or a calming effect on their electrical

storm and in fact you've done precisely the opposite. I presume that's what makes it paradoxical?
A. Indeed.
Q. But was it known that it had those effects in 1996?
A. Yes, I think it was. I'm not entirely certain, and I'm just looking to see if I referred to a paper that some colleagues had written on the subject. I see I haven't. I can't remember at the moment whether that is so, but I think that this has been described. I would want notice of that question.
Q. If it were to be known in 1996 that, not by any means commonly but it could produce those effects, and you have a child who is under hourly observation if that's a part of what you have directed, should the possibility of paradoxical or adverse effects be described or explained to those who were carrying out the observations so that they know to look for these or, if they see it, be able perhaps to alert somebody more senior to the fact that this might be happening?
A. Assuming that it was known at that time, I think that that's a highly expert judgement and very

difficult to make. In other words, even if it had been described and published at that time, I don't think that it was common knowledge. This is a very -- I consider this to be a very expert opinion in the area.

Q. So it's not necessarily something that you would expect somebody in the position of Dr Webb to have been describing to the nurses, "This child is going to have a drug that could produce certain sort of effects. You should look out for that and, if you see it, you should be alerting somebody to the fact that that might be happening". That's not something you would expect?

A. I would not expect even an expert paediatric neurologist, who might well know of the risk of paradoxical seizures -- and I'm not saying that he did or didn't -- but even if he did, I would not expect him to explain that to the nurses in these circumstances. It is so uncommon and unlikely that it's not something that one would state formally in the course of a routine management of a patient with status epilepticus.

THE CHAIRMAN: Thank you.

MS ANYADIKE-DANES: When you mentioned earlier about

you would have continuous monitoring by an ECG -- in fact I think you regarded it as essential -- is that just for the stat dose at 1445 or is that also for the infusion that takes place at 2300 hours or thereabouts?

A. I would be less concerned about the later infusion if the earlier evidence had shown that there was no cardiac effect of the loading dose. If on the other hand no cardiac monitoring was carried out during the loading dose, then I would certainly want it to be carried out during the next dose.

Q. Yes. I think the position is that one can't be certain that was done during the loading dose. But the nurse's note at 090-040-138 indicates that it was done for the infusion of a maintenance dose. If one turns that around, you can see:

"IV phenytoin directed by a doctor and 1/1-hour cardiac monitor in situ throughout infusion." There is no similar note when it is administered later on. But in your view, that's really essential; they should have done it for the first dose?

A. Yes.

Q. All the more given the size of it?
A. Yes.
Q. Okay. I wonder if we can move on now to the midazolam; sometimes it's referred to in the notes as Hypnovel. That was "12 milligrams" actually written down, but I think that none of the experts and the clinicians think it was actually given as "120 milligrams". That was an IV stat dose at 1525. Can you help with what the half-life is of this drug?
A. The half-life of midazolam is quite short, two to three hours, and it's for that reason that it is nowadays very commonly used, for example, for relatively minor surgical procedures such as endoscopy and for induction of anaesthesia; in other words, bringing on anaesthesia because it has such a short duration of action. You give it, it has its effect, wears off very quickly.
Q. What's its onset of action?
A. After intravenous infusion, probably a few minutes, again highly variable but not very long.
Q. Yes. I'm just seeing where the actual dose is first described and it's first described in the clinical notes at 090-022-055. You can see it right up at the top, the stat dose there. Dr

Webb, who was the paediatric neurologist, his third witness statement describes a little bit about how that came about. We don't have to pull it up, but it's his third witness statement, 038-3 at page 2, when he says that he believes his communication with the medical staff in relation to it was most likely to have been by phone as he didn't attend the ward until some time later and didn't write the dose himself in Claire's notes.

Now, the first thing before one deals with the dose and the way that was translated into the prescription, at that stage would you have been prescribing and administering midazolam. The "at that stage" is: she's had her 5 milligrams of rectal diazepam at 1215; she's had phenytoin at 1445; and quite a large dose -- I think you described that as an overdose -- the 635 milligrams.

A. Yes.

Q. And now she's having her midazolam at 1525. Would you have prescribed midazolam then?

A. I would have called for a paediatric neurologist because you're in trouble. You're in difficulty.

Q. Why do you say that?

A. And think probably I wouldn't have given the phenytoin at that stage for the reasons that I explained before. You don't have a diagnosis, it's a long-acting drug, you really don't know where you are. This child looks very ill, and when exactly it was appreciated that she was very ill may not be clear. And this is probably continuous deterioration or at least gradual deterioration. And at some point or other, a discontinuous decision is made, namely to take her to the paediatric ICU. When you make that decision is difficult. But the tipping point is the decision to give midazolam, clearly, because at that point she's had diazepam. Somebody thought it worked but not well enough not to give phenytoin. And presumably the decision to give midazolam was based on the view that the -- this condition was continuing and maybe even getting more serious with a declining Glasgow coma scale, for example.

So the time of giving midazolam was clearly a turning point, the point at which it clicked, "This child is not well and we are not succeeding in improving her condition". And the truth is it happened when midazolam was given and she was

transferred to the ICU.
THE CHAIRMAN: No.
MS ANYADIKE-DANES: Not immediately, no. She wasn't transferred to the ICU until about three o'clock in the morning of the next day, after she'd had a respiratory arrest.
THE CHAIRMAN: In fact it's about a 24-hour gap. The midazolam --
A. I'm sorry. I'm sorry, yes. Absolutely, yes ...
THE CHAIRMAN: The other point, doctor, is this: that near the start of that answer you said that you would have called a paediatric neurologist.
A. Well, I was speaking as a general physician.
THE CHAIRMAN: Yes, but it was the paediatric neurologist who gave the midazolam.
A. Quite, yes.
THE CHAIRMAN: Or who decided on the midazolam.
A. That's to ask a paediatric neurologist. Were I in that position at that stage, I would have been asking for help because I would have been very unhappy, I think, about this girl.
I'm sorry, you're quite right of course. The respiratory arrest and transfer occurred later, and no doubt you will want to discuss that.
THE CHAIRMAN: Yes.

MS ANYADIKE-DANES: Yes. You described the midazolam as a turning point. To be fair to you, I'm not sure whether you thought it was a turning point because you've reached a stage where you felt you needed midazolam or you thought it was a turning point because you had believed shortly thereafter she went to intensive care. But leaving that aside and knowing as you do now that she didn't actually go into intensive care until three o'clock the following morning, this is all happening at 3.25 pm or thereabouts --

THE CHAIRMAN: This is 12 hours earlier.

Q. Exactly.

A. My judgement was based on both of those considerations, even leaving aside the later transfer. I think from what I've heard -- and people who were there at the time and those who had been more closely involved in her care, we need to judge that -- that given that she was given diazepam and then given phenytoin, and then it was decided that midazolam was needed, I would -- at that point as a general physician, I would think that there are difficulties in this case. And I am seriously worried about the problems that the treatment is providing here.

Q. In terms of the difficulties, are they such that you wouldn't have been happy about her being treated on a general ward and would have wanted her, for example, to be transferred to intensive care?
A. Well, as I say, as a general physician, I would look for help from the paediatric neurologist. And at that stage, I would at least have thought that transfer to a paediatric neurology ward, if such existed, or some specialised facility would be indicated, if not necessarily transfer to an ICU. I would certainly be calling for specialist help at this point.
Q. Those transfers, either to the paediatric neurologic ward or to paediatric intensive care, are they because of the greater specialism and attention of care that she might receive there?
A. Yes. I think it's a truism that, if you've had a stroke, you're better on a stroke unit. If you have acute severe diabetes, you're better in a ward where people know about the management of diabetes. If you are in this position of having status epilepticus, as was presumed, or at least some difficult neurological problem, then I think you're better under the care of a neurologist in

an environment where the nursing staff and all the junior staff are used to taking care of these kinds of difficult problems.

It may be that of course that a bed's not available, in which case one would ask for close involvement of those individuals. But that would be falling short of desirable; that if a bed were available in a specialised place, then it does seem to me that that's the time when one would think about it.

Q. Thank you. Can I ask you then about the dose? The dose itself is 12 milligrams and there is an issue between the paediatric neurologist who phoned it through. His evidence and his statement is that what he said was, "0.15 milligrams per kilo". It says, you can see written down here "0.5" so that has made a difference.

But leaving aside that, and I know you said you wouldn't be wanting to do it in these circumstances, but if you were prescribing midazolam, have you got any comment to make on what an appropriate dose might be?

A. Currently, the dosage that is given in the British National Formulary for children is 150

micrograms per kilogram. That's 0.15 milligrams per kilogram, as originally ordered, not 0.5 milligrams per kilogram, which is at least threefold more.

In the BNF for 1996 of course, it does not give a dose because midazolam at that time was not licensed - it still isn't - but was not even recommended. And so there is no dosage written in the BNF specifically for use in the treatment of status epilepticus. What there is is information about the use of midazolam by intravenous infusion in a child over seven for induction of anaesthesia.

Now, if I was going to use an unlicensed product, I would choose a dose that had been found to be appropriate in other circumstances, although I might not know what the effect would be. But that's the dose I would go for, and the dose that's given there for a child over 7 years is 150 micrograms per kilogram.

Q. So that would --

A. So it seems to me that 150 micrograms per kilogram is the dose to choose. And you tell me that the doctor ordered 0.15 milligram per kilogram, which is 150 micrograms per kilogram.

Q. No, I say that's his evidence that that's what he did. But in any event, it would have produced 3.6 and not 12?
A. Yes.
Q. How significant is that, the difference between the 3.6 and the 12 in these circumstances?
A. Well, that's at least three times more than would be recommended, and that would produce much greater sedation than one would expect from the appropriate dose.
Q. Then the product information that I think you provided, 237-002-058, which was the Hameln(?) product information, that's correct, I think it says that:
"Midazolam should be titrated slowly to the desired clinical effect, and the initial dose of midazolam should be administered over 2 to 3 minutes."
It's just there under "Children". Does that accord with how you think it should be administered?
A. Yes, that's reasonable advice.
Q. If that is how it should be administered, then in the same way as I had asked you before about the phenytoin, is that something that should have

been directed?
A. I think it's less important than with the phenytoin, and I wouldn't lay as much stress on it. I think the counsel of perfection would be to say, "Give it slowly". But I think if I were ordering it I would say, "... and look it up in the book. Make sure you get it right". The phenytoin is much more important because the risk of cardiac arrhythmias is really quite high.
Q. Yes.
MR COUNSELL: I just wonder if Dr Aronson could indicate what he means by "look it up in the book"? I don't know whether it would assist him if we brought up on the screen the BNF, for which I think the reference is 311-028-020.
MS ANYADIKE-DANES: That's it.
A. I do refer to the British National Formulary, and this is the relevant volume of the British National Formulary that I would expect the doctor to look at. The section on midazolam does not, I think, give this advice. And if you look at the section later on, which you may not have, which is appendix 6 to the British National Formulary --
THE CHAIRMAN: Can you give us a page number ...

A. -- starting at page 598 --
THE CHAIRMAN: Thank you.
A. -- entitled "Appendix 6: Intravenous additives", if you turn to page 606 where it says, "Phenytoin sodium", there are strict instructions about how phenytoin should be given. But if you turn to the page in which you expect midazolam to be listed, there are no instructions. And I take that to mean that either it was not known that one ought to give this drug slowly at that time, or it was not considered to be very important and I don't consider it to be hugely important. I do consider the phenytoin rate of dosage to be very important, and that is borne out by its inclusion in that section in the British National Formulary.
THE CHAIRMAN: Okay.
MS ANYADIKE-DANES: I take it from what you've just said that it wouldn't concern you that the midazolam was administered as a bolus?
A. No, I don't think I would be greatly concerned about that.
Q. Although the same product information, at least that from the manufacturer, specifically says that it shouldn't be administered by a rapid or a

single bolus IV administration. One finds that at 311-034-004. But is that one of those counsel of perfection --

A. I think it probably is. I don't think this is hugely important. One gives midazolam quite quickly when one is injecting it intravenously for endoscopy, for example, although less than two to three minutes. And this may -- the SPCs, these summaries of product characteristics, are very defensive.

Q. Yes.

A. They fall on the side of caution and for obvious reasons. So I wouldn't lay great stress on that, no.

Q. Leaving aside the rapid or single bolus, which comes under the "Precautions", there is some other guidance which indicates the potentially serious effects of this drug; that it's a serious drug, midazolam.

A. Oh, yes.

Q. If you've got junior doctors who have never prescribed it or administered it, which is the evidence of the junior doctors in this case, and nurses who are unfamiliar with it and may never actually have come across it at all, which I

believe is also the evidence in this case, then is there anything that the prescribing paediatric neurologist should say to them? Not necessarily about rapid or single boluses, but just to impress upon them the potential characteristics of this drug with which they may not be familiar?
A. I'm always reluctant to use drugs in those circumstances because the possibility of things going wrong is much higher than in the normal course of events. But you're going to say, "But they did give it, and given that they did give it, what should they have done?"
Q. Yes.
A. And again I would say the counsel of perfection is to say, "Let's look it up. Let's see what the current indications for this drug are, what the information on its administration is, and so on, and let's stick as closely as we can to that information". Of course 1996, difficult to find that information perhaps. Nowadays, we go to the computer on the ward, we press a button and the sheet comes up, as it does in this courtroom.
Q. Well, sir, I --
THE CHAIRMAN: Mr Sephton?
MR SEPHTON: Perhaps the doctor could be taken to Dr

Webb's third witness statement, which is 138-3, page 4?

MS ANYADIKE-DANES: Certainly.

MR SEPHTON: I beg your pardon, it must be the --

MS ANYADIKE-DANES: I think you might want page 5.

MR SEPHTON: Page 5.

MS ANYADIKE-DANES: Yes.

THE CHAIRMAN: I think you're going the wrong way. Is it not --

MR SEPHTON: No, no, page 5 is the one I had in mind, and then please could we have next to that page 6. And we can see on page 6 in the abstract the indication that:

"0.15 milligrams per kilogram bolus [I emphasise that] followed by an infusion."

Use of midazolam, which is the paper that Dr Webb specifically said he'd refer to before he told Dr Stevenson what to administer. I think the doctor might give his comments on that.

MR COUNSELL: With respect, I'm not sure that's advisable(?).

MS ANYADIKE-DANES: No.

MR COUNSELL: The paper that we've just highlighted --

MS ANYADIKE-DANES: Is 1997.

MR COUNSELL: -- is 1997.

MR SEPHTON: [inaudible: no microphone] in Vancouver and the paper on the left is 1993.

MS ANYADIKE-DANES: Perhaps, Mr Chairman, if we may got to what Dr Webb actually did say, which is 138-3, page 2. He starts immediately under (1), which is something that I had read out before. He believes he:

"... suggested midazolam as a next option for Claire. But I would not have been certain of the dose and would have had to check this by reviewing papers kept in my office."

Then he says:

"I believe my communication with the medical staff in relation to this was most likely to have been by phone as I did not attend the ward until sometime later and did not write the dose myself in Claire's notes. Cannot recall for certain the dose that I recommended, but I believe this would have been a loading dose of 0.15 milligrams per kilo. I believe this because this was the dose recommended in the principal paper describing midazolam use in this situation at the time."

He refers to the Critical Care Med paper, which is 1993, and then he says that:

"There were several other shorter papers

recommending a similar bolus dose."

and then goes on to refer to a subsequent paper, but he certainly doesn't say that a 1997 paper is what led him to prescribe the dose in 1996. If we pull that up and have the two things side by side again, which is page 5 and page 6 ...

THE CHAIRMAN: So if we go back to 138-3, page 5, and drop page 2.

MS ANYADIKE-DANES: Yes, thank you very much, Mr Chairman (inaudible), yes. So it's the page 5 one that Dr Webb says that he used in order to get the dose and to telephone through to the ward what they should do. One of the things that I wanted to, if you like, comment on is if you see after it says "The objective" -- and this is, I presume, a test to a trial or a test carried out with a limited number of children for research purposes -- then you see "The design", and then you see "(inaudible) in the paediatric intensive care unit". Does that indicate anything about at that time, and this of course would be 1993 but at that time what they thought about where you were best placed administering this medication to children?

Q. I don't think it -- you might infer that, but I don't think it implies it necessarily. It's merely the place where the trial was carried out.
THE CHAIRMAN: No, I understand but I'm lost about how "I infer it but don't imply it" or "imply it but don't infer it".
A. You might infer it from what is written, but what is written does not necessarily imply it. The direction is important, right?
MS ANYADIKE-DANES: Yes.
THE CHAIRMAN: It's very subtle.
MS ANYADIKE-DANES: But in any event, that is the paper that Dr Webb referred to. Having read that part out of his witness statement, whether it's to be implied or inferred, it would appear that he himself was not so familiar with the medication. Because he had to go and check what its dose was from the time when he had been in Canada, and he then phones that dose through to the SHOs. Their evidence, as I told you, was that they certainly didn't know about it. At least, Dr Stevenson who is a person who writes it up, he didn't know about it at all. So that's why I had asked you: in those circumstances, what is the obligation of Dr Webb to make sure that

the junior doctors, and if necessary the nurses who are going to be carrying out their observations of Claire, understand about the drug that is going to be administered to her.

A. There's something of Alexander Pope that says, "Be not the first to try a new treatment, but don't be the last either". Somebody has to take up a new treatment when it appears, and what has happened here is that Rivera et al, as we can see, have carried out a small clinical trial, an open but prospective trial, not strong evidence but some evidence, that suggests that this medication may be of benefit in patients who are in paediatric intensive care units who have status epilepticus, presumably convulsive status, not non-convulsive status.

So the evidence for this is not very good here, but nonetheless the doctor has decided that he will try it because this is a difficult case and thinks it might help. And his assessment is that it's probably quite safe, and so the balance of benefit to harm, the balance of possible benefit, which he is inferring from the published study, he is taking out from the published study, is likely to outweigh the possible harm from this

drug. And that's fine. I don't have any problem with that. A specialist in the field, who has experience in -- experience of managing such patients, does sometimes have to try new things based on whatever evidence is available at the time, even though the evidence may not be as strong as one would want. That's the first point. So I don't think there's anything to say that this should not have been a possible way of proceeding in these circumstances, given all the caveats we've discussed before.

The second point then, which is what you're asking about, is how to communicate the uncertainty in this decision, and how to communicate the way in which one should proceed. And it's my view in such circumstances that, when you are dealing with what is really quite an experimental treatment - it's a small, open study; it's not double-blind, placebo-controlled; it's in patients who have different conditions, not well described in the abstract but presumably better described in the main paper - this really -- it's an early use of this drug and one ought to take great care when communicating to one's staff that one wants to use this drug.

To do it over the phone creates difficulties. Communication by phone is not ideal. And if indeed the doctor said on the phone "0.15" and the doctor at the end of the phone wrote "0.5", that's merely an illustration of the difficulty that can arise.

So yes, I do think that a doctor, who is in this position, as we've described it, has a duty to be careful about his or her communication of how this drug should be used and the precautions that need to be taken.

THE CHAIRMAN: Professor Neville's overall observation of Dr Webb was that he's to be complimented and praised for the efforts that he went to to help Claire. Professor Neville's concern, however, was that he was simply on the wrong track. And the fact, if I take his statement that he did go off and check some papers that he had access to what the appropriate dosage was, that confirms the first point anyway, doesn't it? That he did go to some lengths to do whatever he could to have a check?

A. Undoubtedly. Oh, I do agree. I think the fact that he has seen this drug used when he was in Canada, I think he said - although he didn't

think that he'd used it himself; he knows the paper to look up; he's gone to the trouble of looking it up, getting a copy, reading it, thinking about it; all that confirms what you've said. But if the diagnosis is wrong, then it rather vitiates the -- that side of the action.
THE CHAIRMAN: We build into the equation also presumably that Dr Webb was also the reason -- it may be that the reason that he didn't come himself to the ward at that time and see Claire but did it over the phone to Dr Stevenson was that he had his own list to deal with that day. He had other children presumably he was looking after whom he had to devote himself to as best he could.
Q. It does happen, but nonetheless does not alter the fact that communication by telephone is -- can be hazardous.
THE CHAIRMAN: Yes.
MS ANYADIKE-DANES: Thank you. Then if we go to --
MR FORTUNE: [inaudible: no microphone], looking at page 5 under the heading "Measurement and main results", the sentence that starts:
"None of the patients had clinically important changes in blood pressure, heart rate, oxygen

saturation or respiratory (inaudible) attributable to the use of midazolam."

Which instruments would be used to measure those changes, bearing in mind that midazolam is being administered by a junior doctor?

A. It varies and with time the instrumentation improves, becomes more sophisticated. But blood pressure cuffs, sphygmomanometers, to measure blood pressure. In some cases, particularly nowadays, in-dwelling cannulae in the artery can measure blood pressure directly. But more likely a cuff from a sphygmomanometer measuring blood pressure. Heart rate: probably with a cardiac monitor. Oxygen saturation: nowadays with a little instrument that fits over the thumb or a finger that measures the colour of the blood in the finger. It gives you a measure of oxygen saturation. And respiratory status would be counting the respirations. So these are things that would either be done automatically by monitoring instruments -- I can't remember what it was like in 1996 --

MS ANYADIKE-DANES: Well, that's exactly the point that I was going to ask you, doctor, because --

A. -- or perhaps by direct measurement by the

nursing staff putting a blood pressure cuff on, feeling the heart rate, counting the respiratory rate.

Q. That is exactly the point that I was going to ask you because although it's of intellectual interest to know what is done now in the prescription of midazolam, from the point of view of this case and the clinicians who found themselves in the position of having to treat Claire in her condition, 1996 is what's important.

A. True.

Q. And this is the paper for 1993, and is indicating amongst other things these measurements that were being taken. And I think what Mr Fortune was asking you is: in the 1996 setting in Claire's circumstances - I think that's what he was asking - what should have been being tested then?

A. Well, this is --

MR FORTUNE: We are only talking about 1996.

MS ANYADIKE-DANES: Yes.

A. But the paper is 1993. It's what is described. Well, vital signs; this is what we're talking about. When the nurses are asked to make observations, these are the observations that

they're being asked to make, in addition to neurological observations.
Q. Well, that's what I was going to ask you. Are not these observations that the nurses would be making in any event?
A. Yes, indeed.
Q. And this paper doesn't suggest that the nurses would have to do anything different in relation to the administration of midazolam?
A. Not as stated here. But the clinician might say, "Do it every hour", rather than whatever the nurses were doing at the time. In other words, the clinician might order a review of the patient's status at a different time than the nurses would normally be expecting to do that, which might be four-hourly. But the actual measurements would not be any different to what they would normally be doing when observing vital signs.
Q. Would you have thought it advisable that she's connected to a heart monitor?
A. At this stage, probably not, as long as phenytoin is not being administered, and there's no indication here of problems with the heart. I suppose that in an intensive care unit it would

be routine.
Q. Yes.
A. But in an ordinary ward, I think I wouldn't be strongly advocating that.
Q. Thank you. Well, if we can move on to the phenytoin and the subsequent administration of phenytoin. That happens at 2300 hours, and you have to go back to see what Dr Webb directed so that one can see how that is translated into a prescription that is written up by Dr Stevenson. And what he directed is at 090-022-054, and you can see there:
"After the stat dose followed by 2.5 milligrams per kilo, 12-hourly."
I think you'll find in the course of this that I have left off the sodium valproate which happened at 5.15 pm but I'll take you back to that in a minute. Now that we're here, let's deal with the phenytoin. So that's what he wants to happen afterwards and then he says:
"Will need levels 6 hours after loading dose."
How do you interpret that direction to the junior doctor? What should he have made of that?
A. Well, the directions there is give intravenous phenytoin stat, a single dose, and we've

discussed the direction for doing that. And "Will need levels 6 hours after loading dose" means take blood to have the serum/phenytoin concentration measured six hours after you give the phenytoin. That, I think, is straightforward.

The difficulty arises here, I think, in interpreting the direction "2.5 milligram per kilogram 12-hourly". That suggests that -- the note "followed by 2.5 milligram per kilogram 12-hourly", that suggests a maintenance dose of 2.5 milligram per kilogram, and when the second maintenance dose is given, it should be given 12 hours after the first.

It might also imply that the first maintenance dose should be given 12 hours after the loading dose, but it doesn't actually say that, doesn't say when the first maintenance dose should be given. It merely says that the maintenance doses should be given 12-hourly.

Q. Well, we can see what Dr Stevenson in fact made of that. It's 090-026-075. If one looks up at the top, you have 60 milligrams which he has calculated it out as 60 and we see how he got to 60 from the left-hand side. He had 2.5

milligrams times the 24; that got him 60. See that from the medical notes. That's his notation there on the left-hand side. So he got 60 milligrams 12-hourly. Then if you look at the actual prescription, he's got 60 milligrams and he ticks 8.30 pm and 9.30 pm. So that's going to be 9.30 pm that evening when a dose is going to go on which is about seven hours or so after the loading dose, and then another one at 8.30 pm which is about 12 hours afterwards. So that's what he made of that and that's his signature there.

And then that prescription was rewritten and it's changed in certain respects but not that much(?) so that remains the same. And then if one looks at the IV fluids to actually try and see what did happen, you can see if you go to 090-038-135. Sorry, I beg your pardon.

A: Before you move on to that, can I just ask you a question about the left-hand side.

Q. Yes.

A: Can we go back, thank you. It says "2.30 pm", is that right, above you?

Q. Yes.

A: We were talking, I think about 2.45 pm before so

that's, I suppose, in the same ballpark:

"24 kilograms, 18 milligram per kilogram. Loading dose wrongly calculated as 632. Subsequently given as 635."

Right.

MS ANYADIKE-DANES: So where that is highlighted yellow, I'm asking you about the dose that he subsequently calculates ...

A. ... He's then suggesting that he's going at some time to do it and this is the instruction he's repeating:

"Phenytoin 60 milligrams 12-hourly either IV or orally."

Right. And "... check levels [he says] at 9.00 pm", which is 61/2 hours, yes, all right, after the note when he's going to give the loading dose. Okay, good. And then he writes, "Phenytoin 9.30 pm tonight" and retrospectively, it looks like, but actually looking forward to tomorrow, "8.30 am" tomorrow.

Q. Yes. Well, can I just pause there. What is the purpose of him being directed to check the phenytoin levels at nine o'clock?

A. My view is of that is, I would say, check the plasma concentrations, the levels, if you like,

sometime this afternoon or this evening to see if the dose was right, to see if the dose was appropriate. There's no point in measuring the plasma concentration unless you're going to use the information.

Q. So then what happens afterwards is contingent.

A. Absolutely.

Q. So if that is an acceptable level of concentration of the dose, then you move on and you administer your 60 milligrams and 12 hours thereafter you administer another lot of 60 mg.

A. Indeed, and this is the problem with advance directives. I tell you, "Give the phenytoin now. He is the dose. Give some more later as a maintenance dose". And you take that and say, "Right, I'll do that" then you stop thinking about it.

THE CHAIRMAN: But sorry, the safeguard is to check the level in between surely?

A. The safeguard is firstly to check the concentration, the level, and then to decide what dose to give, not to decide in advance that you will give 60 mg 12-hourly. The decision to give the maintenance dose is contingent upon the plasma concentration measurement.

THE CHAIRMAN: But then can that be read to say, well, "Check the level" or "Check the concentration", and we know that the concentration came back in excess of what one would expect at 23.4, I think.
A. Yes.
THE CHAIRMAN: So should that have prompted a reconsideration of whether to go ahead and give the second dose?
A. Indeed it should, but by then the second dose had already been given, as I understand.
MS ANYADIKE-DANES: Well, that's not entirely clear. There is some debate about whether the second dose was given after the information came through of the levels. It's just a difference in the notation. But in any event, as I understand you to be answering the Chairman, the purpose of checking it is to make sure that you move on on the basis of an appropriate level of phenytoin concentration in her system.
A. Otherwise why measure the concentration at all if you're not going to do that. Could I just go back to the yellow on the left, the top yellow?
Q. Yes.
A. Because in a sense, the instruction is -- could be better. It could say, "Give intravenous

phenytoin 18 mg per kg as a loading dose. Check the plasma concentration 6 hours later. If satisfactory, give a maintenance dose of 2.5 mg 12-hourly".

THE CHAIRMAN: Yes, but I think to be fair to Dr Webb on this point, it wouldn't take a lot of imagination to read into that; that if the level is in excess of what one would expect, that that should prompt a reconsideration.

A. Absolutely. I agree entirely with that. That's what one would infer from reading that. If it had been written differently, it would have been clear.

THE CHAIRMAN: Yes, it could have been spelt out ...

A. Could have been spelt out more clearly. But you're right that that's what one should perhaps have thought from what he wrote.

Q. What about the timing? The levels are going to be checked in six hours' time, which was about 9.00. In fact, the nurse had written up in the nursing notes that they were to be checked, or at least the bloods were to be drawn for them to be checked, at 9.00. In fact, it happens at 9.30, so there or thereabouts. So that's what's to happen within the 6 hours, and is the 12-hourly

dose, then, to happen 12 hours after that stat dose is given, if, in 6 hours' time her levels are acceptable?
A. That's what I would direct. Whether that was what was in the mind of the prescribing doctor, I can't say.
Q. I understand.
A. But I think that is a reasonable strategy.
Q. Yes, and then when the actual levels come back, they come back at 11.30 pm, and at that time it would appear that the dose which was prescribed is given. What should have been the response of learning at 11.30 pm that bloods taken at 9.30 pm produced a phenytoin concentration of 23.4? What should have been the response to that?
A. That the loading dose was too high for that patient. Even leaving aside the question of the miscalculation, the dose was given; that was done. Having received notice of the plasma concentration or the sodium concentration, whichever it was, which was 23, I would say that is higher than I would have wanted it to be. The target range that you're aiming for is somewhere between 10 and 20, on average, and that's what one goes for; it's the best one can do. Going

above that implies the possibility of toxicity.
Q. Doing the best you can with what you would have expected one of your junior doctors to do in that situation, if I can put it that way, what would you have wanted to happen when that was received at 11.30 pm and you're thinking, "Should I be giving any more of this directed phenytoin?"
A. I'd expect him to phone me.
Q. To phone you?
A. Yes.
Q. As a consultant?
A. Yes.
Q. Not the registrar?
A. No. Well, he might, but I -- I was the one who did the prescription, and I would -- if I came round the next morning and found that this had happened, I would be very angry, because I'm presuming now that I had given clear instructions, as we discussed before, but if he had -- if he gave the -- the maintenance dose, the first maintenance dose before getting the plasma phenytoin concentration, that would be wrong. If he knew the plasma concentration and nonetheless gave the maintenance dose, that would be wrong, and I would be very annoyed that if he

had -- if he had not consulted someone at least -- and I would be delighted if he consulted me, I would not mind in the slightest.

If he consulted the registrar and the registrar said, "Oh, that's okay, go ahead", then I'm not sure how I'd react, but --

Q. Actually I think that's what the junior doctor's evidence was; that he consulted the registrar, Dr Bartholomew and she said to continue. That is his evidence.

A. I see, yeah.

Q. What's your reaction to that?

A. I'd be at least very disappointed.

MALE SPEAKER 1: Am I right in remembering that Professor Neville said this was a bit high but it was okay to go ahead?

MS ANYADIKE-DANES: Yes.

A. I'm sorry, I disagree with that.

MALE SPEAKER 1: Okay, don't apologise. It's not the first disagreement.

MALE SPEAKER 2: Can I just make a point here and ask while we're on this subject? If one did the checking and came along later in the evening and found that at page 56 of the notes we have "23.4" and in brackets after it we have, "Between 10 and

20," which seems to be the doctor reminding he or she that that was what range should be, as the witness has said. Should someone not have checked back to see why it's an overdose and look back at the calculation at page 54 of the notes?

MS ANYADIKE-DANES: That was actually going to be my next question. Once anybody had recognised that they were over the target range, if I can put it that way, and you said -- when I asked you the question, you said, "Well, that would imply too much had been given", then does somebody not go back and look and see what was prescribed, what is recorded as having been administered?

A. Yes, you might do that.

Q. Should you do it?

A. Ideally, yes. By that stage --

MALE SPEAKER 1: But that's less important.

A. I think at that stage the horse has bolted, really.

MALE SPEAKER 1: That's less important than deciding what to do next.

A. Absolutely.

MS ANYADIKE-DANES: Yes.

A. Which is why I'm saying, "Yes, you might do it; ideally you would do it". But that horse has

bolted, it's done; you're not going to be able to do anything about that.

Q. In a way, that's a teaching issue ...

A. To an extent.

Q. You might deal with your registrar or junior doctor afterwards when you had ...

A. To an extent, yes, you might.

Q. ... addressed matters.

A. Indeed. But there is -- there is a point to this question which I think is important, and that is that the calculation of the maintenance dose does depend on the relationship between the loading dose and the plasma concentration, so in the cold light of day I'm sure I would do that.

I would go back and I would draw the graphs, actually, of concentration versus dose, and there are ways of doing this. And I would certainly go back and look at the loading dose, draw the loading dose against the plasma concentration to calculate the kinetics of the drug in that individual, and from that information I would predict the maintenance dose. I think that's a difficult exercise to expect a junior hospital doctor to do.

Q. But you as a prescribing consultant might do it?

A. I as a clinical pharmacologist could and would certainly do it.
Q. Yes. Can I ask you, Dr Stevenson had originally envisaged that the phenytoin would be given at 9.30.
A. I'm sorry, say that again.
Q. Sorry, I beg your pardon. Dr Stevenson, who is the SHO, in his prescription which is still there on the screen (you can see it), that that phenytoin would be given at 9.30; that's what he thought, and it may be because he thought that the levels were going to be checked at 9.00, but that doesn't equate to 12-hourly after the loading dose.
A. No, well that's why I said it's not clear what that instruction means in relation to the timing of the first maintenance dose. It's clear about the timing of the second maintenance dose; it should be 12 hours after the first. It does not specify that the first maintenance dose should be 12 hours after the loading dose. Now, clearly, as you've just said, the doctor did not interpret it in that way. He wrote down "9.30" which is what, seven hours or so after.
Q. Well, in fairness to Dr Stevenson, he might have

worked that out subsequently because in fact somebody knew, or decided to give it at 11.30. If there was a change of that sort, would you expect any kind of record to be made as to how we get from Dr Stevenson's prescription that it should be given at 9.30 to the administration by Dr Stewart at 11.30?

A. Um ... if a nurse had been going to give it, I would have expected it to be given at 9.30 or thereabouts, because the nurses adhere to the instructions in the prescription chart. If a doctor were going to give it, I might expect the difference between the written and the given time to be greater because doctors are busy doing things off the ward and may not get there in time.

So it could be -- one explanation would be that the doctor was busy and couldn't get there in time to give the dose. Beyond that, it may be that the other doctor wanted to wait for the blood concentration to come back before making a decision. I can only speculate, I don't know.

Q. Yes, if we then look at the fluid balance sheet at 090-038-135, this is one of the places where you get some guidance as to when these

intravenous drugs were actually being administered. You can see there the midazolam, which I'm going to have to come back to, adjusted the stat dose of midazolam, but that's a continuous dose of midazolam. You can see that that is at 4.00. And then you see at -- it's slightly obliterated, but in fact it's at 2300 hours; working across you can see, "3 ml per hour [it looks like], phenytoin." Or maybe that's the midazolam. Sorry, I beg your pardon; that is the midazolam. Just ...

A. Is that -- is that ...

Q. Just -- just -- sorry, I beg pardon. Just above that you see the 60, so that's the phenytoin going in.

A. Yeah, okay, so at 2300 -- or 2200; do we know?

Q. Can you tell from looking at that fluid balance sheet when the phenytoin is actually given and how much of it is given?

A. Well what I see is that at 2300, obscured by the hole in the paper but clearly 2300, 11.00 pm, phenytoin is given.

Q. Yes.

A. That's what it appears to be saying. It doesn't appear to be saying what dose is -- what dosage -

- what dose was given. There is a "60" written above it, but that's at 2200; it's not clear that it relates to the phenytoin.

Q. No, I think, in fairness, that's carrying down the acyclovir figure, which is 60.

A. Right, okay.

Q. So that's not the phenytoin. Is it clear from that record ...

A. Well in that case it just says -- it just says "phenytoin."

Q. Yes, so there's no ...

A. Of course, the drug chart says 60 mg.

Q. Yes. So that would be given in what, just a push through?

A. No, that again would have to be given by slow intravenous infusion over at least a few minute at any rate. Not as slowly as the 600 mg but over a minute or two, perhaps.

Q. What would it be given in?

MALE SPEAKER 3: Can I help Dr Aronson, because in fact in the nursing notes there is the answer at 090-040-138, because at 11.00 pm, in the handwriting of Staff Nurse McCann it says:

"IV phenytoin erected by doctor and run over one hour, cardiac monitor in situ throughout

infusion."
A. One hour, yeah, yes.
MS ANYADIKE-DANES: Yes, thank you.
A. Yes, thank you, we saw that before and thank you for reminding me. I would expect it to be -- to answer your question, I would expect it to be made up in saline, 0.9 per cent saline, which is always the default position for infusing drugs.
Q. If you look at the intravenous fluid prescription chart at 090-038-136, you can see that that has specified the normal saline for the midazolam and underneath that it looks as if they had put phenytoin there and crossed that out. I may be wrong; it is difficult to see.
But in any event, it doesn't indicate what the phenytoin should be put into to infuse it. Is there any reason that you can think of why it would specify what it is for midazolam and not for phenytoin?
A. The only suggestion I can make is to return to the British National Formulary in the appendix that we were discussing before, where phenytoin is specified quite clearly as to be given in -- in saline, and therefore one might think that there was no need to specify it otherwise.

Whereas midazolam is not specified at all, and one might therefore want to specify that saline was to be used in that case.
Q. Just while we are here and you say that, how would Dr Stevenson have known to use normal saline for midazolam if it's not specified in the BNF which is where he might have gone to look?
A. Because for intravenous infusion, saline, I would say, is the default position. If you're not sure, then saline is a safe medium in which to infuse any drug.
Q. Thank you.
A. There are one or two minor exceptions, but that is what one would do if one didn't know.
Q. Yes. I wonder if I then could just go back to do the continuous infusion of midazolam. The clinical note records that at 090-022-055, and you can see it says, "2 mcg by kilogram per minute." And then Dr Stevenson -- it's him doing it, this is his note -- he calculates that out as 69 mg per 24 hours. There's nothing wrong with that calculation?
A. I think that's right.
Q. And that then has to turn itself into a prescription and one sees his prescription for

that. It's at 090-026-075. If we just blow up the top one because that's at B. There we are. That's his prescription, and then the prescription gets rewritten. If one looks at 090-026-073 it's rewritten there.

It's a bit difficult to see, but it's the second line, and it looks like:

"2 ml increased by 1 ml an hour to 3 ml an hour every 5 minutes."

In fact I think the nursing note helps with that; just to see that more clearly it's at 090-040-141. Then if you turn that round you can see:

"Continuous infusion running at 2 ml per hour of Hypnovel [that's the midazolam], to increase by ..."

-- is it 0.1, or ...

A. Yes.

Q. Yes, 0.1, because it's now millilitres. 5 minutes until up to 3 ml an hour.

Is it possible to see from the clinical note that he takes of what Dr Stevenson believes Dr Webb has told him over the phone, or told him, how he gets to that prescription?

A. Can we go back to ...

Q. Yes, if we go back to the clinical note again at 090-022-055.
A. Yes, I'd also actually like to go back to the first prescription.
Q. Sorry, yes.
A. Not the one that was rewritten but the one -- the open that was to be eventually rewritten.
Q. 090-026-075.
A. Can we just enlarge the top bit of that?
Q. Yes.
A. Actually, I'd like to talk about the whole thing, in fact.
Q. Yes?
A. the first thing to say I that the British National Formulary is very clear about prescription writing for doses that are less than 1 mg, in other words, in micrograms; and this is true of the 1996 BNF. It says:
"Quantities less than 1 mg should be written in micrograms."
And elsewhere it says that the words:
"Micrograms and nanograms should not be abbreviated."
Q. So not to "mcg"?
A. Correct. Because there is a danger that the

prescription will be misread as milligrams and that something will be misinterpreted. A thousand-fold difference, you might say, "Well, that's unlikely", but I have seen errors arising of ten-fold differences that were important when prescription charts were misread. And I think that this is very sound advice and there's a lesson here that if you're writing doses of micrograms, take the time to write it out in full.

Q. Okay.

A. But it's clear "mcg" and it's unlikely that an error would be made, but nonetheless, one likes to see things done properly.

Below midazolam, you think says "120"; maybe it does. It could be 130. I'm not sure what it says, but it's certainly not 12. But that's the previous loading dose.

Curiously, it's not signed off as having been given and I don't know what that implies but it's signed to be given but not as having been given.

Okay, so the dose to be given is 2 mcg per kilogram per minute. If we go to the next page which you brought up which is the calculation of the dose ...

Q. Yes, 090-022-055.
A. At the top we've talked about the wrong loading dose, but the maintenance dose is 2 mcg per kilogram per minute; a 24 kg child, 48 micrograms per minute, multiplied by 60, 2,880, 2.88 milligrams per hour, 69 milligrams per 24 hours. That calculation, as far as I can see, is correct.
Q. Yes.
A. But the arithmetic has not been done properly. How are you going to give that? Well, it's going to be given in 50 ml of normal saline I think you said. Can we go to that page that says that?
Q. Yes, that's the IV fluids. It's at 090 038 136.
A. So here we have 69 milligrams. It looks as if it's been changed from something. It could be 64 but that's not a major problem; 69 milligrams of Midazolam to be given in 50 ml presumably, again not clear, but one would infer that 50 ml of normal saline, that's .9 per cent sodium chloride so there's 69 milligrams in 50 ml. That's a concentration of 1.4 roughly milligrams per millilitre and that is to be infused at a rate of 1 ml or 2 ml per hour. So that's 2.8 milligrams per hour multiplied by 24 gives you about 69

roughly milligrams in the day. So that is a correct calculation.
Q. Yes but then the nurse notes that it is to be increased and that's to carry on up till 3 ml an hour and you see that at 090 041 41.
A. Then the instruction is to increase by it should be 0.1. Again the BNF is very clear on this. If you're writing fractions, you should put a preliminary zero in case the dot is missed.
Q. Mm hmm.
A. It's unlikely that that instruction would be misunderstood but nonetheless there is a principle to be followed which would be 0.1 ml every five minutes until up to 3 ml per hour. So that means ten times .1 over 50 minutes the dose is to be increased from 69 milligrams per 24 hours by 50 per cent so we add half of 69, 39.5, that's about 109 milligrams per day, 50 per cent more than was originally intended.
Q. Is it obvious to you from the notes and records where that comes from? One can see potentially a change in the rewritten prescription at 090 026 073. Although it's actually quite difficult to see that but on that second line, that might be where that's happening.

A. Yes, if you could just enlarge that because it is difficult to see, yeah. So he, or somebody, I don't recognise the signature, has said, and as you say it is difficult to read in the photocopy, Midazolam 2 ml per minute, I guess, is it?
Q. Well, then next per hour.
A. Two ml per hour.
Q. Think you can then see the .1 ml an hour to --
A. I can see the .1 ml per --
Q. -- 3 ml an hour and then underneath --
A. Every five minutes.
Q. Yes.
A. Yes so that's where that instruction has come from as you said and I presume that that is what it's saying.
Q. This is a different doctor who rewrote this and signed this off. Given that all of this therapy is actually being directed by the paediatric neurologist and he is the person who has been directing the Midazolam part of this, in fact, all of it really, but certainly the Midazolam, and his original instruction was correctly taken down by Dr Stephenson(?) as you've seen in the clinical note, what do you think should have led to a change like that?

A. I suppose that the obvious inference from this is that the prescribing doctor thought that the clinical response was not adequate and that an increased dose was required. Looking at your very helpful diagram at --

Q. 310 020 001.

A. -- at 020 001.

Q. Yes.

A. What you see is that the increase -- whether the prescription occurred at that time but the increase in dose of Midazolam occurred just after the episode of screaming and drawing up of the arms at 9.00 pm. One might infer that that's why the instruction to increase the dose of Midazolam was given and she had already had two episodes that could be interpreted as epileptic episodes, having teeth tightened slightly, teeth clenched and groaned. Whether one would interpret the episode of screaming and drawing up of arms in that same way I think you'd need to ask a neurologist. To me, that suggests more that this girl was perhaps in pain but it might be, I suppose, interpreted that this was more evidence of continuing epileptic activity.

Q. But given the view that you expressed earlier,

what are your comments on having increased the Midazolam at this stage, as to the advisability of that if I can put it that way?
A. Really that we still don't have a diagnosis that shows that this medication is appropriate and so we're in a hole and we're digging it deeper. It might, had the diagnosis been correct, have been appropriate or at least a reasonable strategy at the time but in the absence of a diagnosis, I feel very unhappy about it. As I say, in my position as a general physician, I would have been asking for help long before this. But given that the diagnosis was not substantiated, you're piling also Epilim here, you're adding drug to increase the dose of a drug to treat a disease that you haven't diagnosed.
Q. Yes and then if we just go finally in the set of the anticonvulsants, if we just keep that up there, there's the Epilim or the Sodium Valproate and that was administered, as you can see there, at 5.15 pm. Dr Webb's direction was to add IV Sodium Valproate, sorry this is at 090 022 055, you don't have to pull it up because this might help you to answer, to add the IV Sodium Valproate 20 ml per kilo IV bolus followed by an

infusion of 10 milligrams per kilo IV over 12 hours. That was the third part of his plan when he came to examine Claire at 5.00 pm in the afternoon. Can you give your view as to the advisability of that?

A. We're adding another anti-epileptic drug again in the absence of diagnosis so that the same comments apply.

Q. There was to be I should say that -- if you see under that Sodium Valproate you will see that it's continued on as an infusion and that's because that's what Dr Webb had wanted to happen but it's far from clear, it should say that that actually did happen, because if one goes to the drugs and you can see at 090 026 075 right down there at the bottom, yes, there you are you can see the Sodium Valproate 400 milligrams 5.15 pm time administered. You can see it's signed for and the person giving it who is Dr Sands, the Registrar, has initialled it. Then above that in the regular prescriptions, you can see that there is the prescription for the continuous infusion of Sodium Valproate but that's struck out and when that prescription is rewritten at 090 026 073, it simply doesn't appear.

A. So it wasn't given.
Q. It looks like it wasn't given and I think Dr Hughes, who is the person who has signed on that and, in fact, rewrote that prescription, I think her evidence was that she didn't give it or at least she thinks she might not have given it. I think that's more accurate. I'm not entirely sure that there's a full recollection of everything that happened. But so far as you're concerned, if we pull back at the timeline we had of 310 020 001, what would have prompted that decision not to carry out the infusion of Sodium Valproate which otherwise would appear to have carried on fairly proximate to the administration of the bolus?
A. I'm having difficulty in deciding what prompted the use of the drugs in the first place.
Q. I understand.
A. So it's hard to know why one would change one's mind in the case of a drug that perhaps one would not have given anyway. I can't speculate on that.
Q. Thank you. I just have a few more questions at least for my purposes to ask you. I know it has been a very long afternoon but we are nearing the

end, at least from the point of view of the things that I have to ask you. One question was if one looks at the drugs singly or in combination, could any of them have affected Claire's white cell count, either by raising it or lowering it? To help you, we have a schedule that shows the blood cell count. It is 310 022 001. There you see them. Now, there is no differential done so we can't help but this is the information that was available so far as we understand it.

A. I commented on these white cell counts in my -- I mentioned them but didn't comment on them and the first question I would ask, the count is 16,000, units are slightly different nowadays, but that's higher than the reference range as quoted above, 4 to 11.

Q. Yes.

A. My first question would be, "What's the differential?" because white cells come in a large variety. About 70 to 80 per cent of all white cells in the blood are what are called neutrophils because of the way they stain with the particular kind of stain to which they are completely neutral so they are called neutrophils

and they are indicative usually of bacterial infection. Generally speaking, when a white cell count rises to this level, it's usually because of neutrophilia, an increase in neutrophils, and one can say that that is consistent with a bacterial infection. If, however, the increase is predominantly in the number of lymphocytes, which form about 15 to 20 per cent of the normal count, then one makes other assumptions. One says, "That is more like a viral infection" and that is what was suspected in this case. So I would really want to know the differential on that count and I'm surprised that it's not available. I would have thought that laboratories should be giving that as a matter of routine on the differential on a raised white cell count in these circumstances. If they didn't give it as routine, I would be phoning up and saying, "Can you do a differential white cell count please?"

Q. Would you be doing that because you want to see if what is being administered has had any effect?

A. No, generally not. I would be using it as a diagnostic question from the point of view of bacterial or viral infection or some other effect

which I can come to later. But this was taken at 10.30 pm on the 21st which is before Claire -- is that right, that's the --

Q. No, that's --

MALE SPEAKER: That's Monday night. She was admitted on Monday night.

A. Yes, 10.30 pm on the 21st.

MALE SPEAKER: Yes.

A. Your chart shows that she received all the drugs on the 22nd.

MS ANYADIKE-DANES: That's correct.

A. So it is not just unlikely but --

MALE SPEAKER: It can't be a reaction to the drugs.

A. It can't be a reaction to the drugs.

THE CHAIRMAN: Just before you move on, when Professor Cartwright gave evidence yesterday, he was really taken aback by the fact that the printout which gave the white cell count did not include the differential and he said -- there's perhaps something of a difference between him and Professor Neville(?) in this because Professor Cartwright was saying yesterday that this was a standard calculation to be given in a printout and had been for decades.

MS ANYADIKE-DANES: Mr Chairman, we can call that up if

you wish to see some ...
THE CHAIRMAN: Yes, please.
MS ANYADIKE-DANES: It's 090 032 108.
A. While we're doing that, I should say that, as I said, I would expect the differential to be reported in a raised white cell count and if it were not, I would be phoning the laboratory to ask what it was.
THE CHAIRMAN: The difference between him and Professor Neville is this. What Professor Cartwright said yesterday was that below platelets in the left-hand column, below that, he would expect automatically for the differential to be printed.
A. I would expect it above platelets and below leukocytes but the point is the same.
THE CHAIRMAN: Right, okay. But you would expect it as a standard part of this printout?
A. Yes.
THE CHAIRMAN: Right, and Professor Cartwright said not just in 1996 but actually for some considerable time before that?
A. Yes. Sir, I think that practices may vary from hospital to hospital.
THE CHAIRMAN: Yes.

A. But in a case where the white cell count, the leukocyte count, the white cell count is raised, I would expect to be told what the differential count was as a matter of routine.

THE CHAIRMAN: Right and I think Professor Neville's only -- this wasn't quite explored in the same way as Professor Neville but he said if he got that result, he would immediately ask the laboratory for the differential. So either/or but both of them seemed to say that this was the natural and inevitable reaction to getting this reading.

A. The first question you ask when you see a count of 16.5, "What's the differential?" It trips off your tongue automatically.

THE CHAIRMAN: If that wasn't picked up on the Monday night/Tuesday morning when the results came through, it should certainly have been picked up on the ward round on Tuesday morning?

A. Yes.

THE CHAIRMAN: Right.

A. There is a hint elsewhere of the differential count here and it's from the lumbar puncture result, the CSF, which I thought was rather curious. I don't know if you can call it up.

THE CHAIRMAN: It's 090 022 ...
A. Very good. That's the cerebrospinal fluid analysis on -- I'm not sure what the date is.
MS ANYADIKE-DANES: That would be the 23rd.
THE CHAIRMAN: Curiously, it's dated the 24th, which also seems to be ...
A. It's post mortem.
MS ANYADIKE-DANES: Post mortem, sorry, yes.
A. Yes, it's post mortem. Now, what are erythrocytes doing in the cerebrospinal fluid? You don't normally expect to see erythrocytes in the cerebrospinal fluid. If there has been a subarachnoid haemorrhage, which we have no evidence of in this case, there would be erythrocytes but we have no evidence of that. So why are there erythrocytes in this fluid? The likeliest reason for that is what we call a "bloody tap". When you take cerebrospinal fluid, you stick a needle through one of the lumbar spaces, the space between the two lumbar vertebrae low down in the back and the needle enters the space in which the cerebrospinal fluid is to be found around the spinal cord. You do that because at that point, the spinal cord runs out and all you have are strands of nerves

hanging down from the end of the spinal cord. So you're not going to go into the spinal cord itself. You're going to be pushing aside the fronds that hang down from the tip of the end of the spinal cord, the cord itself. So you put your needle in and you suck off spinal fluid. Sometimes when the needle is going through on its way to the spinal fluid, it hits a little blood vessel and you suck up blood with it. That's called a "bloody tap". I think that's what happened here and you've got some leukocytes roughly in proportion, as you would expect, to the number of erythrocytes. I think this is a bloody tap and you see that the 4,000 cells were mostly lymphocytes. I can't prove it but I suspect that this is telling us that the raised white cell count was a lymphocytosis consistent with a viral infection.

Q. Thank you. Just for the sake of completeness, because I have been asked, could any of the medication have affected her white cell counts the other way, reduce them in any way?

A. All drugs can reduce the white cell count. There is no drug in my knowledge -- well, there might be a few but there are reports of low white cell

counts due to almost any drug you can mention and indeed a low white cell count, neutropoenia as it's called or sometimes agranulocytosis when the count is very, very low, is known as a designated medical event, that because you can't tell what it means, but what it means is that so often when you get a low white cell count with no obvious cause, it's due to a drug. You can bet your bottom dollar it's due to a drug. What drug it is, you can't always tell. So, any drug can lower the blood -- the white cell count, yes, and one never knows what is doing it.

Q. Could it have had the effect of lowering what might otherwise be an even higher white cell count associated with the viral infection?

A. Unlikely.

Q. Thank you.

A. Unlikely, because when a drug does that it pretty much reduces the white cell count dramatically. It would be unlikely to reduce a count of 20 to 16. I mean, it's conceivable, but I think it's highly unlikely.

Q. Thank you.

A. Just for the sake of completeness, to answer the question that, I think, as you've suggested sir,

is probably irrelevant, because the drugs were taken after the raised white cell count. In cases of allergic reactions, you can get a rise in the count of -- of the type of leukocyte that's known as an eosinophil, but we have no evidence in this case that that was relevant. That's just for the sake of completeness in answering your question.

Q. Thank you. And could the drug therapy have had any effect on her serum sodium levels?

A. She had a low serum sodium concentration.

Q. She did?

A. Hyponatraemia, low sodium in the blood. The commonest cause of that is sodium -- excess sodium loss from the body. And the commonest cause of that is the use of a diuretic drug, a water tablet conventionally called, which causes increased loss of sodium and water. And she wasn't, as far as I'm aware, being given any diuretics.

The other major cause of hyponatraemia is dilution of the sodium concentration by too much fluid. I most commonly see this when I'm called to the surgical wards to consult on a patient who has a low serum sodium. And what has happened is

that the surgeons have given too much dextrose and not given any saline after an operation and they have diluted, diluted, the sodium concentration down. We stop the dextrose and give saline and the problem resolves.

In this case, the dilution is thought to have occurred in a different way. And it's through the secretion of a hormone that is produced in the pituitary gland in the brain, little gland that hangs down at the base of the brain, and it secretes a hormone called ADH, anti-diuretic hormone.

Now, when we go to sleep at night, we secrete anti-diuretic hormone. That's why we don't get up to have to pass urine. However, the older members of the -- the older members of the -- I was going to say "audience", it's the wrong word -- will know that they do get up at night to pass urine, once, twice a night, maybe, sometimes more. That's because you cease to secrete ADH at night as you get older.

The circadian rhythm of AHD changes, as you get older you start secreting it more during the day and less at night. So, remember that when you're wakened in the morning, it's your brain

that isn't working properly, it's not your bladder. You have failed to secrete ADH. If, on the other hand, you secrete too much ADH then you reduce the amount of water output, you build up water and you dilute your sodium.

And there are ways of distinguishing these different types of hyponatraemia. And the tests here suggest secretion of ADH. And it's called inappropriate, because normally ADH is secreted in response to a change in the osmolality of the blood. That means -- difficult concept. That means the amount of sodium in the blood, basically. It's more complicated than that. But to put it simply, the more sodium you have the more osmotic your blood is and ADH will respond to that.

So, if you have a high sodium, the pituitary switches on ADH, you retain more fluid and your sodium is diluted, falls back. If your sodium is low, you should switch off ADH. So, here you have a low sodium, but you have increased ADH. So, it's inappropriate. That's why it's called the syndrome of inappropriate ADH secretion.

So now your question is: could any of these drugs have stimulated the secretion of ADH?

Because this does happen. There are reports of this. And some drugs do. I believe that none of these drugs does that. There have been reports that valproate can do it, but they're few and anecdotal. And I was learning only last week at the International Society of Pharmacovigilance that large study using the general practice research database, as it used to be, showed that there was no increased incidents of hyponatraemia in patients taking valproate.

So, I'm pretty sure that none of the drugs that we are talking about would have contributed to the risk of hyponatraemia.

A. Thank you very much. I think I've probably just got two more questions to ask.

THE CHAIRMAN: Sorry. Just one small point before we leave that.

MS ANYADIKE-DANES: Yes.

THE CHAIRMAN: Claire's vomiting would have had some affect on the --

A. Small affect, yes. Vomiting tends to affect the potassium more, but it could affect the sodium as well. You will lose salt and water, yes. So, it might have had a bit of an affect. I wouldn't count it as major though, in this setting.

THE CHAIRMAN: No, okay.
A. And certainly not, inappropriate ADH secretion, because the tests do suggest that very strongly. That that was the diagnosis.
MS ANYADIKE-DANES: Yes --
THE CHAIRMAN: What test is the doctor referring to?
A. Yes. You start with the serum test, serum sodium potassium and urea. Normally if you have a low sodium, you tend to have a high potassium. The two go in opposite directions. If they're both low and the urea is low as well, that suggests dilution. Everything is low, because there's too much water, simple. You then measure the osmolality of the serum and the osmolality of the urine, how much sodium tension there is, if you like, in those two things. If they don't match or if they match in a particular way then you can diagnose what the cause of the low sodium is.
So, those are the test on which I would base a diagnosis of inappropriate secretion.
THE CHAIRMAN: SIADH rather than fluid overload was the cause.
A. Well, fluid overload is, of course, the secondary effect of SIADH. It's fluid retention. But, if by fluid overload you mean excess administration

of fluid --
THE CHAIRMAN: Yes.
A. Yes, then I would agree with what you said. That it's -- that the test diagnose SIADH rather than excess fluid administration.
THE CHAIRMAN: Why is that?
A. Because the osmolalities would be different in -- if there was overload, because the pituitary would respond normally to the dilution whereas here it's -- it's inappropriate.
THE CHAIRMAN: The only osmolality I can put my finger on at the moment is 090-022-057. You can see in the left-hand margin, there it is.
A. Can you enlarge that?
THE CHAIRMAN: Yes.
A. Yes, 249(?). It's low serum osmolality.
THE CHAIRMAN: That helps you to suggest that it's SIADH rather than ...
A. Yes, but I would like to see the urine osmolality as well. Now, you can -- you don't have to measure the urine osmolality, you could calculate it if you knew the urine, sodium and potassium. But, I would like to see the urine osmolality too.
THE CHAIRMAN: Thank you.

MS ANYADIKE-DANES: I think that's a difficulty. They might not have done that earlier.
A. Right.
Q. There are only two records of her serum sodium levels taken. One is the evening of her admission and you see the result of that on 090-022-052. See that's taken down there. We don't exactly know who did it, but in any event that is the details that come through. Then after that, one sees it --
A. As for there, I would expect the osmolality to be roughly normal, because the sodium is not -- it's low, but not greatly low.
Q. Yes. Then we go to 090-022-056 and just at the top there. Somebody correct me if I'm wrong, but we have not been able to get the lab result that relates to this. But, in any event, maybe it was phoned through and it's just been mislaid. But, that's the only detail that we have. This is from the bloods taken earlier that evening. Until you come to the one which Mr Sephton showed you, that's really all that we have.
A. It says here: "Send urine for osmolality", which is perfectly appropriate.
Q. Yes, it does.

A. And I had assumed that the subsequent diagnosis was based on that result. You say there's no urine osmolality measured?
Q. We've not been able to find the result of that. It's not clear that any urine was actually taken or measured after that time. So, that may be a reason, but in any event we've not come across a result that relates to that direction. Let me put it that way.
A. In that case, my assumption is in doubt, in that case, without the urine osmolality. I had assumed that that was the basis on which it was discovered. So, your question is very appropriate.
Q. So, your point is, in that way you can't distinguish between how the hyponatraemia arose?
A. I think, it could -- it could have been due to fluid overload if there wasn't a matching urine osmolality to confirm the diagnosis of SIADH.
Q. Yes. Well, as you see --
THE CHAIRMAN: Can you have combination of --
A. Sorry?
THE CHAIRMAN: Can you have a combination of SIADH --
A. Yes, you can. That can be difficult to diagnose, of course. That complicates things.

MS ANYADIKE-DANES: But you can see from this note that this is what the SHO in the evening was querying?
A. Yes.
Q. The thoughts that he got hyponatraemia and his first line query was fluid overload and low sodium fluids and then he queried the SIADH and then he had some suggestions for how one might address that. But, that was largely based on his feeling that it might be fluid overload.
A. Yes.
Q. But, in any event, what I was seeking to clarify with you is that so far as you can tell and in your experience none of these drugs that were being produced would have affected that hyponatraemia condition that Claire developed, if I can put it that way?
A. Correct.
Q. Whichever route she developed it by?
A. Indeed.
Q. Thank you. Then the last question that I was going to ask you related to the brainstem test. If we can pull that up at 090-045-148. You can see that the first one was carried out at 6.00 am in the morning and that's what I want to draw you

attention to. If you just see the answer, so perhaps if I can take you to where the answer is. Firstly (c):

"Could other drugs affecting ventilation or level of consciousness have been responsible for the patient's condition?"

There you see the answer: "No." I was asked to ask you whether you believed that any combination of those drubs could have precipitated or contributed to her respiratory arrest, which is something that happened at about 3.00 am on the Wednesday morning?

A. I apologise again for mis-remembering the order of events here. What I was recalling was the association between the respiratory arrest and the midazolam.

Q. Yes.

A. Not the start of the midazolam, as I expressed at that time, but the end of the midazolam.

Q. Well, maybe we can pull that chart up again, 310-020-001. You see the green is the midazolam and you see the respiratory arrest is that last red line down there.

A. Yes. Which coincides with the end of the transfusion.

Q. That was the question: is it possible that the midazolam could have contributed to the respiratory arrest?
A. Yes. Indeed it is. Any benzodiazepine carries a risk.
Q. Now, many things are possible, so it's a matter of getting some guidance as to whether it's probable.
A. Again, I'm finding it difficult. I think it is certainly possible and more possible than the possibility I was talking about before. And it could be bordering on the probable. In other words if we were on the cusp of the balance of probability, I think it is possible that we are close to it, if not actually over it. It is difficult to be sure if the midazolam alone did it. It increases the probability even more if one considers that there's still phenytoin on board.
Perhaps even a little diazepam, although I would discount that by that time. As your dotted lines helpfully show, these are the lines that show one half-life and so at least half of the drug is expected to be present at the end of that dotted line. So, there is still some drug of

midazolam. That might not be hugely important. But, there is still a fair bit of phenytoin, given that we know that there was a toxic concentration measured at the times we know about.

Even, I think there was one phenytoin concentrate of 19, which is within the target range, but is nonetheless high.

Q. I was going to take you to that. Phenytoin level, you can see that at 090-031-101. There we are.

A. Yes.

Q. It's not entirely clear when the bloods were taken for that test, but it's thought that they would have been taken when she was admitted to paediatric intensive care, when a number of things were being put in --

A. That's at about 3.00 am, I think. Is that right?

Q. Round about then.

A. Yes. That makes -- that makes sense.

Q. At that stage phenytoin level is 19.2. But the target range, as you have already said, in brackets, is 10 to 20. So, the question is: what is the effect, if I can put it that way, of that having been the concentration of phenytoin in her

system at round about 3.00 am and when the first brainstem death test was done, which was at 6.00 am?

A. Well, perhaps we can deal with the respiratory arrest.

Q. Yes, of course. I'm sorry. Yes.

A. Because on it's own, I would say, "Well, it's high, but it's in the target range and I wouldn't be very concerned about that". But she's also receiving midazolam in a very high dose, actually. If you look at the current recommendations for midazolam, it's something like 1 mg per kg per minute rather than 2 mg, which is the thin infusion line, or 3 mg, which is the thick infusion line. So, she was getting quite a high dose of midazolam, I believe.

THE CHAIRMAN: And an overdose of phenytoin?

A. Not at that stage, an overdose.

THE CHAIRMAN: But she had received an overdose.

A. But she had received an overdose of phenytoin. By that stage we're down to 19, which is just in the target range.

THE CHAIRMAN: Okay.

A. So, it's on its own, okay. But, in combination with the high dose of midazolam one starts to

wonder whether those two drugs might in combination have contributed to a respiratory arrest. Now, given that this girl had other things wrong with her, it appears, it's hard for me to say that even on the balance of probabilities those two drugs did it alone. But, it is certainly possible and perhaps probable that the combination of the two drugs plus whatever else was going on contributed to the respiratory arrest.

MS ANYADIKE-DANES: Thank you. Sorry. Can I just pull that 310-020-001 up again. It's just a follow on from what the chairman was putting to you there. She had had that high dose of phenytoin, but according to you, she's also had much more midazolam to start off with than she should have had.

A. Yes, I think so.

Q. Then she goes into, what you consider, even at the first level of 2, was too high an infusion rate and then that too high infusion rate is increased yet further.

A. Yes. I think so. From consulting the doses that are recommended for midazolam in patients with status epilepticus.

Q. If we then go back to the brainstem death test or the diagnosis of it, which is at 090-045-148 --
A. Just --
Q. I'm so sorry.
A. If I can just confirm that?
Q. Yes.
A. In -- again, in the current British National Formulary for Children, again, nothing in the 1996 version, as far as I'm aware. But, in the current edition it says: "Initially by intravenous injection." And this is in a neonate, so lower doses than one might want to use:
"150 to 200 mg per kg followed by continuous intravenous infusion of 60 mg per kg per hour."
That's 1 mg per kg per minute. I would expect an older child -- well, it's hard to know, but if that's the dose of a neonate, I think that one suspects that 2 mg or even 3 mg is probably too much. I can't -- again, I can't be sure about that. But, according to the information here -- oh, I'm sorry. I take that back. I was looking at the wrong place:
"Child 1 month to 18 years, 60 mg per kg per hour."

So, that is true for that age group as well.
Q. So, it is too much.
A. It is true, yes. I was -- I'm sorry, I was reading the neonatal section. It's the child 1 month to 18 years, exactly the same instructions are given. And continuous intravenous infusion of 60 mg per kg per hour is the -- is the initial dose that's -- that's recommended. But then it says:
"Increase by the same amount every 15 minutes until the seizure is controlled."
So, on the basis of that information, it's perhaps reasonable to increase the dose the way they increased it.
THE CHAIRMAN: That's the current edition?
A. This is the current edition.
THE CHAIRMAN: Where would the doctor have got that information in 1996?
A. Well, I don't know. I don't know. This is -- I have to say, this is not a situation I find myself in. Must make that clear. I'm not a paediatric neurologist.
THE CHAIRMAN: Yes.
A. And I'm making inferences from what I can read in the texts. So, you really need to get an opinion

about that from someone who is experienced in the field. But, my reading of it is that that may be a high dose, but according to what I've just read it may be reasonable to have used those doses, assuming that you had a way of knowing that the patient was or was not responding, which in this case is difficult.

MS ANYADIKE-DANES: Can you have a way of knowing that without doing an EEG and when the patient is essentially comatose?

A. Well, we've been there already and --

Q. Exactly.

A. By this time, unfortunately, there's so many drugs on board that I'm not sure what an EEG would show you. You'd need to talk to a neurophysiologist about that.

Q. Then if we go to the particular part of the brainstem death test, which is (c):

"Could other drugs affecting ventilation or level of consciousness be responsible for the patient's condition?"

Given what you have just said, which is a sort of mixed picture about the possible effects of the anticonvulsant therapy, would you have considered it appropriate to have deferred the

test, not because anybody thinks it would automatically make a difference to the conclusion, but just for the priority of commencing that test and answering in that way at 6.00 am in the morning?
A. You're talking about the question about could other drugs affecting ventilation be responsible?
Q. Yes.
A. If there is evidence that there are drugs in the body, then I think you should wait. It's some time since I did one of these tests --
THE CHAIRMAN: On the basis of what you've just told us over the last few minutes, doctor, you couldn't probably answer no to that question, could you?
A. I agree. If you look at the diagram 020-001, it shows that there was still likely to be at least phenytoin in the body at 6.00 am when the first brainstem death test was carried out. We know that at 0300, or we think that at 0300, the plasma concentration or the serum concentration of phenytoin was 19. This struck as a very long half-life. That is confirmed by the fact that it was 23 earlier on. Not much has changed, although she's had an extra dose.

So that three hours later there's likely to be quite a lot of phenytoin left in the body at that point. Even 12 hours after that there may well be phenytoin. Although I would now discount the other drugs, including the diazepam, which I think is now getting to be trivial. Even though your diagram suggests there might be some there, it's going to be very low and probably not contributing in a major amount. But there is still phenytoin and it's likely still to be within the target range, even though no more has been given.

MS ANYADIKE-DANES: Can I then just take you to the clinic note that Dr Webb enters, 090-022-058. This is at 6.00 am and the brainstem test is going to be carried out or is being carried out. If you just see there's a sort of a second block of his hand, just above his signature, and the second line in that --

THE CHAIRMAN: It starts CT?

MS ANYADIKE-DANES: Yes, exactly, Mr Chairman.

THE CHAIRMAN: Okay. Beside where the arrow is, we'll highlight those four lines.

MS ANYADIKE-DANES: Yes, thank you very much. Could you just enhance that a little bit: "CT

cerebral ..."
A. Herniation.
Q. Sorry, "Cerebral herniation." So, she's had the CT scan: "Under no sedating / paralysing medication." Would you consider, in the light of what you've been saying and looking at, that to be an accurate statement?
A. Well, I think that the presence of the phenytoin would contradict that.
Q. If you were being asked for guidance on it, as a clinical pharmacologist, when would you have thought it would be better, from the point of view of completing the form, not as I say, the outcome, but for the point of view of completing the form, when do you say it would have been better to have started the first test?
A. Well, I think --
MR FORTUNE: (overspeaking)
A. More appropriate, given the answer that has to be given to 3(c).
MR FORTUNE: Or clinically indicated.
A. Well, clinically indicated, of course, you can carry out these tests at any time. But, the answer you give to them depends on the clinical condition, clearly. I would have wanted to have

repeated the phenytoin concentration. And I would probably have said -- and this may be erring on the side of caution, given that another expert has suggested that a plasma concentration of 23 is okay, with which I disagree, I would say that I would want to see the plasma concentration below 10 before I felt that the contribution of phenytoin could be disregarded.

Q. Thank you.

MR FORTUNE: At what time, then rather than 6.00 am, would Dr Aronson be considering carrying out the first set of tests?

THE CHAIRMAN: When the reading's below 10.

A. Well, I'd measure the concentration that morning and see what it was. And if it was whatever, I could make some theoretical calculations, based on now having three or more plasma concentration measurements, very helpful information, now I can model the plasma kinetics, the pharmacokinetics of this drug, work out exactly how Claire is handling the drug and predict, with a fair degree of certainty now, when it would fall below 10.

MR FORTUNE: Would that information normally be within the province of a consultant paediatric neurologist?

A. I don't know. I think that if someone is used to using phenytoin and uses it a lot, then yes it should be. But, I can't say on behalf of paediatric neurologists.

THE CHAIRMAN: But the prescribing paediatric neurologist would know that the phenytoin and, I think you said, the midazolam could have been responsible -- should have said that it could have been responsible for Claire's condition. I think you're saying that the answer to that question, 1(c), should not have been, "No".

A. I'm sorry?

THE CHAIRMAN: Okay. Let's bring out 090-045-148. The question that's being asked at (c), which precedes the brainstem test is: could other drugs which affect ventilation or level of consciousness have been responsible for Claire's condition? Now, your answer to that is that this was actually verging over from possibility into probability?

A. Depends what you mean by the patient's condition. I was talking before about the respiratory arrest. Now, it is possible, and I don't know exactly where the probabilities rest, but it seems to me not unlikely -- and on the -- let me

say, "Okay, on the balance of probabilities, it is likely that the combination of the midazolam and the phenytoin, perhaps the diazepam as well, plus whatever condition Claire had that was -- that caused her original admission, perhaps a viral encephalitis, I don't know, would in combination have led to a respiratory arrest at that time.

It's possible. And perhaps even on the balance of probabilities. I don't know. But, I might be pushed to say that.

THE CHAIRMAN: All right.

A. So, she has a respiratory arrest and presumably the next thing that happens as a result of that, and here we have a chain of events, is that she develops brainstem death. So, indirectly, yes, we're talking about effective drugs plus the rest of the condition. Whether she would have had a respiratory arrest in despite of the drugs, I can't say, I can't know.

At the time then that the first brainstem death test occurs, I don't know whether I can attribute the midazolam at this point, because there probably isn't much midazolam left in the body at that point. It has a fast half-life.

But, I can at least say that we know that there is phenytoin in the body at that stage. So, even if we're not talking about the respiratory arrest, there is a drug there that could in some way contribute to the presentation.

And it would be worthwhile waiting for the phenytoin to disappear to see if the brainstem death test was in anyway changed.

THE CHAIRMAN: Well, let me put it another way, doctor, in order to answer that question, "No", one would have to be pretty confident in excluding the phenytoin and the midazolam as a possible cause?

A. I think so, yes.

THE CHAIRMAN: That is difficult to do, is it not?

A. Yes. Well, you've seen me struggling.

THE CHAIRMAN: Yes. But, surely, that's the point about doing the brainstem test, if you can't explain the contribution of these drugs as being relevant then should you answer question 1(c) in the negative?

A. Your default position should not be the negative.

THE CHAIRMAN: Mr Sephton.

MR SEPHTON: Could I just ask how the doctor's construing question 1(c), because it's not

grammatical? Is the question: could other drugs have been responsible for the patient's condition at the time of the terminal event? Or does it mean: could other drugs be responsible for the patient's present condition? I suggest that the second must be the case, because if you've come -- if the answer to the question is the first of those possibilities, has some drug caused the patient to be in an unconscious state and remaining so, then the answer would be yes, not only at 6.00 am in the morning but also at 6.00 pm in the evening. It would always be the case. So, is not the issue: were the drugs at 6.00 am in the morning still effective to cause the presentation of which the doctors are taking cognisance?

THE CHAIRMAN: That is a very perceptive question. A. The word "been" here is, as you point out, ungrammatical. Does it mean: could other drugs be responsible currently as you are doing the test, now, here and now? Or does it mean: could other drugs have been responsible, as you suggest, three hours ago when she had a respiratory arrest?

In which case, as you say, respiratory

arrest, leading to irreversible brain death, it would always have been responsible, even if the drug was not present 48 hours later or whatever. And I don't think one can tell, actually. I don't -- I think I disagree that you can necessarily come down on one side or the other of that question. I don't know the answer.

MS ANYADIKE-DANES: I think, Dr Aronson, just finally, just to clarify that, when you were answering the Chairman I think you expressed it in two ways. Firstly, you couldn't exclude the possibility that some combination of those drugs, possibly the phenytoin, but perhaps with some contribution of midazolam, contributed in some way to her respiratory arrest.

A. Correct.

Q. So, from that point of view, there could be a causal relationship. Perhaps in combination with other factors, but there could be a causal relationship. Then, when you were asked about her presenting condition, you were of the view, perhaps no longer the midazolam, because that would have reduced, but certainly the phenytoin. There may be sufficient levels of phenytoin in her to be contributing to her present state. As

I understand your answer.
A. Do you mean the brainstem death or the respiratory arrest?
Q. The respiratory arrest, you've already answered, but her state as it presents itself at the time, at 6.00 am.
A. Yes, I think if, taking this question on board, the word is "be" rather than "been", then I would say, "Well, at this time, while I am doing the test, I know that there is phenytoin in the patient's system. I would like to wait to see what happens, to what her condition is like when the phenytoin is no longer in the body". And I would count that as a reasonable time to be below 10 mg per litre in the plasma.
Other might say, "Well, a more purist approach might be to say, 'Wait until it's disappeared'". But, somewhere in that region would be -- would be reasonable.
MS ANYADIKE-DANES: Thank you very much. Mr Chairman, I have no further questions. I'm just going to (overspeaking)
MR QUINN: [inaudible - no microphone] I may make them to my friend. But, the first point, if we just set the scene. I'm aware of the time.

THE CHAIRMAN: I think you'll have to be. We've got a taxi coming for you at 6.00 pm, doctor. So, because of the circumstances you can do it directly if you like.

MR QUINN: I'm obliged. We know that Claire's mother was in the hospital between somewhere around 2.00 pm the rest of the day. And we know that she was -- she saw Dr Webb there and we know that the midazolam and the phenytoin was given during that time.

THE CHAIRMAN: Sorry, this is 2.00 pm?

MR QUINN: This is the 22nd October between 2.00 pm and say 9.00 pm that night.

THE CHAIRMAN: All right.

MR QUINN: We know that at some time in the afternoon, some time between 3.00 pm and 3.30 pm say, the phenytoin and the midazolam were given to Claire. We know that.

A. Yes.

Q. We've heard you saying that midazolam is perhaps an experimental drug and in this setting, in 1986, and that the phenytoin is something that should be administered by using an EEG.

A. ECG.

Q. ECG, I apologise.

A. Making the diagnosis is the EEG. Giving the phenytoin is the ECG.
Q. Yes. Two points arising out of that: should the parents or Mrs Roberts have been told about the risks of phenytoin, that is administering it at all, given that it could create problems with the heart?
A. I think that I would not normally say to relatives that that was the case. I think what I would say is, "Your daughter appears to have status epilepticus (let's just assume that's the diagnosis). It has been difficult to manage. We have given her the first line drug, which hasn't worked. I think that this second line drug might be beneficial and we're going to administer it with careful monitoring of her condition". I think that's what I would say. I don't think I would specify that there was a risk of a cardiac arrhythmia.
Q. Would it be appropriate to say nothing at all?
A. If they were there and available for discussion, I think that one would be duty bound to tell them what you were doing.
Q. The second point is, you've used the description of midazolam as "experimental".

A. It was certainly -- in 1996, it was not licensed for this indication, not mentioned in the BNF and the paper on which its use was based was a small open perspective study in 24 patients. I call that, yes, experimental, if you like, in an early stage of its use.
Q. Then should the parents have been advised of that fact?
A. Yes, that's -- I think that's a difficult question to answer about informed consent. And I was at one time chairman of the Oxford Research Ethics Committee and this was a question we dealt with not infrequently and I find it difficult to answer. There are dual standards in healthcare. If you're doing a clinical trial then you have to ask for informed consent --
Q. Well, let me make it easy, should they have been told -- never mind the experimental aspect of it, should the parents have been told that they were going to give midazolam?
A. Yes. If I can finish what I was going to say.
Q. Yes, sorry.
A. I was going to say that in the context of a formal clinical trial, we have to ask for informed consent. In the context of treating a

patient with a drug that we think might or might not work, we're not required to do so. I think this case falls in between those two. It's not a clinical trial, but on the other hand it's not an established treatment.

And so I would -- I think -- I would like to think that what I would do is to speak to the relatives and say, "I'm going to try -- I'm now going to try a treatment that is in the early stages, although it has been tried elsewhere, that we haven't used ourselves, we think might be beneficial and probably relatively safe".

Q. How appropriate is it to say nothing at all?

A. I think that if the relatives are there and you have a chance to speak to them, you should tell them these things.

Q. The last point on midazolam. Given what you've said about it and given the points that have been made today about it, was it appropriate to raise the infusion rate later on in the evening?

A. Yes. I -- as I've said, I find that a difficult -- difficult to answer. I really don't know. At this -- in 1996, I don't know what the appropriate dosage would have been. According to current standards as we've just read, that seems

not unreasonable. Whether it would have been reasonable in 1996 I'm unable to say.

Q. If I move to another subject very quickly. Could we bring up 310-011-001 and with that bring up page 090-022-055. Now, we know that, from the left-hand chart, that the Glasgow Scale's dropping from -- if we look at 1.00 pm we know it's dropping from 9 and then Dr Webb saw the patient at 5.00 pm, 1700 hours, on the right-hand page, we know that it's down to 6.

Bearing that in mind, and someone who's looking for what is wrong with a very ill child, would the doctor not be duty bound to check through the notes to see what drugs have been given and whether or not those drugs had been calculated properly?

A. Yes.

Q. Just before you answer, I want you to fix with this point --

THE CHAIRMAN: Mr Quinn, you got a yes.

MR QUINN: Yes, I know that. But, I want to just fix this point doctor's mind. When one looks at the sheet on the right-hand side, and we know that there's nothing below the upper entry, when Dr Webb appears at 5.00 pm. The calculation is

jumping out at you. Is that correct?
A. Show me.
Q. The calculation of 0.5 mg per kg, three lines from the top.
A. Yes. Yes, 0.5 mg per kg, multiply by 24 kg, 12 mg.
THE CHAIRMAN: Yes, but the point is Dr Webb did see Claire at about 5.00 pm. The Glasgow Coma Scale score was low. Mr Quinn's point, that you've accepted is, that that should have prompted him to look through the notes. If he'd looked through the notes, surely he should have seen that the prescription of midazolam witness statement more than triple what he had instructed. And that seems to have been entirely missed.
A. That seems a reasonable inference to make. I should say that in retrospect -- and you're saying at the time, which is different. In retrospect I think those changes in the Glasgow Coma Scale score, which could be partly attributed to the drugs, probably were not entirely attributable. But, your question is: at the time should one investigate with a view to thinking, "Could the drugs have caused that?"

And the answer to that is, "Yes".
MS ANYADIKE-DANES: Could I ask one final point?
THE CHAIRMAN: That would be a final point would it.
MS ANYADIKE-DANES: Yes.
THE CHAIRMAN: Mr Fortune, you can go and then don't worry I will come back to you, Mr Counsell.
MS ANYADIKE-DANES: Thank you.
MR FORTUNE: It may seem a long time ago, but back on 31st May --
THE CHAIRMAN: Sorry, just one second, if you're going to raise another point Mr Fortune, I'm quite happy for you to do that, but if anybody wants to raise a follow on point about the question Mr Quinn just asked. No?
MS ANYADIKE-DANES: Yes. I was --
THE CHAIRMAN: Okay. Let Ms Anyadike-Danes ask her follow on and then I'll come back to any other issues.
MS ANYADIKE-DANES: Sorry, Dr Aronson, it was one I was asked to ask and it slipped my mind as I was putting it. It is allied to Mr Quinn's point, which is, if you had been not sufficiently certain of this drug yourself, in the sense that you've got to go back and check through your notes and see what the dosage is and all that

sort of thing, which is what Dr Webb said he did, if you had given that dose over the telephone to a very junior doctor, which is who Dr Stevenson was, when you had the opportunity thereafter, at 5.00 pm, to come to the ward and examine the child and you actually are making your own note, would it have been appropriate or prudent to have just checked that the junior doctor had actually done what you'd told him to do over the phone?
A. Yes.
MS ANYADIKE-DANES: Thank you.
THE CHAIRMAN: Okay. Mr Fortune.
MR FORTUNE: Back on 31 May, Dr Haynes was asked about brainstem death. For the benefit of Dr Aronson, Dr Haynes is a consultant paediatric anaesthetist at Newcastle. I believe at the Freeman. He was asked at page 114, line 7, in answer to a question from my learned friend:
"Can you just very briefly because I'm conscious of the time (so am I) explain why it is in the protocol or, so far as you're concerned, important to exclude these electrolyte imbalances, if I can put it in that way, or to rectify them?"
Answer:

"Brainstem death is a diagnosis made when a patient is comatose, is on a ventilator and it is important to exclude any reversible causes of that coma. The first premise is that there has to be an underlying demonstrated diagnosis, which in Adam's case (this is Adam Strain) there most certainly was. There has to be the knowledge, and the wording is no stronger than that, that there has to be a certainty that there is no residual effect of any neuromuscular or sedative drug or other intoxicating agents, which in Adam's case none were present, then there has to be the exclusion of metabolic and biochemical causes of coma and that exclusion has to be made before doctors making the test can go on and do the test."

Firstly, having had it read to you, do you understand what Dr Haynes was saying?

A. Yes, I understand and I agree with that. I think that's perfectly appropriate. And the question was: could the drugs present in Claire's body have been -- have fallen under that rubric as you just read it? I think they could.

THE CHAIRMAN: Thank you. Mr Counsell.

MR COUNSELL: Dr Aronson, I wonder if you could look

at, and it could be brought up on the screen, page 14 of your report. So, that's reference 237-002-014. I wonder if you'd look towards the bottom of the page. You begin a paragraph with the words: "I have noted." You say:

"I have noted above that it is not clear what dose of midazolam Claire was actually given. Midazolam 120 mg, even if given over 24 hours, is a very large dose and would have caused major anaesthesia, coma, severe respiratory depression, possibly death, as has been reported in adults."

I think that reference was a reference to an alert by the National Patient Safety Agency, isn't it? Can I just ask you this: knowing what we know about Claire's condition, both at 3.25 pm and in the hours that followed, can we effectively rule out the possibility of her having been given 120 mg?

A. Oh, yes. Oh, yes, absolutely. I answered that question because the question was phrased -- and the questions had been phrased to ask, "What would 12 mg have done? What would 120 mg have done?"

Q. I understand, doctor.

A. And that's why I --

Q. It's just been there in the background.
A. My own view is that it is highly unlikely that Claire was ever given 120 mg of midazolam.
MR COUNSELL: Thank you very much.
THE CHAIRMAN: Is that everything? It's been a long afternoon, doctor. Thank you very much for your time. Your evidence is finished and you're free to go.
(The witness withdrew)
THE CHAIRMAN: Now, ladies and gentlemen, we're going to sit on Monday with Dr Scott-Jupp. He, I understand, has to leave by 4.00 pm at the latest. He's available to us only for Monday. We're then going to take Dr McFall on Tuesday and I think it's at least possible that he will run into Wednesday.
To get through Dr Scott-Jupp and not have him as another witness who we want to have to bring back or bring up in a video link or whatever, can we start at 9.00 am? I think that's our best chance of getting Dr Scott-Jupp concluded on Monday. We'll then do Dr McFall on Tuesday. He may run into Wednesday. Beyond him, on Wednesday, if he does run into Wednesday, I'm not clear what witnesses we have. The pathology

witnesses were not asked to give evidence and I expect that's not quite ready yet.

We've got four sitting days next week and I don't want to lose any, because when we're running behind already I don't want to lose a day or a day and a half. So, we will try as best we can over the next 24 hours to identify all the witnesses who are available for Wednesday, 14th, November after Dr McFall finishes, if he isn't finished on Tuesday, and into Thursday, 15th November.

The next thing I should say to you is that will bring us into Monday, 19 November. We will not be sitting in the week of Monday, 19 November.

MR QUINN: Did you say the whole week?

THE CHAIRMAN: There has been some discussion about that in the chambers, Mr Quinn, was welcoming a break between clinical and governance. We're going to have a break, but we won't quite finish clinical, I'm afraid. But, we'll have enough of it finished that we will be able to distribute the governance opening by Monday, 19th November, so you would see the lines that we're picking p for closer scrutiny in governance and the issues

that we want to address. We will circulate the opening by 19th November.

Then on 26th November, we'll work on a timetable for that, about the pathologists, any opening addresses on governance and then sitting on through. Okay?

MR FORTUNE: I thought previously you had indicated that you would not be sitting on Monday, 26th November and Tuesday, 27th November and perhaps some of us have made arrangements, that are of a personal nature or not, to be elsewhere.

THE CHAIRMAN: You might very well be right, Mr Fortune. Let me see what we can do, because there have been some change in circumstances at our end and more information coming through on various issues, so let me see. Sometimes what we have been able to do, if one or two individuals are not available, is to see how we can juggle witnesses, so that witnesses who are called during a day or two are less directly relevant to one's particular client.

Sorry, it is your recollection that I said we weren't sitting on 26th and 27th November?

MR FORTUNE: That was the information I received. That you would be sitting on Wednesday, 28th

November, Thursday, 29th November and Friday, 30th November. I don't think I'm alone in that recollection.

THE CHAIRMAN: No, sorry. I think that was maybe given out towards the end of last week. Is that right?

MR FORTUNE: Yes. In fact, it had been given out previously, because I had already made some, I'll be quite frank, personal arrangements for that Monday and Tuesday.

THE CHAIRMAN: Well, I'll tell you what we'll do. We'll liaise between now and the early part of next week. We will be sitting, as I say, next Monday, Tuesday. If anything that makes it all the more urgent that we get through as many witnesses as we can next week and identify all the people who will attend. Ms Conlon will be back with us on Monday and we'll pick that up at that point. Okay?

MS ANYADIKE-DANES: I would ask, if we're going to sit at 9.00 am and try and complete Dr Scott-Jupp's evidence, of which there is quite a bit, if I could just ask my learned friends if there are any areas they specifically wish me to cover there is now some time to do that. That they get

that to me, not in the early hours of Monday morning, but sometime before then, so that I can integrate those into the question, that would be very helpful.

THE CHAIRMAN: I am tempted to say that a lesson from today, is there much more evidence you can hear without a stenographer? Anyway, thank you very much.

MS ANYADIKE-DANES: Thank you very much, Mr Chairman.

THE CHAIRMAN: 9.00 am on Monday.

(5.56 pm)

(The hearing adjourned until Monday, 12th April at 9.00 am)