Friday, 24 February 2023

(10.30 am)

(In the presence of the jury)

MR DRIVER: May I call Dr Emma Lewis, please.

DR EMMA LEWIS (affirmed)

Examination-in-chief by MR DRIVER

MR DRIVER: May I invite you to state your full name, please.

A. My name is Dr Emma Jane Lewis.

Q. Dr Lewis, could you tell us something of your occupation? We are particularly interested in your occupation as of 2016.

A. 2016. I'm a consultant clinical biochemist. I work within the blood sciences laboratories at the Countess of Chester Hospital. I was doing that in 2016 and I'm still there now.

Q. Could you, in a sentence or two, describe the role of a consultant clinical scientist within the laboratories at the Countess of Chester Hospital?

A. So my role -- a lot of that is to provide advice about test results, about how samples are collected, if there are any special procedures required, to give advice to consultants, to anybody who basically asks for advice from us, and also I'm concerned with the overall running of the department as well.

Q. Thank you. Do your responsibilities extend to ensuring the protocols and the integrity of the laboratory to ensure the quality of results?
A. Yes. We would put in place procedures so that the quality of the results that we produce would be accurate.
Q. Thank you. I'm now going to continue to ask you some questions of general application before we move to a specific set of tests and results.

The general topic is blood testing. How is a request for a blood test generated within the Countess of Chester Hospital?
A. So in 2016, you could have either requested a test or a series of tests within our electronic patient record or you could have used a paper-based request form; either were acceptable at that point in time.
Q. Let's concentrate on the former for a moment. How would the user, how would the doctor or the nurse who wished for a test to be undertaken, how would they make the request through the computerised system?
A. Through the computerised system there was a requesting panel, so you could request laboratory tests within this, within this module, within the hospital system. All the tests that we do within the laboratory were on that system and it was just a case of finding which test

you want, clicking on "add", and requesting those on the system, and that would form the basis of that request.

Q. So that would be a medic or a nurse --

A. Yes.

Q. -- making the request on a desktop computer --

A. Yes.

Q. -- within their unit --

A. Yes.

Q. -- for example? Such a request having been made, how would it be received within the laboratory?

A. So once the sample had been collected, the sample can either be sent via -- we have a pod system within the hospital, so basically you just put the sample and the request form in a tube, put it through the pod system, and it arrives in the lab. Or it can be transported by hand, either by somebody from the ward or a porter can do that as well, to come to the laboratory.

Q. The request for a test having been made within the unit, and we here, of course, are focusing upon the neonatal unit, that request having been made, would the fact of a request having been made be communicated to the laboratory before the sample was podded and sent in?

A. The requests were on the system but they weren't actually downloaded into the pathology part of that module until we actually received that request within

the laboratory. And then we physically had to download the data from our -- not download the data, but receive it, and it wouldn't actually come into our part of the module until we received the sample.

Q. But the making of the request, would that be logged within the system?

A. That was logged within the system, yes. Once the request has been made, it is on the system.

Q. And the logging of the making of the request, what information would be contained within that log?

A. So on that information, you would have details of the person who requested it, you would have the time that it was requested, you would have all the information that the laboratory required, so all the patient information, so their name, date of birth, things like that. And you would have the list of tests that were required within that request.

Q. Sorry to be pedantic, but you said the time of the request would be logged and, I assume, the date?

A. And the date, yes.

Q. That having been made within, for example, the neonatal unit, what, if anything, would be generated at that end within the unit at that point in time?

A. I believe at the time you could have generated -- you were generating a paper-based request form at the time.

Q. Thank you. Let's move then to the point in time where a blood sample, for example, has been taken from a patient.
A. Yes.
Q. What would be the next stage in the procedure within the unit as far as you are aware?
A. As far as I am aware, once a blood sample has been taken, it would then be sent to the laboratory. As I said, either by the podding system or by somebody physically taking it to the laboratory.
Q. Let's consider what it is that's being podded or hand-delivered to the laboratory. Blood?
A. Yes.
Q. Where would that be stored?
A. The blood is in a tube. And obviously seeing it's a neonatal tube, it would be in what we call a paediatric size tube. These are very small tubes, they only take about -- 1.3ml, I think, is the size of blood they take. From a neonatal unit we generally don't get full tubes of blood.
Q. Thank you. What, if anything, would be labelled or marked on that tube to identify the patient, the substance and the testing request?
A. So the tubes we'd get from the neonatal unit generally have what we call a patient identification sticker

wrapped round. The tubes are generally far too small to actually write on. There's a label you can write on but they are very small so what they generally do is put a patient identification label on the tubes.

Q. Are you aware of how the patient identification label is generated?

A. Um... I have to say I'm not 100% on how these things are generated.

Q. Thank you. So let's move to the point in time where the sample is received by the laboratory. At that point in time, is the laboratory forewarned or notified of the arrival of a sample?

A. Generally not unless we have to do something with it particularly quickly or it needs to be -- or it needs special attention or anything. Generally, the samples just arrive within the laboratory.

Q. How do your colleagues at the laboratory know what is requested of them?

A. Because they will have the request form and they will also be able to look on the computer system and that request will be on the system with the details of everything that is required.

Q. Thank you. We'll come to a specific example in due course, but at the moment staying with general matters, could I ask you now about the testing process.

A. Yes.
Q. We are primarily here concerned with a blood sample and most specifically for tests for insulin and C-peptide levels, as I know you're aware. What is the testing process within the laboratory for blood samples to achieve that end?
A. For blood samples, depending on the type of testing, there would either be put straight on an analyser or, if we don't need the cellular component of the blood, they would be centrifuged before being sent to the analysers. With adult tubes we have automation within the laboratory, so the centrifugation is a completely automated system, but with paediatric samples they are treated manually because they are so small and they are manually centrifuged and then anything -- the serum at the top of the sample, which is the bit that we use, is manually taken off and put into a different tube so that that can then go on the analyser.
Q. Could you kindly explain the process of manual centrifugation in words that I can understand?
A. Right. So we have the tube, we have what we call desktop size centrifuges, so these are centrifuges that are probably about that sort of size (indicating). They have special inserts in them that can take these very small paediatric tubes that we have. We put them in the

centrifuge, they're spun, basically like a washing machine spinning, for a fixed amount of time at a fixed rate. Once they're done, they're taken out and if you hold them up, you can see a clear separation between the cellular material that will be at the bottom of the tube and the bit that we want to test, which is the sort of straw-like serum or plasma at the top of the tube.

Q. So this spinning process separates these two components --

A. Yes.

Q. -- of the blood and allows you to isolate the part that you're most interested in --

A. Yes.

Q. -- the serum?

A. Yes.

Q. What happens next?

A. If it's a paediatric sample, we don't put those tubes directly on to the analyser, we take off the serum or the plasma at the top of the tube, we put it into what we call a micro cup. These are little tubes, little cups that can go into separate tubes so they can be put on the analyser to be sampled and to be tested.

Q. We, as you know, are interested in insulin C-peptide tests. The sample having been spun, the components having been separated, would that test be undertaken

within your laboratory at Chester?

A. We don't analyse insulin and C-peptide levels, we send them away to be tested, we send them to the Royal Liverpool Hospital.

Q. Could you help us understand the process between the spinning, the separation and the sample being delivered to the Royal Liverpool Hospital?

A. The sample would have been separated as I have detailed in the centrifuge, the plasma would have been taken off, it would have been put into a separate tube, a slightly bigger tube, not a micro tube that we use for the analysers. It would have been labelled with all the patient identification. And because it's for insulin and C-peptide, it actually would have been frozen at that point because insulin is (inaudible) unstable.

Q. Could you assist us as to the transport process?

A. So we have a hospital transport that goes every day from the laboratory and takes any samples that we need to send to Liverpool directly to their laboratories over there.

Q. Thank you. We've heard from your colleagues at the Royal Liverpool Hospital as to the testing process within there. Could you tell us, from your perspective, about the receipt of results from Liverpool?

A. So we get results back from Liverpool, normally in

paper -- on paper. We would get a paper copy of the report. If the result is very abnormal or there is something that somebody needs to do something about relatively quickly we may get a phone call from them saying, "We have this result for you".

Q. You may receive a phone call if the results are abnormal, am I right to assume, because through that method the information is communicated to you more quickly?

A. Yes.

Q. If that isn't done, what's the usual time lag between sending to Liverpool and receiving the paper results?

A. It very much depends on the test being done, how often Liverpool do the test, whether it's something they would do daily or maybe it's something they would do weekly. It's very variable as to how fast we get these results back.

Q. In circumstances where you receive results orally through a telephone call, how is the fact of that communication and the content of that communication recorded within your laboratory?

A. It may well be -- if we get a result that's phoned to us we will put it on the computer system and some people when they put these results in will say -- will put a note in to say it's been communicated from the

referring hospital, but it's not a sort of written down procedure as, it were, that we have to do that. So sometimes people will just put the results on the system.

Q. Thank you. I'm now going to ask you to assist us understand a document that's been generated by your system and has been exhibited by you as part of your statement-making process.

A. Yes.

Q. If I could ask Mr Murphy to take us to tile 190. There's a screen to your right. Dr Lewis, and members of the jury, there's a paper copy of this behind our divider 16, I think. Yes. Of [Baby L]. It's a document that we looked at briefly the other day, it has EL/3 at the top.

Click behind there, please, Mr Murphy. Dr Lewis, there's a mouse by your right hand. If that assists you to take us to relevant parts, I encourage you to do so. Divider 15, members of the jury, not 16. 16 is [Baby M], 15 is [Baby L].

Do you recognise this document?

A. Yes.

Q. Let's deal with the top line by way of exclusion, I hope. Does this record the date when I think you caused this document to be generated from the system

retrospectively?

A. Yes. So you've got a run date here, so that's the time and the date that this was printed. And this is the user here, so that's my mnemonic(?) there.

Q. This just records the administered process of you recovering this when making a statement for this inquiry?

A. Yes.

Q. Thank you. The remainder of this document, is this information and data that was put on the system back in 2016?

A. Yes. This is information about the patient and also some audit data about times when various things happened to that sample.

Q. Thank you. So let's look at it -- we've got the patient's name, which we're familiar with. We have details about his age and date of birth in the next part of this band of information. Does the remainder simply seek to inform you where he was at the time the sample was taken?

A. Yes.

Q. And the location?

A. Yes.

Q. What about the far right of this band? What does that tell you?

A. This bit here (indicating)?
Q. Yes.
A. So the CC here is his hospital number. This is a registration date. And this is his discharge date. Obviously, this was produced well after he was discharged so it actually has a discharge on it, but sometimes that wouldn't be filled in.
Q. So the CC is [Baby L]'s unique patient reference number?
A. Yes.
Q. We understand the discharge date, I'm sure. But what about the middle entry, the reg?
A. I'm assuming -- I'm not entirely sure, I assume it's some sort of registration date.
Q. Registration of what, do you know?
A. Probably the patient because it's --
MR JUSTICE GOSS: Well, it was his birth date. The day he came into the world.
A. Yes.
MR DRIVER: Thank you. Let's move to the next section. Moving from left to right, thank you, Mr Murphy. SPEC to the left?
A. This one here (indicating)?
Q. Yes.
A. This is a laboratory -- this is part of the way we

record -- it's a laboratory number.
Q. Thank you. Is that a reference to the sample, to the test?
A. That's the sample number.
Q. That's the sample reference, thank you. Let's move to the next three entries. Just to the right of the same -- so ORDER, FOR, COL and RECV.
A. Order, that's the date it was ordered. Collected, that is an automatic infill because we don't actually -- there was no recording of when the sample was actually collected --
Q. Right.
A. -- but that's the date it was received in the laboratory, the date and time it was received within the laboratory system.
Q. Right. Pausing there, so the system, the laboratory, was not provided with a time for the taking of the sample; is that the position?
A. No.
Q. And does UNK mean unknown?
A. Yes.
Q. But you do have a time and date stamp for the receipt of it --
A. Yes.
Q. -- the sample, into the laboratory?

A. Yes.
Q. Thank you. We see on the next column, status, consultant/GP, and we have the name we're familiar with and that's a doctor who's already given evidence before this jury.
The final entry, REQ?
A. So this is a request number, but this is something that we don't particularly use in the laboratory, but it's an audit function within the entire hospital system.
Q. So that's the audit reference for the request to undertake the test?
A. I believe that is, yes.
Q. Thank you. Moving back to the left of the page, we've got four sets of digits.
A. Yes.
Q. Order number, could you decode that for us?
A. These are the individual order numbers for some of the individual tests. Some of the -- for the tests that are requested here, they're going to different analysers so they actually require different individual sort of order numbers or request numbers to go to the different analysers. There are four there because there are, I think, four different types of test there.
Q. Thank you. Next, beneath -- we'll go line by line from left to right. We see entered and then we have the date

again, 9 April 2016 and the time. Staying with the time for a moment, 15.45, what does that inform the reader?

A. I believe that that is the time that the request was actually made.

Q. So the request from the NNU --

A. Yes.

Q. -- to the laboratory?

A. Yes.

Q. If we just remind ourselves, for tests of a sample that was received at -- on 9 April 2016 and it looks like at 18.26.

A. Yes.

Q. Again, that request at 15.45, if we go from left to right, was made by Dr Ukoh?

A. Yes.

Q. With an instruction to copy, one assumes, the results to Dr Gibbs?

A. Mm-hm.

Q. Let's look at the next line:

"COLL by PAT HASM."

Can you help with us that?

A. Yes. This is collected by -- this is the mnemonic of one of our biomedical scientists within the lab. Although it has to be said because the collection module in the system didn't actually work, that mnemonic is

actually the person who received the sample within the laboratory.

Q. So that's a colleague of yours, an identifiable colleague who received the sample?

A. Yes.

Q. So we see that abbreviated name twice. "Last reported", is that beneath?

A. Yes, I think that's last reported. Yes, that's the last time that the result was actually looked at within the system.

Q. And that's 19 October 2018, so way beyond --

A. Yes.

Q. -- the time we're very concerned with?

A. Yes.

Q. The last, ACT, help us understand that?

A. That would be the last time an entry was actually put into that result, that series of results before it was finally complete. So it would probably have been either the insulin C-peptide that's referring to, the last result that went in.

Q. So the ACT there could be?

A. An action.

Q. But that action could be an administrative action as opposed to a scientific testing action?

A. Yes.

Q. Next line, "ordered"?
A. This the mnemonic for the series of tests that were ordered on this baby. So U&E is a urea and electrolytes, we have insulin and C-peptide, we have a cortisol and we have growth hormone.
Q. Is that the component parts of the request made by Dr Ukoh according to this note at 15.45 on 9 April?
A. Yes.
Q. Comments?
A. So the comments is just any clinical comments or any clinical information that is made by the doctor at the time of the request. So you can see here the clinical details they've put in were "hypoglycaemia neonate".
Q. So that's a reference to the baby who's providing the sample?
A. Yes.
Q. Is that "worksheets"?
A. Yes.
Q. Just going to the right:

"Closed on 11 April 2016 by Con Bowles."

Who is Con Bowles?

A. She is Dr Shirley Bowles, she is our consultant chemical pathologist.
Q. What does "closed" mean in this context?
A. So what happens -- not all tests go through the system

automatically, some are held back for review by whoever is acting as duty biochemist that day. So the cortisol and the growth hormone would have been on a fertility sheet. That's a set of tests that require a view before they are put on the system for review by either consultants, doctors or whoever's requested them.

Q. Thank you. Moving down, we see "perform site". Could you help us understand that and the entry beneath it?

A. So this is the lab, so it has been -- testing has been performed within the laboratory on that time and date. So that was when the testing of the sample was started.

Q. So the testing of the sample was at 18.17 on 9 April?

A. Yes.

Q. Is that the spinning process or is that something post-spin? Are you able to tell us?

A. I'm not entirely sure what that piece of audit data is referring to.

Q. Thank you. Moving along that line, "at site", we see to the right.

A. Again, I think that's just laboratory, it was performed at our site rather than anywhere else.

Q. Beneath that is "report audit"; is that of any significance?

A. No, that just tells us where and when data has been sent. The second one, obviously a copy of results was

sent out to ward 36, which is this one here, at that time and date.

Q. Thank you. So that records or creates an audit trail for the communication of the results --

A. Yes.

Q. -- once the process has been completed?

A. Mm-hm.

Q. So that would tend to suggest that ward 36 was informed of the results at 12.47 on 14 April?

A. I think -- yes, that date there is the completion date, so the date when everything was complete.

Q. Thank you. If Mr Murphy scrolls down so we can see entries 1 to 9. Here we have a bank of similar looking entries. Generally speaking, what are they?

A. That's audit information as to when results were available -- were sent out from the system from the pathology laboratory system on to the hospital system and what time they would have been viewable by people on the ward. So you've got the time and date there. "Result out" just means that results are going out. This Iguana here, this is just the name of the integration engine, so it's part of the system that sends results out from the pathology module to the main hospital system. I'm not sure what this record number here is. This is sent and this is the user who was

involved.

Q. So we can see the first five, 1 to 5 inclusive, were sent out at times on 9 April?

A. Yes.

Q. Numbers 6 and 7 sent out on 11 April, and numbers 8 and 9 on 14 April.

A. Yes.

Q. Focusing on this part of this information, is there anything in that bank of information that can inform us as to which results -- in the sense of which results from which test were sent out at what time and which dates?

A. They don't actually state which tests were sent out at which time but you could make an educated guess, shall we say, as to which ones were sent out at what time.

Q. Shall we look at the next page to see if that helps us better understand that. Thank you. We can see there a list of tests down the left column; is that correct?

A. Yes.

Q. Sodium, potassium, et cetera?

A. Yes.

Q. Before we get to insulin and C-peptide, which we're most interested in, help us understand from left to right the information contained on this page.

A. Okay. If you look at the sodium there, the result of

140, that's a result from that sample. Where it says "Reference: 133 to 144", that's what we would call a normal range or a reference range.

Q. Yes.

A. So this bit here where it says "Entered at 9/4 18.48 auto-insert", that means it was automatically sent across from the analyser to the pathology module. And where it says VER, that's verified. It was auto-verified because it was within a set of parameters that was set within the laboratory. It says: nobody needs to look at this result, it can just go straight out through the system.

Q. So that's a specific result?

A. Yes.

Q. The anticipated range of results within which it lies?

A. Yes.

Q. A record of the method of the testing of that result?

A. Yes.

Q. And the confirmation of that result and the communication of that result?

A. Yes.

Q. Thank you. That's repeated in terms for each of them.

Let's go down to where it says insulin. Is that a test that was undertaken within your laboratory or elsewhere?

A. No, that would have been undertaken at the Royal Liverpool.
Q. Thank you. The result?
A. So the result there is 1,099. You've got units here, which is picomoles per litre. That's just the units they are reported in. You've got a comment there and it says:
"Interpretation of insulin levels depends on glucose."
That's a standard comment that would probably go on any insulin result because it does. It says here "entered", so it was entered on 14/04 at 9.38 by Dr Shirley Bowles and verified 2 minutes later by her. Where it says "Method: send away tests", that basically means it is not a test we do in-house, it's a test that is sent away to somewhere else.
Q. So can we interpret from that entry that Dr Shirley Bowles acknowledged or read the results at 9.38 on 14 April?
A. Yes.
Q. And added them to your database?
A. Yes.
Q. Thank you. The next entry below, "Insulin C-pep".
A. So again, you've got your insulin C-peptide here with a result, which I believe says 264. And you've got your

reference range there, which is 190 to 990 picomoles per litre.

Q. Yes.

A. Again, the method underneath it, entered at that time on that date, again by Dr Shirley Bowles, and verified at the same time by again Dr Shirley Bowles, and you have got the method of "send away tests" as well because it was something that was analysed outside our laboratory.

Q. Thank you. The grey area which has been reproduced poorly, I'm not asking you to read the content because that would be impossible, I imagine, but what's that for, what's that part of this form for?

A. That's a ratio, that's what we call a C-peptide to insulin ratio. I believe that says 0.2. The L next to it means that it's low compared to the reference range, which is 5 to 10.

Q. Yes. There's a folder in front of you. Behind divider 15 there's this page and some other pages. If we flick through, if you don't mind, please, Dr Lewis, until we get to this document that we've been looking at, your EL/3. Have you got that?

A. Yes.

Q. Keep going beyond it four pages. Keep going through the file until we get to a page that looks like this (indicating). Do you see that? The bottom corner has

a stamp that says J26995. Do you have that?

A. It doesn't seem to be...

MR JUSTICE GOSS: It's the penultimate document, second from the back in that section.

MR DRIVER: That's the one in your hand now. Thank you very much. Do you recognise this screenshot?

A. Yes. This is basically the report that you would print off if you printed off a report from the user side of the hospital system. So it's got very much the same data but without all the sort of audit bits in the back, the times and the dates.

Q. So your EL/3 that we've been focusing upon on screen contains all the information?

A. Mm-hm.

Q. Of course, that information has to be shared --

A. Yes.

Q. -- with the requesting ward or unit?

A. Yes.

Q. And is this how or --

A. This is a sort of paper copy of how it would be reported.

Q. Would it be reported electronically?

A. It would be reported electronically, yes.

Q. Thank you. If we look towards the bottom of this, I anticipate we'll see more clearly the results that

we've been peering at on the poorly reproduced version there. What does that tell you in terms of the data results for insulin, C-peptide and the ratio between the two?

A. So we've got the insulin level there. There is no reference range associated with that insulin level because it's not a fixed reference range, it's dependent on what the glucose level is. You've got your insulin C-peptide level and the ratio, which is just an automatic calculation of the insulin -- sorry, the C-peptide level divided by the insulin level.

Q. And the result in this case was?

A. The result in this case was 0.2, which, as indicated by the L, is low compared to the reference range.

Q. Thank you. Moving away from that paper document and going back to the audit trail on screen, is there anything in your EL/3 that informs about the communication of the result to the unit?

A. There's nothing there to say that communication was anything other than electronic, as detailed on the first page.

Q. Thank you. If Mr Murphy could scroll down. We've housed, for our convenience, behind your EL/3 this screenshot, which was produced by a consultant within the NNU. It has the same data, parts of the same

result. Do you recognise that format or is that something that would be viewed from a different perspective?

A. That's the view of the report they would get on the ward or at an outpatient clinic.

Q. Right. Does it flow from that that that must be the result sent by your colleagues --

A. Yes.

Q. -- within the lab to the ward, effectively?

A. Yes.

Q. On that document we have some of the things we've seen already: received at 18.26, an order from Dr Ukoh. Does anything on this screen enable us to understand when the result or these results were communicated by the lab to the ward?

A. There's nothing on that particular one to say what times anything was sent.

Q. Thank you. If we were to go back to EL/3, would we be able to discern the same information from there or not?

A. Yes, there is actually slightly more information on that document than there would be on that one.

Q. Let's go back to that one. Scroll up, it's on the same... Can you help us, where on here will we find the time of communication?

A. The time of communication, if we go back to the first

page, you've got the times here, but if you also look on the second page under the individual results, where it says "entered", and then where it says "verified", that is the time it would have gone from the pathology module and be viewable within the hospital system. So you can see the sodium there, for example, was verified on 9 April at 18.46. So that's the time it was sent to the hospital system and would have been viewable.

Q. Thank you. So the sodium at 18.48, potassium 18.48, bicarb 18.48, as with urea, creatinine, the cortisol, all of those on 9 April. Cortisol at 12.18 on 11 April --

A. Mm-hm.

Q. -- as with growth hormone the same time and date. Is that correct?

A. Yes.

Q. But the insulin C-peptide and the ratio results come at 09.40 on 14 April 2016?

A. Yes.

Q. Is there anything on your EL/3 that informs as to whether the Royal Liverpool communicated by telephone, by paper or both?

A. There isn't anything to indicate how these results were communicated from the Royal.

MR DRIVER: Thank you. I have no further questions for you.

If you remain there.

Cross-examination by MR MYERS

MR MYERS: I'd just like, Dr Lewis, if I may to confirm a few things about the document we're looking at moment so I can be quite clear and we all can. If we just look at the top -- sorry, I meant at that page. My fault. There we are.

I'm interested in just knowing when on the ward or the unit these readings would first be available to see. If we look at the first five, so that's sodium, potassium, bicarb, urea and creatinine?

A. Yes.

Q. And then if we look across each of them has 9 April, 18.46 for sodium, hasn't it?

A. Yes.

Q. Does that mean where it says "VER [verified] 9 April 18.46", it would have been viewable on the unit at that time from what you understand?

A. From what I understand, that is the time that it's verified within the laboratory and at that point it is sent out to the hospital system as well.

Q. To the hospital system?

A. Yes.

Q. So if the unit can get on to the hospital system they can then check that result?

A. Yes.
Q. That process applies to potassium, doesn't it, underneath that, for 9 April?
A. Yes.
Q. Same time?
A. Yes.
Q. And then bicarb, 9 April -- does that say 18.18 on that one?
A. That may well be 18.18.
Q. All right. Anyway, urea, 18.48?
A. Yes.
Q. And then creatinine, 18.48 as well?
A. Yes.
Q. And then if we go to the next two down, please, from this we can see the cortisol following the same process. That would first have gone across to the hospital and would be viewable from 11 April at 12.18?
A. Yes.
Q. So that's how that works?
A. Yes.
Q. And in fact, for growth hormone as well, if we look down, just above insulin, 11 April, 12.18?
A. Yes.
Q. So the first five are one batch in effect?
A. Yes.

Q. And the next two are the next batch?
A. Yes.
Q. Right. We're going to leave this on the screen. If you look in the file in front of you -- and ladies and gentlemen, I don't know if you've got the paper files but I'm going to go to this page, which is 17998. Just help us with some technical abbreviations, if you would.
Can you see the paper page I'm talking about, Dr Lewis? It's page 17998. If you keep going back as you are doing you'll come to it.
There are some handwritten figures.
A. Yes.
Q. So this says:
"9 April 2016, hypo screen results (12 noon)."
We've dealt with this elsewhere, I'm not going to ask you about how this comes into being. But looking at what we have here, where it says "Na 140", is Na the periodic table abbreviation for sodium?
A. Yes.
Q. That's 140. If we look across at the results it says 140, doesn't it, on the formal results?
A. Yes.
Q. That would have been available at 18.46 on 9 April?
A. Yes.
Q. And K, that's potassium?

A. Yes.
Q. And HCO3?
A. Bicarbonate.
Q. Is that U --
A. U is urea, I'd imagine.
Q. Following through, that's the result we see being verified at 18.48 for urea on EL/3, isn't it?
A. Yes.
Q. And creatinine, 7.3?
A. Yes.
Q. Which is a bit difficult to see there. But we've seen on the formal printout that it is 7.3.

Then just to follow this, for cortisol and GH it 8.63. A little difficult to tell from there, but that would equate with growth hormone?

A. That's growth hormone, yes.
Q. And those results came through a couple of days later?
A. Yes.

MR MYERS: Thank you very much., Dr Lewis.

Re-examination by MR DRIVER

MR DRIVER: Just two points of clarification remaining with this screen. We see two entries, really, per test type. One ENT and the other verified. In time, which comes first, the entering or the verification?

A. Entry comes first.

Q. So it's rather obscured because of the poor reproduction, but there can't be a time in the right column that's earlier than the time in the left?
A. No.
Q. What is the earliest -- I will just use sodium for example. What is the earliest time and date that anyone in the NNU could have viewed and noted this results?
A. They were only verified on 9/4 at 18.46, so they wouldn't have been available to view before that time.
Q. Thank you. I am being very pedantic, but if we look at the entry time for that sodium, that's 18.48. So the verification must be --
A. 18.48, yes, sorry.
MR DRIVER: Thank you. Does your Lordship have any questions for the witness?

Questions from THE JUDGE

MR JUSTICE GOSS: Well, I'm being stupid now. The bicarb entry, the third entry, it's clearly -- it's entered, left-hand column, "09/04, 18.48", then "Verified 09/04", and you say that must be 48, not 18?
A. I suspect that's 48 rather than 18, yes.
MR JUSTICE GOSS: So it's just the way it's come out in the copying process?
A. Yes.
MR JUSTICE GOSS: When Mr Myers was going through it,

I thought it couldn't be verified before it was actually created.

MR MYERS: May I just check, they're all 48 in fact?

A. Yes.

MR MYERS: The last two were 48. That was confusing.

MR JUSTICE GOSS: As you said in your evidence originally in answer to Mr Driver, you said it would automatically be verified because it was in the appropriate range?

A. Yes.

MR JUSTICE GOSS: So the computer would simply say, okay, that's okay?

MR DRIVER: If we can just go to the bottom of this page, Mr Murphy, towards the bottom, thank you, these two entries, HEMOL?

A. That's haemolysis index. That's a check that we have built into the analyser that checks whether the sample's been haemolysed. A haemolysis is when the red cells break up when the sample's being taken. The reason that's important is because if you have too much haemolysis it can affect your potassium results and you would get an artificially inflated potassium result. That haemolysis of zero means there was no detectable haemolysis within that sample so it was okay to use and to test.

Q. We've heard other witnesses refer to clumping.

A. Yes.
Q. Is that --
A. Yes. It can be clumping of cells, sometimes you might get some clots in samples, but that's the haemolysis index.
Q. My Lord, this isn't strictly re-examination, I'd overlooked to deal with this final entry.
Random glucose, could you help us understand that?
A. That's just a test for glucose. We can do -- when it says random, it means that the patient wasn't fasting before the sample was taken, because you can do glucose levels either randomly throughout the day or when a patient has undergone a prolonged fast and they will give you slightly different information.
Q. The very last thing I want to ask you is to do with this tube number. Could you help us with that because it features -- again for glucose but not the others?
A. So what that's saying is that the glucose that we test actually requires a different type of tube to the testing all these testing have come under. So although that says glucose on there, it was done under a different sample number, which is that 030824.
Q. So does that inform us that the sample taken from the patient must have been sub-divided (overspeaking) separate tubes?

A. It was a completely separate tube because it requires a different type of preservative.
Q. Right. And if we were to go back to the last page or anything in your EL/3, would we be able to work out when that tube, the one that ends in the digits 24, when that was received?
A. Not on this one, but I would imagine because the request is -- there is a request on here with a sample number, that the same would have come in at the same time as that one.
Q. One more document that might help, it might not. If we go back to the very final page in paper, our 26996. That's our reference number. We have a request number there. Is there anything on this document that helps you tell us whether or not that corresponds to the random glucose result entry that we've just been looking at?
A. You can't exactly say that this sample is the one that's correlated on there because the specimen numbers are different, the way they're recorded is slightly different. That was a feature of the system, this particular system, at the time.
Q. If we look at the request number, 08643930, on the top right of the page document I've asked you to look at. If we go to the first page of your EL/3. Mr Murphy,

could you take us to the first page of the document. Where your cursor is now, is that the corresponding request number?

A. That's the hospital audit request number, yes. So from that, you can probably say that they were requested at the same time.

MR DRIVER: Right.

MR JUSTICE GOSS: Well, Mr Myers, do you want to ask any questions arising out of that?

MR MYERS: No, the same points would apply across from what I've dealt with so there's nothing extra that I need to ask, thank you.

MR JUSTICE GOSS: That's, you told us, the hospital number, so that's your hospital number?

A. That's a request number within the hospital system.

MR JUSTICE GOSS: That's for the hospital computer system?

A. Yes, it's not necessarily the request number that we would use in the laboratory.

MR JUSTICE GOSS: No, but that's for some other auditing process?

A. Yes.

MR JUSTICE GOSS: Or -- is that right?

A. Yes.

MR JUSTICE GOSS: Okay. Thank you very much, Dr Lewis. I think I can confidently say you won't be required to

give evidence again.

MR DRIVER: You certainly can.

MR JUSTICE GOSS: So thank you very much for coming and giving evidence on this particular issue. You're free to go.

(The witness withdrew)

MR JOHNSON: Professor Hindmarsh, please, and a document for the jury, which is the requested table.

PROFESSOR PETER HINDMARSH (recalled)

Examination-in-chief by MR JOHNSON

MR JOHNSON: Good morning, professor. Welcome back. Just for the sake of the recording, would you identify yourself, please?

A. I'm Peter Christopher Hindmarsh.

Q. Professor, you gave evidence to this court in November, if you remember.

A. That's correct.

Q. Thank you. Before you start, I'd just like to give the jury a document that you have seen this morning as well.

My Lord, I'm going to ask the jury to put this behind divider 6 in jury bundle 1. The reason for that is Professor Hindmarsh's table for [Baby F] is there or should be there. If it isn't, would you let me know so we can get a replacement in due course. It won't hold us up now, but if you haven't got the

original table there, please let us know.

(Handed)

To avoid confusion, can I invite you to write on the one that you had there before, so the one that's on the lesser quality paper, can you write "[Baby F]" or "[Baby F]". We've put "[Baby L]" on the new one.

(Pause)

I would like to deal, if we can, first of all, professor, with the [Baby F] table because I think this morning you have had an opportunity to remind yourself of some of the -- all the questions you were asked on the last occasion from the transcript.

A. That's correct, yes.

Q. Amongst the questions you were asked, there were questions about two boluses of dextrose that were given to [Baby F] at 02.05, and some of the jury may have written this into the document, I don't know, but at 02.05, a 10% dextrose bolus of 3ml was given. And at 04.20, a 10% bolus of 3ml was given as well.

MR MYERS: The sheet which Professor Hindmarsh produced on the last occasion, I don't have a copy of that, for whatever reason. I have a copy elsewhere but not right now.

MR JUSTICE GOSS: Right.

MR MYERS: If we're going back to that --

MR JUSTICE GOSS: You wish to have a copy of it?
MR MYERS: Yes, I'd like to have a copy.
MR JUSTICE GOSS: Certainly.
MR JOHNSON: If we take the break now, we can get it copied.
MR JUSTICE GOSS: I think Mr Astbury may be able to provide one.
MR MYERS: I'm grateful for that.
MR JUSTICE GOSS: All right. You know where we are, do you? We're on this document and I'd actually written it in on red on my copy. Some of you may have written in the two dextrose boluses of 3ml, 10%.

Is there one, Mr Astbury?

MR ASTBURY: No, my Lord, there isn't one in this jury bundle. Sorry about that.
MR JUSTICE GOSS: Right. I'm prepared -- if you don't mind having mine, I have written nothing else apart from that on it, Mr Myers. Borrow mine and I'll try and follow it without a copy.
MR MYERS: I'm grateful, thank you.

(Handed)

MR JOHNSON: So just to help, I hope, Mr Myers and my Lord, Professor Hindmarsh did make a statement on 2 December about this. Because of some questions he was asked in court, he went away and thought about it and made a further statement. The statement is at page 5777 on

the electronic system.

MR JUSTICE GOSS: All right.

MR JOHNSON: So it's to cover that evidence. We have now located a copy.

MR JUSTICE GOSS: I'll write on my replacement copy.

MR MYERS: I've returned your Lordship's copy in fact. I'm grateful.

MR JUSTICE GOSS: Not at all.

Mr Myers, you were busily engaged.

You were actually given the reference to the statement this witness made on 2 December on the system. You've got it?

MR MYERS: I have that. I'm grateful.

MR JOHNSON: Professor Hindmarsh, you were asked, as I say, just to recap slightly, a series of questions that revolved essentially around those two boluses that were given at 02.05 and 04.20, both were 10% dextrose and both were 3ml boluses.

You were asked that in the context of the blood sugar or blood glucose measurement at 05.00 hours, I think, which is above the 2.5 or 2.4, which has variously been referred to by various witnesses as a watershed, in effect, in blood sugar readings. Did you go back and think and calculate or make some calculations to try to take into account those two

boluses?

A. Yes, I did. I apologise to the court, but I wasn't mathematically agile enough on that day to do the calculations in the same session.

MR JUSTICE GOSS: Don't apologise, let's just hear what your calculations were then.

A. So what I have done in this, I have focused on that value of 2.9 (inaudible) blood glucose recorded at 05.00 hours on 5 April. And in doing so, I've taken the delivery of the bolus of intravenous 10% dextrose and assumed that was given at 04.00 hours. I have assumed that the 05.00 hours measurement was presumably checked to see what the response to that intravenous administration of glucose was.

So as I say, the assumption is that the bolus was given at 04.00 hours as a bolus injection. And that would mean, after equilibration of the glucose in the bloodstream, which I have generously allowed for 5 minutes -- normally it's about five times the circulation time, which is 30 seconds. That's the point at which I've started the calculations.

I have also used two ways of estimating how glucose might be removed from the circulation. One in the presence of insulin and one in the absence of insulin. I've gone on then to look at the delivery of the

glucose, which was in a dose of 2 milligrams per kilogram body weight and I've used the birth weight for the purposes of the calculation so that the dose administered would be 2.9ml of the 10% dextrose and for the purposes of this I've simply rounded that up to 3ml.

In that 3ml solution of 10% dextrose there will be 300 milligrams of glucose. That's distributed in the blood volume of the infant, which I calculated as 125ml, so that the starting blood glucose concentration for the calculation after the bolus administration of the 10% dextrose would be 13.3 millimoles per litre. That's why that appears in both the columns, assuming there's little to no insulin present or assuming that there is some insulin present. So they are both the same for the time point of 04.05.

In the situation where there's an assumption there's little to no insulin present by 04.45 hours, the blood glucose would be 6.7 millimoles per litre. And assuming that the process continues, by 05.25 it would have fallen to 3.3 millimoles per litre.

On the right column if we assume insulin is present, then we would have reached, at 04.45, a concentration of 3.3 millimoles per litre with a further fall to 1.7 millimoles per litre at 05.05.

There is a caveat that actually the blood glucose in

a normal situation will never fall below 3.5 millimoles per litre.

Q. That's probably quite difficult for the jury to follow.

MR JUSTICE GOSS: Well, it's certainly difficult for me to follow because there's been reference to columns and that sort of thing and figures that don't match with anything that I have.

MR JOHNSON: No, but hopefully --

MR JUSTICE GOSS: I think you're going to have to break that down and go through it all again.

MR JOHNSON: Let's concentrate, if we can, on what we have in your table, please, professor, because the thrust of the questioning or the issue that was raised with you was what effect those -- so if we concentrate on the thrust of the questions, what effect those two 3ml boluses would have had on the blood sugar readings. So looking at your table, not the one in your statement but the one you gave to the jury, which I hope is -- if you look in -- you have it there and it's in hard copy in one of those files in front of you, which I can direct you to.

MR JUSTICE GOSS: It should be in the one that's got a 1 on the spine.

MR JOHNSON: If you go to divider 6, hopefully it'll be there.

A. Sadly, it's not there.
Q. This is the table you produced in the case of [Baby E] -- sorry, [Baby F]. So looking at your table, we have two -- well, the principal object of the questioning you were asked last time was about that rise, that particular rise at 5 o'clock, 05.00 hours --
A. Yes.
Q. -- to 2.9. There is a corresponding rise, of course, at 02.55 --
A. Yes.
Q. -- which splits the readings at 01.54 and 04.02.
A. Yes.
Q. Both those rises correspond, on the face of it, to the two boluses of dextrose, the first given at 02.05, following that very low reading at 01.54, and the second given at 04.20, following the very low reading at 04.02. I hope everybody's with me so far. The jury are all nodding.
The precise figures may not be terribly important in the context of the issues in the case. All right? What I'd like you just to answer, if you would, please, using the time parameters that you've set out in writing in your statement, is what sort of effect those two boluses would have had on the readings that we see in the table.

A. So I think that both of those measurements that you've mentioned are consistent with the prior administration of the 10% dextrose bolus at...

Q. 02.55 and 04.20?

A. Yes, thank you.

Q. I'm not sure whether the precise figures, unless my learned friend wants me to -- no. It was raised last time and that's the answer.

MR JUSTICE GOSS: Mr Myers will obviously ask any questions he wishes to ask about that.

Just so I've understood this, in simple terms if a patient, and we know we're dealing with a very small infant here, is given a bolus of dextrose, so that's an infusion in one go of dextrose, that will raise the blood sugar level?

A. That's correct. And that would not be an inappropriate value to record --

MR JUSTICE GOSS: Exactly.

A. -- at that stage.

MR JUSTICE GOSS: Yes. Now, then you went on to your earlier answer, long answer, to talk about figures for whether there was insulin, and I was going to ask you by insulin do you mean natural insulin or manufactured insulin that's in the baby?

A. Those figures are only based on natural insulin.

MR JUSTICE GOSS: On natural insulin?
A. Yes.
MR JUSTICE GOSS: Right. All right. I'll leave it to Mr Myers now if he wants to ask anything in due course.
MR JOHNSON: Yes. In the context of the issues in the case, it's of marginal importance, but it was raised, the professor didn't answer it, and he's provided an answer and so (inaudible: off microphone).
MR JUSTICE GOSS: Thank you.
MR JOHNSON: Hopefully we'll move on to more straightforward material now, but given the time, could we have the break now?
MR JUSTICE GOSS: I think it would make more sense, if we're going to move on now to [Baby L], let's do [Baby L] of a piece. We'll have a ten-minute break.
(11.41 am)
(A short break)
(11.53 am)
MR JOHNSON: Professor, you have written several reports concerning the case of [Baby L]; is that right?
A. That's correct.
Q. I'll just run through them for the sake of the record. The first was dated 30 August 2021?
A. I recognise that, yes.
Q. The second, 20 June 2022?

A. Yes. I recognise that as well.
Q. Thank you. Was there a third, dated 7 July?
A. That is correct.
Q. Thank you. As a structure for your evidence, if we can use your original report, please, of 30 August.
A. Thank you, I've got that before me.
Q. Were you approached by an officer from Cheshire Constabulary originally to seek your opinion in this case?
A. I was.
Q. Was the overall purpose of your involvement to address the case of [Baby L] with respect to the hypoglycaemic episodes from the 8th to 11 April?
A. That's correct.
Q. Was that in the context of a report that had been written by Dr Dewi Evans?
A. That is correct.
Q. I'll come to the material you received in a moment, but can we just look at the table that's been given to the jury this morning, please, just to evaluate what I have described and you have agreed with was the hypoglycaemic episodes from the 8th to 11 April.
Here in the table we have three pages of typescript. The first and earliest date is 8 April 2016. There's a black line. Then we go to the 9th. Then over the

page, a further line separates the 9th from the 10th and a yet further black line, the 10th from the 11th.

This is not your document, is it, professor?

A. No, it's not my document.

Q. So any mistakes are my responsibility. But this is the result of a collaborative process amongst the parties in the case to try to clarify when readings were taken, what they are, what they were, what was being infused to [Baby L] at the time, and then in the final column we have references, hopefully to help the jury find the original information if there's any doubt about the accuracy of any of this data.

So in terms of hypoglycaemia, we see that the third column in the table is the blood sugar reading, sometimes abbreviated in medical notes as BM; is that right?

A. It is.

Q. We see, looking at the 8th as an example that's on the screen at the moment, on the electronic screen, that from very shortly after his birth, [Baby L] had a very low blood sugar of 1.9, which rose to 2.5, then 5.8, and then various figures thereafter.

Overnight from midnight, no readings were taken at all until 10.00 hours on the 9th when it had reverted back to 1.9, where it had been almost exactly 24 hours

earlier. Is that a fairly accurate summary of the position?

A. That's a correct observation of the situation, yes.

Q. Thank you. In terms of hypoglycaemia, so low blood sugar, can you tell us what, if any, is the watershed for a diagnosis of hypoglycaemia?

A. So in the newborn period in a well infant, baby, the cut point has been debated, but is generally agreed to be less than 2.6 millimoles per litre. But a value of 2.4 millimoles per litre would be viewed as acceptable, and most paediatricians would operate somewhere between those two values.

Q. Thank you. Just before we get to the detail of your evidence and your opinion, please, professor, can we just continue with the table. Going down the page, we see that on 9 April, following an absence of readings from midnight, the readings recommenced at 10.00 hours; is that right?

A. That's correct.

Q. We see them for ourselves on the page. Over the page, we see from 16.00 hours again through to midnight various readings; is that right?

A. That's correct, yes.

Q. Amongst those, we have at 18.26 and 18.29 an entry recording in effect the evidence that we've heard this

morning that at those two times blood samples were received in the lab at the Countess of Chester Hospital.

A. That's correct.

Q. We also see that at 16.30 hours that afternoon, the infusion being given to [Baby L] changed from a 10% dextrose infusion to a 12.5% infusion?

A. And we should also note that not only was the concentration of the dextrose infusion increased, but the rate of infusion was also increased as well at the same time.

Q. So if we just turn back to page 1 for a second, we see that from about midday, the rate of infusion was 3ml per kilogram per hour, which equates to 4.4ml per hour. A bolus was given, as in the case of [Baby F] that we heard about just before the break. Moving over the page, we then see that following the concentration rate being altered, a new bag being hung, as you have observed, we go from 5.9ml per hour to 7.3 to 8, to 8.9, then back to 7.6 and so on; is that right?

A. That is correct.

Q. Thank you. Thereafter, on 10 April, we've got various records amalgamated into this table, timed between 01.00 hours that morning and 23.00 hours. As before, the third column gives us the blood glucose readings. The fourth column shows when the concentration of the

infusion was increased at somewhere between 02.30 and 03.00. We also see the corresponding rates of administration or infusion once again fluctuating from time to time.

A. That's correct.

Q. Then finally, 11 April, beginning at the bottom of page 2, continuing on the 15% concentrated glucose, increasing from 5.4 to 10.5ml per hour at 01.00 hours. Then varying over the page thereafter?

A. Yes.

Q. Is that correct?

A. That is correct as well.

Q. Thank you. Just so that we have an overview of where we're going here, please, professor, that's all consequent on your telling us that there was a hypoglycaemic episode between various times for [Baby L]. By reference now to what we have now in this paper document, can you point out to us what you are referring to as the hypoglycaemic episode?

A. We see initially, a low blood glucose on 8 April at -- this is the very beginning of this table on page 1, with a blood glucose of 1.9 millimoles per litre, which was managed, as you pointed out, in terms of correction with the 10% dextrose infusion --

MR JUSTICE GOSS: You'll have to keep your voice up, sorry.

A. That restored the blood glucose to 2.5 millimoles per litre an hour and a quarter later. And by the afternoon, at 16.00 hours, the blood glucose was well within the normal acceptable range.

You will note that around about 16.00 hours, perhaps as a result of that 5.8 millimoles per litre reading, the infusion rate was reduced to 2.9ml per hour and then to 1.6ml per hour, and you'll notice that there was a gradual decline in the blood glucose in the period of time from 18.00 hours through to 22.00 hours. I think probably it's worth pointing out to the jury that the infusion rate at that stage -- and I apologise, this is going to be in more numbers than units -- but the infusion rate delivered from 18.00 hours to 22.00 hours decreased to 1.7 milligrams of glucose per kilogram of body weight per minute.

That's an important number just to remember.

Q. I'm sorry to stop you, but what we're looking at on the table is millilitres per hour and you have referred to different units. So can you just talk us through that differential, please?

A. So what we're interested in is to compare how much glucose is being infused, which is your 10% dextrose, plus your infusion rate, which, for example, could be 2.9ml per hour at 16.00 hours. And what we're trying --

I'm trying to do is to put that in the context of what a normal newborn baby, neonate, would require in terms of glucose delivery in order to maintain a normal blood glucose and satisfy the glucose requirements of the brain.

The newborn and neonate have higher glucose requirements than children and adults, and the number that we would be interested in is in delivering glucose to the body, to the brain, at a rate of 5 milligrams per kilogram per minute.

Q. Right. I'm sorry, once again, to interrupt you, but 5 milligrams of sugar, of glucose?

A. Of glucose.

Q. Per kilo of body weight?

A. Correct.

Q. Per minute?

A. Per minute.

Q. Okay. So what we have here is 2.9 millilitres per hour, taking your 16.00 time as a reference point.

A. Yes.

Q. How does that 2.9ml per hour convert to milligrams per kilo per minute?

A. It converts to 3.3 milligrams per kilogram per minute. So it's less than you might otherwise expect to be delivering in order to maintain normal blood glucose and

normal glucose delivery to the brain.

Q. What we haven't produced here, so that you understand, is the enteral feeds. You have seen me coming, of course. Perhaps given that you know what the question is, can you provide the answer?

A. You're absolutely correct that this does not include enteral glucose delivery and providing that glucose delivery orally was adequate then it would be reasonable to reduce your glucose infusion rate. So the step down in the infusion rates might well reflect the introduction of oral intake of milk, although there does appear to have been a further decline in the blood glucose as we go later in the evening of 8 April.

Q. Yes.

MR JUSTICE GOSS: Can I just see that I've understood this or I'm keeping up with it? In terms of a neonate of [Baby L]'s age and weight, he would normally require 5 grams --

A. Milligrams.

MR JUSTICE GOSS: Milligrams, sorry, of dextrose.

A. Yes.

MR JUSTICE GOSS: Per minute? It would be per kilo per minute?

A. That is absolutely correct.

MR JUSTICE GOSS: Right. At the rate of infusion of 1.5ml

per hour he would be getting 3.3 milligrams?
A. No, 3.3 refers to the 2.9ml per hour.
MR JUSTICE GOSS: Right. Sorry, 3.3 is 2.9?
A. Yes. For your 1.5, that would be 1.7 milligrams per kilogram per minute.
MR JUSTICE GOSS: All right. Sorry, I misnoted what was... I'm glad I...
So there would be a deficiency of 3.3?
A. That is correct. What we are unclear of is whether there was any contribution from oral feeds.
MR JOHNSON: We're about to come to that.
MR JUSTICE GOSS: Exactly.
A. Right.
MR JOHNSON: In the lever arch file that is -- it's number 2, it's the one just under your laptop there. Behind divider 15 you'll see in the bottom right-hand corner of each page there's a red J number.
A. Yes.
Q. If you go to 18031, please.
A. This is a neonatal unit fluid balance chart.
Q. Correct. We've got the glucose infusion rates at the top and about two-thirds of the way down the printed half of the page or four-fifths down the page is a hole. You've got DEBM, which is the donor-expressed breast milk feeds. We see that every 2 hours, with the

exception of 22.00 hours, when he received 8ml, [Baby L] was receiving 7ml of milk.

A. Yes, I can see that.

Q. I'm not going to ask you about that at this stage, that's just to provide the answer to the jury to the issue that you raised about what else was going on at the time. So what I'm still concentrating on, please, professor, is the overall hypoglycaemic episode, as you have characterised it in your report, of [Baby L].

So we've looked at the figures for the 8th. I don't want to descend into an analysis of what's going on at this stage, I just want to clarify the parameters of what we're going to deal with.

So on the 9th, which spreads or covers the two pages, is that entirely a hypoglycaemic episode going through that day?

A. Yes, it is. There's a 2.8 millimoles per litre recorded in your table at 18.29 hours.

Q. Yes. Just so that you understand, the jury know this very well, that analysis was conducted at 18.29. That's why -- sorry, the sample was received at the lab at 18.29. It doesn't mean that the blood and -- the blood certainly wasn't taken at that time. So there is an evidential grey area about precisely when that sample

was taken. All right? So probably, I hope I'm not being controversial, at the earliest taken at midday and at the latest taken at about quarter to 4 that afternoon, so 15.45 or thereabouts. So that's the time window in which that sample was taken.

So again, just skating over the figures for an overview first --

A. Sorry, Mr Johnson, could we also clarify? I'm afraid it is important, I think --

Q. Yes, please.

A. -- that this is a glucose sample, which was analysed in the laboratory.

Q. Correct.

A. And it would be not a whole blood sample, it would be a plasma glucose measurement.

Q. Yes.

A. Plasma glucose, when compared to blood glucose, was a bit higher than your finger prick measurement or, to put it another way, the blood glucose on a finger prick is about 10 to 15% less than you would record in plasma. So that value, if you did match it with a finger prick or heel prick blood glucose measurement, would be more like 2.4.

Q. Right. So you're not comparing like with like?

A. That's correct, yes.

Q. Putting it a different way and to be entirely, I hope, clear, all the other values would have to be increased if you were comparing like with like?
A. Yes.
Q. Either you decrease this one or you increase the others, same difference?
A. Yes.
MR JUSTICE GOSS: Simply because this is plasma and not just from blood?
MR JOHNSON: Yes. You will have heard the evidence this morning from the witness who described the spinning of the sample and that sort of thing?
A. Yes.
Q. Right. So moving on then, on 10 April, was that entirely a hypoglycaemic episode?
A. Yes. There is some slight improvement as we go through to 11.00 and 14.00 hours. There seems to be a bit of an improvement there. That seemed to be maintained as we went through the evening into 11 April. Again, there had been changes to the glucose infusion, which I'm sure we'll come back to.
Q. We will. Just in terms of the parameters of where we're going now, professor, if you had to put a time on it, when would you say that the hypoglycaemic episode ended?
A. I think in a consistent direction we don't have readings

between 05.00 hours on the 11th and 11.00 hours on the 11th as well. It looks as though probably it was becoming more stable but it really didn't return to values within the -- really within the normal range by of about 3.5 millimoles per litre at 15.00 hours on the 11th.

Q. We're going to explore the reasons for all this in a moment. Just having gone on a diversion into the overall figures, can we return to your report, please.

You've told us the basis for your instructions. So far as the material that you were sent, were you sent, in short form, [Baby L]'s medical records from the Countess of Chester Hospital?

A. I was.

Q. The blood test results that were available for [Baby L] covering this period of time?

A. I received those as well.

Q. And did you also receive, in addition to Dr Evans' report, a report from or reports from Dr Bohin?

A. I did.

Q. Thank you. Were you told that it was suspected that [Baby L] had either been given an injection or infusion of insulin?

A. I was.

Q. And were you told that the reasoning behind the

suspicion was that there was a mismatch between the level of C-peptide and insulin in a blood sample?

A. That's correct.

Q. So, so far as the specific questions that you were asked to address, were they as follows? First, what had caused the high insulin and low C-peptide level?

A. That's correct.

Q. Were you asked whether you agreed with the conclusions of Doctors Evans and Bohin?

A. I was.

Q. If you did agree, were you asked why you agreed with them?

A. I was.

Q. Alternatively, if you did not agree, were you asked to say why?

A. I was asked that question.

Q. And in that event to explain what you thought had happened?

A. That's correct.

Q. Were you asked specifically to address the issue of naturally occurring conditions that an infant could suffer that would leave a high insulin level and low C-peptide concurrently?

A. I was.

Q. And were you asked to help with how those conditions

could be identified?

A. I was.

Q. If there were other potential causes for the findings, what evidence there was for and against that particular proposition in this particular case?

A. Yes, that was included in the request.

Q. Thank you. And finally, were you asked to say how common it was to find such a disparity between insulin and C-peptide?

A. I was.

Q. And/or any other conditions that you identified that could account for the readings?

A. That's correct.

Q. Thank you. So far as [Baby L]'s background is concerned, did you summarise his arrival in the world and treatment at the Countess of Chester Hospital?

A. I did.

Q. And did you set out at least a good proportion of the readings that are now reproduced in this table that we've spent some time going through?

A. That is correct, and I've certainly documented right up to 16.00 hours and then I took up the values again on the measurement at 22.00 hours.

Q. I'm looking at, in my version of your report, page 4. I don't know if it corresponds precisely with the

printed copy that you have. But did you refer specifically to the document that the witness this morning was being asked about, which is the printout from the lab? I think if you go to jury bundle 2, it's page 18026.

A. I'm on that page, yes. I recognise the data output and the values recorded as the ones that I used in the formation of this report.

Q. Thank you. So you were looking at the glucose reading, cortisol, growth hormone, insulin, C-peptide, sodium and potassium?

A. That's correct.

Q. What struck you as being unusual, if anything, about these results?

A. So in the face of the plasma glucose value, we have a plasma insulin concentration of 1,099 picomoles per litre, and insulin C-peptide of 264 picomoles per litre, plus a cortisol of 397 millimoles per litre, which is raised, and blood plasma growth hormone of 8.63 micrograms per litre, also elevated.

The elevation of the plasma cortisol and plasma growth hormone largely excludes ketotic hypoglycaemia as a cause.

Q. I'm sorry to interrupt you. This is highly technical for people like me. So you started by looking at

cortisol and growth hormone?

A. Yes. They were both elevated, as you would expect in a situation where you are hypoglycaemic. So the responses, although elevated, are correct and appropriate for the hypoglycaemia.

Q. Why does that exclude what you've just told us?

A. Because they are one of the -- deficiencies of cortisol and growth hormone are one of the major causes for ketotic hypoglycaemia.

MR JUSTICE GOSS: So that is a form of hypoglycaemia?

A. Yes.

MR JUSTICE GOSS: And that can be -- deficiencies there can be a cause?

A. That is correct.

MR JUSTICE GOSS: But not here?

A. But not here because we're going to come on to considering the other form of hypoglycaemia, which is non-ketotic hypoglycaemia.

MR JUSTICE GOSS: Right.

MR JOHNSON: You have just mentioned ketotic hypoglycaemia. Is this one of the naturally occurring potential causes of low blood sugar?

A. Yes.

Q. So two hormones measured, those results in your opinion excluded the possibility of this particular type of

naturally occurring low blood sugar?

A. Correct.

Q. So turning to non-ketotic hypoglycaemia?

A. Non-ketotic hypoglycaemia is driven by two large causes: one is excess of insulin and the other is a deficiency in the formation of acylcarnitine, which I think we can exclude because we have here clearly documented high plasma insulin concentrations, which you do not get in non-ketotic hypoglycaemia due to acylcarnitine problems.

Q. Acylcarnitine problems. Problems is a word I know. Can you explain the rest of it, please?

A. In order to form ketone bodies when you're starving, you have to break down fat in the liver and the process that does that operates or uses the carnitine system to promote the breakdown of your stored fat into ketone bodies, which the brain can use as an alternative source of energy when glucose is not available.

Q. You described this to us last time, didn't you, in [Baby F]'s case, when you were telling us how dangerous it is to have an overdose of insulin because the overdose of insulin prevents the body's backup or plan B, which is when, as you say, you're starving, you consume fat, and the fat in effect keeps the brain functioning?

A. That is absolutely correct.

Q. Right, I'm glad I understood that. All right. So we have two potential causes for high insulin, which you have excluded for those reasons; is that correct?

A. I've excluded one cause for non-ketotic hypoglycaemia, which is this acylcarnitine side of things.

Q. Yes.

A. I am now left with a situation of hypoglycaemia associated with an elevated plasma insulin concentration, and the question then is: is the source of that insulin from the body itself endogenous insulin or is it from somewhere else, from outside the body, exogenous insulin? And to direct us to which of the two it might be, we have an associated measurement of the plasma C-peptide concentration, and because of the way that insulin and C-peptide are produced and removed from the circulation, the concentration of C-peptide is always five to ten times the concentration of insulin. So if your plasma insulin was 10 picomoles per litre you'd expect your C-peptide going with that measurement to be somewhere in the region of between 50 and 100 picomoles per litre.

So always a situation where the insulin is coming from the pancreas of the individual, when you measure insulin and C-peptide together, the C-peptide will always be greater than the insulin. This is not the

case looking at these particular measurements. You can see that the plasma insulin is high at 1,099 picomoles per litre. If we were to apply our rule of it being five to ten times -- of the C-peptide being five to ten times the plasma insulin concentration, we should see a plasma C-peptide concentration of somewhere between 5,000 to 10,000 picomoles per litre.

We do not see that. What we see is a plasma C-peptide which is down towards the bottom end of the range quoted by the laboratory. It's on the basis of that that I concluded the view of the two paediatricians who reviewed this case was correct in that the cause for the hypoglycaemia was the exogenous administration of insulin.

Q. Thank you. So somebody gave insulin to [Baby L]?

A. And I think we should -- yes, I agree with that statement. I think we should add, to qualify it perhaps, also, that this was not prescribed insulin.

Q. No. Would it also be -- plainly, there is no prescription in the medical records, but would any of these blood glucose readings justify somebody giving insulin to this child?

A. On the data that we are presented with in the table from this morning, there is no indication whatsoever for the administration of insulin. The only occasion when that

would take place would be if there was persistent raised blood glucose values. This is not the case at all in the recordings that we have observed over the period of time from 9 April through to 11 April.

Q. You told us last time of the dangers of administering insulin in a case where it is not medically indicated. Do they apply equally to this particular case?

A. They are exactly the same.

Q. Thank you. You told us last time that you can't give insulin orally because, basically, it won't -- for the reasons you explained about the size, it's a protein, the size of the molecule and all the rest of it, it doesn't pass through the system through the stomach?

A. That's correct.

Q. Therefore, given the range and duration of the low blood sugar readings, by what means was, in your opinion, insulin given to [Baby L]?

A. I think the most likely way of administering it would be by the intravenous route. The other route you could administer the insulin is by injection under the skin. But assuming that the insulin used was Actrapid insulin, ultra-short-acting insulin, which is available as ward stock, the duration of action would require, over the time period we are discussing, some seven to eight subcutaneous injections in order to maintain this period

of hypoglycaemia.

If the route was intravenous we have two options. One is to give multiple single -- sorry, multiple injections, intravenous bolus injections of insulin. Again, the duration of action would dictate that you would need to give somewhere between 10 and 12, perhaps 14, single intravenous bolus injections to achieve the same effect in terms of blood glucose over this period.

If you went for an infusion of insulin intravenously, then that would require adding insulin to the infusion system, the bags that have been used to deliver fluid, and depending on how often the bags are changed, you would not need to alter -- you would not need to have such a frequent attention to administering the insulin, you could make up several bags at once, for example, perhaps, and that would be sufficient to cover this time period.

So my feeling is that the likely mode of delivery of the insulin was through an intravenous infusion by the addition of exogenous insulin to the infusion bag systems.

Q. The next question which you address in your written report is how much needs to go into the bag to produce these figures.

A. Well, the answer is that I've taken quite a conservative

view of this and I would suggest that you could add somewhere in the region of 10 units of insulin to a bag and that would be sufficient to produce the hypoglycaemic effect and also to generate the plasma insulin concentration that was measured in the sample on 9 April.

For your information, the vials of insulin contain 100 units per millilitre, so 10 units is a tenth of a millilitre. So the volumes we're talking about are quite small and would not be noticeable just on a routine stock check. If added to infusion bags, you wouldn't notice the change in the volume within the bag, nor, because insulin is -- Actrapid insulin, I should say, is a clear solution, would you see any change in the colouration of the fluid in the bag, nor would you see any cloudiness in the bag itself, which you might see in some of the older insulins that we used many years ago.

Q. One issue that's been raised with a number of witnesses is that insulin has a distinctive smell. Would you smell it in the bag?

A. Yes, it has a distinctive smell, but you wouldn't smell it. You would only really smell insulin if you're drawing it up and you get it on your hands. But otherwise, no, once it's in the bag, it's in a sense

sealed off from you being able to detect it by smell.
Q. Just going back over to some of that information that you've given to us, 10 units equals one tenth of 1 millilitre; is that right?
A. That's correct.
Q. The jury saw, and you produced last time, a little vial of Actrapid insulin, which is the type of insulin that there was on the ward at the time. That's a 10ml bottle; is that right?
A. That's correct.
Q. So as a 10ml bottle, just to give us some idea of what we're talking about, that bottle contains 1,000 units?
A. Yes.
Q. So it's 1% of that 10ml bottle, putting it in another way?
A. Yes, that's correct.
Q. How does one get insulin if one were determined to do it? How would you get it into a bag of dextrose?
A. You can do it fairly easily: you would draw it up with a needle and syringe, and on the infusion bags you can inject it either -- through the portal is the easiest way to do it. You could just push it into the bag itself, but you're always susceptible then to it leaking if it just went straight into the bag rather than through the portal at the bottom of the bag.

Q. It may be outside your personal experience, I don't know, but we've seen videos or a video of a nurse increasing the volume of dextrose in a bag or the concentration of dextrose and going through a specifically designed port, which, if the bag was hanging, would be at the bottom of the bag.
A. That would be the most likely way of doing it.
Q. Thank you. The next question, professor, is, if possible, can you help the jury with how many bags were contaminated? The jury will have to draw their own conclusions, but if the exogenous insulin was first administered some time on 9 April, we see a very low reading of blood sugar at 10 am, 10.00 hours. We know that 10% insulin, so whether it was one or two bags of that were in use between -- I keep making this mistake, I'm sorry, I do it in writing as well, I say insulin instead of dextrose, I'm sorry.
10% dextrose. I'll start again. What we see on the 9th is 10% dextrose running in effect all day --
A. Yes.
Q. -- until 16.30?
A. Yes.
Q. Despite -- the overwhelming, almost inevitable, I would suggest, inference is that the blood sample that was taken and analysed in the lab was taken before that

change, all right?

A. Okay, yes.

Q. So it would follow from that, would it, that there must have been insulin in that 10% bag?

A. Yes.

Q. So we've got insulin in one bag, which is the 10% bag, running up to about 16.30. Of course we have no blood sample taken after 16.30 on the 9th, but we have a continuing low blood glucose despite that infusion. So looking at the rate, if there was no insulin being administered to [Baby L] during the period from 16.30 onwards, given the amount of dextrose he was receiving, would you expect the dextrose to have raised his blood sugar above those figures that we see for the balance of 9 April, continuing into the 10th?

A. Yes, for two reasons, both of which are rather similar. The first thing is that, if I may go back to the glucose delivery, the glucose delivery from that change at 16.30 hours is to a glucose delivery rate of 8.4 milligrams per kilogram body weight per minute. So we're above our value of 5 milligrams per kilogram per minute, so above what you would normally expect to maintain a normal blood glucose, and I would expect the glucose concentrations to rise as a result of that.

MR JUSTICE GOSS: So 5 is the requirement?

A. Yes.
MR JUSTICE GOSS: And there's 8.4 being delivered without any feed or any other -- just from the bag?
A. Yes.
MR JOHNSON: So in percentage terms, that's, what, 68% extra?
A. Yes. The situation changes further if we go down to 22.00 hours where there's a further step up in the infusion rate and that then now delivers 12.7 milligrams per kilogram body weight per minute. So more than double your --
Q. It's 140% extra --
A. Yes.
Q. -- give or take?
So do you infer from that or those data that this child must have been receiving insulin during that period as well?
A. Yes. That would be taken as evidence for ongoing insulin action and it must be continuous insulin action -- or continued, I should say.
Q. Yes. Does that continue through the following day?
A. Essentially, it does. You can see some variations in the infusion rate, but whatever way you look at it, it is more than a 5 milligrams per kilogram body weight per minute infusion rate, even when we get down to 5ml

per hour. For example, at 04.00 hours on 10 April, we are only down to 8.5 milligrams per kilogram of body weight per minute. So we've still got quite a high glucose requirement during this period of time.

Q. All right. So you have helpfully there picked a time after which the concentration of the bag had increased again?

A. Yes.

Q. So we're on to a third bag by this stage. So in terms of how -- what are the possibilities in terms of how, if bags were being changed, despite that fact, insulin is continuing to be administered to [Baby L]?

A. I suppose my first question back to you is: are the bags changed? And secondly -- well, let's deal with that first.

Q. The evidence suggests that the bags are changed.

A. Okay.

Q. I don't think that's a controversial statement. It's a matter for the jury whether they were or they weren't, but the system, as it's been relayed to us, is that the standard stock back is a 10% bag. To make it up 12% or 15% they add 50% at a given ratio to produce the required concentration.

A. Yes.

Q. So that's the evidence.

A. Yes. Into a new bag?
Q. Into a new bag.
A. And do we also take it as a given that when they're doing that procedure, the whole giving system is changed as well?
Q. No.
A. We don't know?
Q. No.
A. Right.
MR JUSTICE GOSS: It's just a change of the bag. Well, it's for the jury to decide.
MR MYERS: There have been different things said about the giving sets on this particular charge.
A. Right.
MR MYERS: On this one.
MR JOHNSON: Yes.
A. Yes, that's a tricky one now. Can I just take that as the bags are changed and we'll leave the giving set out of it? Then we have a 10% bag, we have a 12.5% bag made up, we have a 15% bag made up, and those three, depending on when they are run out and changed again -- so we're probably talking about a minimum of three bags having insulin added to them potentially.
Q. If the giving set isn't changed, what other possibilities enter the considerations?

A. The giving sets are plastic and insulin is a protein and it sticks very nicely to plastic. So in your giving set as well you would have insulin stuck potentially on to the walls of the tubing from which it could fall off over a period of time as well.

Q. Yes. So even if you run insulin through a giving set from a bag, you replace the bag but don't put insulin into the new bag, you will still have insulin passing in the fluid --

A. Yes.

Q. -- to the child?

A. Yes.

Q. I suppose another alternative is -- well, someone can put insulin into each bag. That's one possibility?

A. Yes, perfectly possible.

Q. As I have already told you, there is some uncertainty as to the precise time at which the blood sample was taken from [Baby L], which was received in the lab at about 18.30 or thereabouts.

A. Yes.

Q. Taking midday as the earliest time at which it could have been taken, and 15.45 as the latest time, what effect would a delay in having taken it from the child, getting it to the lab to be spun and frozen -- what effect would that delay have on the readings for insulin

and C-peptide? I think you deal with this in your report of 20 June.

A. Yes. So there's quite a reasonable data set on this area. I think the time frame that we are discussing and operating over is probably 6 hours, let's say. The data from MacDonald and Astley, my Lord, which I think I referenced and forwarded to the court, would argue for a 3% to 8% decline in the measured insulin if it had been delayed by 6 hours.

Q. So the reading is a minimum reading rather than a maximum?

A. Yes. If we are saying that the sample was taken at 12 o'clock and, for whatever reason, didn't get to the lab until 6 o'clock, then we could apply that argument to the value that was recorded so that instead of 1,099, the value would be higher than that.

Q. What about the C-peptide?

A. Equally. Equally so, yes. The 3% to 8% operates for both insulin and C-peptide in the MacDonald paper.

Q. So does it have any effect on the ratio which, as I understand it at least, is the critical determinant of exogenous insulin?

A. None whatsoever.

MR JOHNSON: My Lord, it's bang on 1 o'clock or a minute short. I think that's probably the end, but can I just

think about it?

MR JUSTICE GOSS: Certainly. We'll break off there and if you have any more questions for the professor, you can ask them at 2 o'clock.

So 2 o'clock then, please, members of the jury.

(In the absence of the jury)

MR JUSTICE GOSS: Thank you, professor. Ready to continue at 2 o'clock, please. Thank you very much.

The matter that was raised at the end of yesterday, I have received the documents but I have not been able to view the relevant material yet. If we could wait until the end of today so far as evidence being placed before the jury is concerned and revisit that issue then.

MR JOHNSON: Yes.

MR JUSTICE GOSS: I'll see where we're up to and what time it is in relation to that.

MR JOHNSON: Has the download succeeded?

MR JUSTICE GOSS: Yes. I've got the download, but I haven't had time to watch it yet. All right, thank you very much.

(1.00 pm)

(The short adjournment)

(2.00 pm)

(In the presence of the jury)

Cross-examination by MR MYERS

MR MYERS: Professor Hindmarsh, could I just ask you a couple of points about the [Baby F] schedule that you created and which we looked at, ladies and gentlemen, just towards the back of divider 6 in bundle 2. It's the schedule that you created, Professor Hindmarsh, so you may have it on your screen.

A. Yes.

Q. We were looking at what lies behind or matters in relation to that figure of 2.9 at 05.00 hours. Do you see that, professor?

A. Yes, that's right.

Q. When we received the table, dealing with 5 August, at the time of 01.54, we had a blood glucose reading of 0.8.

A. Yes.

Q. Then at 02.55 it was at 2.3.

A. Mm.

Q. Then at 04.02, it was down to 1.9.

A. Mm.

Q. And then 05.00, raised to 2.9, and at 08.09 back down to 1.7.

A. Yes.

Q. And then in the course of you giving evidence, I'd introduced the fact that in between the 0.8 and the 2.3

reading there had been a bolus of 10% dextrose at 02.05; do you recall that?

A. I remember that discussion, yes.

Q. And in between 04.02 and 05.00, there'd been another -- I think it was a 10% bolus at 04.20.

A. Mm.

Q. And having reviewed this, I just want to confirm two matters with you, please, Professor Hindmarsh. They are to be taken together so let me put into of them to you.

The first one is that the increase in dextrose from 0.8 at 01.54 to 2.3 at 02.55 reflects that 10% bolus that had been given?

A. I think that's reasonable, yes.

Q. Against a background of ongoing insulin action. That's the thing that you would add to that; is that correct?

A. That's the premise on which I'd be working, yes.

Q. Yes. Likewise, between 04.02 and 05.00, the increase to 2.9 reflects the bolus at 04.20, but again against a background of ongoing insulin action?

A. That's right.

Q. Right, thank you.

Returning then to [Baby L], the first area I'm going to look at with your assistance, Professor Hindmarsh, is the period of hypoglycaemia with a particular view to where we can say with any certainty

that exogenous insulin is or may have been introduced I just want everyone to follow where we are: we are looking at the overall period, where we can see what appears to be, from your analysis, insulin beyond what could be -- hypoglycaemia beyond what could be naturally occurring.

A. Yes.

Q. [Baby L] had neonatal hypoglycaemia from birth, didn't he?

A. Yes, that's correct.

Q. I'm going to be making reference to the table for [Baby L] that we've got. I'll just check we can all see that in front of you, ladies and gentlemen. You can see yours, Professor Hindmarsh?

A. Yes.

Q. So we know that at 12.00 hours on 8 April, a 10% -- a bag of 10% dextrose was put up. We can follow these timings on our table. We can see that in the hours that follow the 10% bag being put up, 12.14, it's at 2.5, so it's risen from the 1.9 earlier.

A. Mm.

Q. 16.00 hours, 5.8, so that's risen significantly in the circumstances, hasn't it?

A. Yes.

Q. 18.00, lower, but then the rate had already been reduced

at that point?

A. That's correct.

Q. When we look across, the dextrose had gone down to 1.6. Going into that evening, we've got readings of 2.3 and 2.2 at 21.00 and 22.00 hours, haven't we?

A. Yes, we have.

Q. Which, as you said, subject to any enteral feeds, may reflect also the reduction in the rate of dextrose that he was receiving?

A. Mm.

Q. Do you agree?

A. Yes.

Q. Then we have that reading at 24.00 hours of 3.6 for blood sugar. Again, that's consistent -- I'm going to suggest that's consistent potentially with ongoing infant hypoglycaemia at that point.

A. 3.6 we would view as acceptable.

Q. Right. So that's acceptable?

A. Yes.

MR JUSTICE GOSS: As I understood it, the professor says 2.6 is the lowest limit, but some people say you can go down to 2.4.

A. Yes.

MR JUSTICE GOSS: So anything above 2.4 is within the acceptable range?

A. Yes. I think -- precisely. Everyone would think if you'd gone up to 3.6, it's well above 3, so one could relax having seen that evolve.

MR MYERS: Thank you. So actually, then, if we look above the first black bar from 8 April to 9 April, although a couple of the readings later in the evening are perhaps just below the range we've just mentioned, taken as a body those are acceptable readings in the circumstances?

A. Yes. I think... Babies often become hypoglycaemic during the first 24 hours or have low blood glucose values as they adapt from the intrawomb environment to having to cope with an oral intake, which is variable in amount and in timing.

Q. Right. So would you put it this way, Professor Hindmarsh, between 12.14 on 8 April through to about midnight, the readings are either in the normal range or consistent with what could otherwise be a transient neonatal hypoglycaemia?

A. Yes. As I said, I'm happy with, firstly, the way they handled the situation and also in the likely explanation for the changes during that period of time.

Q. Right. If we move forward now into 9 April, we have the reading at 10.00 of 1.9, which is, for these purposes, significantly below the acceptable level, isn't it?

A. Yes, indeed.
Q. And that, if we're looking for a period from which we can say there is continuing hypoglycaemia that can't be explained by natural means, that would be where we can start from with any certainty on your analysis?
A. That's my view, yes.
Q. So whatever has gone on either at 10.00 or in the period between midnight and 10.00 hours, something has happened to change that situation?
A. Something has changed, yes.
Q. Something has changed. Then if we go forwards on your analysis, relying on the data you've been provided with, the period of non-natural hypoglycaemia, the period when, to get down to the issue, artificial insulin would be having an effect, is up to about 15.00 hours on 11 April, which is the last page of this table?
A. Yes. I think that's -- on what we have.
Q. Yes, on what we have. So in terms of readings, we've got from 1.9 at 10 o'clock on 9 April to perhaps just before the 3.5 at 15.00 on 11 April. That's the period, the key period?
A. That's right.
Q. With a question mark between midnight and 10.00 on 9 April as to when precisely this might have started?
A. I think we just don't know.

Q. We just don't know.

The next thing I'd like your help with, Professor Hindmarsh, is just the blood glucose reading of 2.8 that we looked at. I'm sure you remember where it is, ladies and gentlemen, but for the sake of convenience, because it reflects when the sample arrived in the lab, it's on page 2 and it's slotted in around 18.26 to 18.29 hours on 9 April.

As you've heard, Professor Hindmarsh, it's in the table there because we have for sure the time that it arrives in the lab.

A. Mm.

Q. In terms of the time at which the sample was taken, there's evidence to be considered on that, but it's, as you've heard, somewhere within the period either from 12 noon on the 9th to round about 15.45 on the 9th.

A. Mm.

Q. So can I just take us to that part of the table to put it in context. Ladies and gentlemen, if we, and you please, Professor Hindmarsh, go to the first page of the table. The sample is taken at some point during the period either from 12.00 hours when we can see there's a reading of 1.6; can you see that?

A. Yes, that's right.

Q. To 15.45. Now we have a reading of 1.5 at 15.00 hours,

don't we?

A. Yes, between 15.00 hours and 16.00 hours, they're the same, so it's reasonable to assume it's 1.5.

Q. And ladies and gentlemen, if you look -- you too, please, Professor Hindmarsh -- on page 2, 16.00 is 1.5, so it's bracketed by that reading, isn't it?

A. Yes.

Q. Thank you. You've explained that the plasma analysis will be about -- the finger prick will be about 10% to 15% less than the plasma analysis; that's right, isn't it?

A. That's right.

Q. So although the glucose is 2.8, in fact that should reflect a finger prick figure of 2.4 or thereabouts?

A. Thereabouts.

Q. As it happens, if we look at this, that's still, for whatever reason, way out from 1.6 or 1.5, isn't it?

A. It's different to those, yes, although bearing in mind there was a change in infusion rates.

Q. Yes. But it's certainly -- the difference is significantly greater than what you would normally expect for there just being the 10% to 15% difference from a finger prick to plasma analysis, isn't it?

A. Yes.

Q. If that is applied across the readings we have, in fact

they'd all be elevated from what we have on this table, wouldn't they?

A. I think we just need to err a little bit of caution in this, in that the 10% to 15% refers to the difference between plasma glucose and blood glucose in children and adults, and because we're also talking about -- the main difference, my Lord, I'm sorry about this, is because there's a water content of the red cells in the blood as opposed to plasma, which doesn't have any red cells. That's why you get this difference.

The number of red cells in neonates is slightly different to what you would -- you and I have. So that 10% to 15% may actually be higher than what we think. So I'm not absolutely sure we can just take that and take it across the whole field. It's an extrapolation from adults and children.

Q. As it happens, though, looking at the front page of this table where you've got 12.00 and 15.40 and the readings of 1.6 and 1.5, going off the plasma reading it's still well above actually what they are, isn't it?

A. We don't know what they are in corresponding to that.

Q. The plasma, as we've just looked at, that occurs -- that specimen is taken at some point at or between 12.00 and 15.45, isn't it?

A. If we think that is correct.

Q. No, as a matter of evidence, we know it is across that time. That bit is clear, Professor Hindmarsh.
A. Right.
Q. So as it happens, the readings, however it happens on the finger pricks, are well below what you would expect from applying your 10% to 15% to the plasma glucose, aren't they?
A. They are, but whatever way you look at it, they are all low.
Q. Mm. Well, these are two of the lowest, aren't they, 1.6 and 1.5?
A. Yes.
Q. And they would come out on your 10% to 15% analysis as 2.4, wouldn't they, roughly?
A. Not quite as high as that, but yes, okay.
Q. Therefore if that applies across these readings, it'll be correspondingly higher on the other ones, won't it?
A. It could be, but as I say, whatever way you adjust it, they're still low and consistently low.
Q. 2.4 would be just on the edge of the normal range, wouldn't it?
A. It's what would be accepted in the first 24/48 hours of life in an infant who is well.
Q. But if 2.4 is the proper analysis reading for, let's say, 1.5 at 15.00 hours; can you see that?

A. Mm.
Q. Then if we go over the page, let's look at 18.00 hours where it says 1.9. Can you go to page 2? 18.00 hours on 9 April, you've got 1.9 just above the yellow bar.
A. Yes.
Q. By the same factor, it's going to be significantly higher than 2.4, isn't it, a corrected blood glucose in that way. It is, isn't it?
A. Yes.
Q. And it's going to take it into the acceptable range?
A. Well, it might be acceptable on one occasion, but what we're seeing here is consistently low glucose concentrations. And as I said, the proviso on the interpretation of "Is it all right to have that kind of blood glucose value" is if you are a well baby.
Q. I understand that. As in, I understand that's your explanation for that, Professor Hindmarsh.
A. Yes.
Q. I'm going to move to a different topic to do with administration of insulin if that is what has happened. You've looked at with us ways in which insulin could have been administered to result in the readings that you have received from the analysis. In short, it would either be by a series of repeat injections or by infusion through the bag, the insulin having got

there -- possibly having got there by one method or another?

A. Yes.

Q. Right. I know you nodded, you have to say yes or no.

A. Sorry, yes.

Q. I think we're probably all there with this, but the problem with different injections on multiple occasions is because Actrapid has such a fast action, there would have to be a lot of them going forwards if it was individual injections of insulin all the time or over the period?

A. Yes, that's correct.

Q. For that reason, your assessment is that it's more likely that insulin has been added, in one way or another, to a bag or bags of dextrose that were hung? That's correct, isn't it?

A. That's correct. Perhaps in the -- in being fair, we should also consider the possibility that a long-acting insulin was used subcutaneously, but if we were going to go down that line -- because it would still need some multiple injections. But if we were going to pursue that line we would then have to work out the source of that because long-acting insulin would not be conventional ward stock.

Q. And the evidence is clear, there's no issue, that the

insulin we're talking about is Actrapid in this case.
A. Yes.
Q. And dealing with the insulin that we're dealing with in the case, as you said, that would take upwards of seven or eight injections over a period of time to try and achieve this sort of effect?
A. Yes.
Q. I suggest that's probably at least, isn't it?
A. Yes, probably at least, yes.
Q. I think you explained on a previous occasion the half-life of this is about 20 to 25 minutes, with Actrapid, isn't it?
A. Yes. If it's given intravenously then the half-life of insulin is 4 minutes. Twenty to 25 minutes is the half-life of C-peptide --
Q. Right.
A. -- which we've talked about, I think.
Q. All right. Let's look at the question of the infusion then. The period we are looking at, at the very least, if we're talking about insulin acting by way of the infusion, is from at least 10 o'clock on 9 April, which is the reading of 1.9, through to a period ending at or shortly before 15.00 hours on 11 April.
A. Yes.
Q. Right. Just going through the question of bags and how

this would work, we know the first bag we're dealing with in this is hung at 12 o'clock on 8 April. So we can have a marker there. That's bag 1.

And on your assessment, Professor Hindmarsh, by the time we get to 10 o'clock on 9 April, something would have been added to that bag; is that correct? Insulin would have been added to that bag?

A. Yes.

Q. That would have been added between midnight and 10 o'clock in the morning?

A. Assuming the bag wasn't changed.

Q. And in fact, factoring in the half-life in the infusion, it would probably have to have been put in by 9.30 or thereabouts, wouldn't it, to have got to 1.9 at 10 o'clock?

A. Yes, that's right. As the latest time point.

Q. At the latest. It's some time between midnight and 9.30, right. Now, at 12.10, there's a question mark, we've seen, as to whether or not there is another bag there. That's 24 hours after the first one. We can put "question mark bag 2" because as a matter of evidence that's something to be considered.

A. Okay.

Q. If a bag is put up at 12.10 and the giving set has changed, so I'm going to do it both ways, if the giving

set has been changed then insulin would have to have been added to that new bag to carry on with the insulin values that we get?

A. Yes.

Q. If we move forwards, the next bag change appears to be at 16.30 hours on 9 April, so that's over the page.

A. Yes.

Q. So that's bag 2 or bag 3 depending on how the evidence is on that.

A. Yes.

Q. If that bag is put up then and if the giving set was changed, again insulin would have to have been added to that new bag to maintain this at some point in some way? That's correct, isn't it?

A. Yes.

Q. Moving on, you identified for us, Professor Hindmarsh, on 10 April 2016 what appeared to you to be potentially a new bag. Is it between 10.30 and 3 in the morning, 02.30 and 03.00?

A. Only in the sense that you've got a change in the dextrose concentration.

Q. Yes.

A. Which in good practice would imply a change of bag.

Q. Yes.

A. I'll take the point that we are talking about good

practice here.

Q. Yes. The point being, if we've been on a certain percentage -- on 12.5% dextrose up to then, for there to be a change to 15% between 02.30 and 3 o'clock, on the face of it, would be a change of bag because it's a different concentration of dextrose?

A. Yes.

Q. So that would be either bag 3 or bag 4. And if that is a bag change and if the giving set was changed, insulin would have to have been added to that bag to carry on with the blood glucose being depressed as it is?

A. Mm.

Q. That's right, isn't it?

A. That is, yes.

Q. If we move forwards to 11 April, so towards the bottom of page 2, we can actually see at 01.45 it says:

"Started by Caroline Oakley/Samantha O'Brien at a rate of 7.3ml per hour."

Can you see that?

A. Yes.

Q. That appears to be clearly a new bag that is hung at that time.

A. Yes.

Q. So that's bag 4 or bag 5 depending on where we are.

Again, if the giving set has been changed on that,

then insulin would have to have been added to that new bag at some point to maintain the depression in the dextrose -- the blood sugar?

A. Yes.

Q. And then going over the page, that takes us to the period from about 15.00 when it seems, on your analysis, we come out of the questionable hypoglycaemia?

A. Yes.

Q. All right. We've dealt there with the situation if insulin is added in the event of giving sets having been changed --

A. Yes.

Q. -- whatever's happened on whichever occasion. If we're talking about the giving sets remaining the same or the giving set remaining the same, you've raised the possibility that given that insulin, as a protein, sticks to plastic, you could have, in effect, sticky insulin coming off --

A. Mm.

Q. -- and continuing with the infusion?

A. Mm.

Q. I'm going to ask, surely that must run out at some point. There can't be an inexhaustible supply of sticky insulin over a period of about a day and a half running through this, can there?

A. That's correct.
Q. Right. Is it the case that sticky insulin could be operative over a certain period potentially?
A. I don't think anybody's actually done those kind of studies, to be honest, and I think the answer is we simply don't know.
Q. The hypoglycaemia that [Baby L] experiences over this period, is it in a relatively steady state, if you see what I mean? So the levels go up and down according to the dextrose that's being given?
A. Yes, they do seem to be influenced by the infusion rates, and at different infusion rates, we do seem to achieve a relatively steady state.
Q. Yes. If we're working with the question of insulin being added in some way or getting in there in some way, would that be more consistent with it being added to the bags as we go along rather than an ever-diminishing supply of sticky insulin coming off the plastic?
A. Yes. If you were just relying on the sticky insulin, you would have to probably come back a bit on your infusion rate because you would probably be overdoing it in parts.
Q. Yes. So sticky insulin may account for some aspect of it, but over time it would really require additional insulin being required as we go along to maintain these

levels?

A. That is what I would view as correct, yes.

MR MYERS: Thank you, Professor Hindmarsh.

Re-examination by MR JOHNSON

MR JOHNSON: Mr Myers prefaced a series of questions there with, "We're going to look at the administration of insulin, if that is what happened". Is there any question in these circumstances that that is what happened?

A. Well, you have information and pathology reports from 9 April in the analysis that I've provided on page 4, but it's also within the documents at J18026, which is the campatha(?) summary of the sample on that day, which clearly demonstrates the presence of insulin in a very high concentration of 1,099 picomoles per litre and a low plasma C-peptide concentration at 264 picomoles per litre. So I think we can be quite certain that at that time that exogenous insulin was present.

Thereafter, despite a variety of background infusion rates of dextrose, there isn't really much change in the glucose measurements, which would imply that there is ongoing insulin present and ongoing insulin action.

Q. You told us this morning that a conservative estimate for the rate of circulation, and by that do I take it blood out of heart, blood back into heart, is 30 seconds

in a neonate?

A. Yes. That was when we were talking about achieving steady states, yes.

Q. Yes. So that's how long it takes --

A. For the mixing.

Q. For the mixing, yes. Looking at the figure of 2.8, which is the blood sample taken some time between midday and 15.45, we see, looking at the bottom of page 1, that a bolus of 4.3ml 10% dextrose was given to [Baby L] at 15.40. If the blood sample which made its way to the lab and was received at 16.29 was taken shortly after that bolus, would that in all likelihood have a significant effect on the blood sugar reading?

A. At 15.40 to 16...?

Q. No, 15.40 to 15.45, in that 5 minutes. So we know, or the paper records suggest that the bolus is given at 15.40. That's the final line on page 1.

A. Mm-hm.

Q. And the evidence or a conclusion the jury could reach is that it was shortly after that time that the blood sample was taken that was analysed in the lab. Would there be an effect of the bolus on the blood sugar reading? It's really the same as the [Baby F] point perhaps.

A. It is the same as the [Baby F] point. So if it was

given beforehand and we had a reasonable period of time for it to mix in, which I've been very generous and said it was 5 minutes, then you would expect a higher blood glucose concentration.

Q. Yes.

A. But precisely what it would be I think would -- you know, we're talking about minutes here. It's not a clean experiment.

Q. No, no. Can I deal with the number of bags that were contaminated. You have been pointed to -- well, directed to 11 April and the entry at 01.45 where it just says:

"Started by Caroline Oakley/Samantha O'Brien at [a rate]."

And it's been suggested that that necessarily means that is a new bag.

We see that in fact that, as has been pointed out, is about 24 hours after the previous 15% bag; do you see that on the 10th?

A. Yes.

Q. It says 02.30 to 03.00 hours. Just looking at the figures from the bottom of page 2, the blood glucose readings, from the bottom of page 2 over to 23.00 hours at the final reading on page 3, given that the rate of infusion is relatively stable during that period of

time, is the fact that the blood sugar levels rise during that period -- is that suggestive of the fact that this probably was a contaminated giving set, this last one?

MR JUSTICE GOSS: While you think about that, can we just break it down? Because there are a number of propositions here that I think we need to be clear about. First of all, that it was a new bag that was hung at 1.45. Work on that basis: it's a new bag of 15%. We have some fairly clear evidence about that.

A. Right. So if we look at what then happens and the infusion rate of the 15% dextrose and the adjustments made, then we have steps that took us up to a delivery rate of actually 15.9 milligrams per kilogram per minute around 04.00 hours and then a gradual diminishing of the infusion rate. I don't know what happens after 07.00 hours in terms of infusion rate, but it looks as though --

MR JUSTICE GOSS: Well, sorry to interrupt you, but I think we can assume that there's no record of any change in the infusion rate from then on, so work on the basis it then continues at that same rate.

A. Yes. So once we've got a fairly constant infusion rate then as time progresses, the blood glucose starts to rise, as you would expect, if there was less insulin

being delivered. So it is quite possible that you have a contaminated set, which is losing its sticky insulin and that is disappearing from the circulation --

MR JOHNSON: Yes.

A. -- and the situation is starting to improve. There's still quite a bit of insulin going in, I would imagine, because there's still quite high infusion rates, but they are nonetheless starting to diminish.

Q. So that pattern, if I can call it that, from 01.45 on the 11th through to 23.00 hours is consistent with that being a contaminated giving set?

A. I think so, because you could even argue that it's earlier than 15.00 hours, in that we are sitting there at 2.8 by the time we get to 11.00 hours, so it doesn't have the same look to it as it had, say, on 9 April, for example.

Q. Thank you.

MR JUSTICE GOSS: Sorry, then, can I just ask? If it is not sticky insulin slowly going through the giving set because the giving set hasn't been changed, how does one otherwise explain the improved figures from 15.00 to 23.00 hours, if it's the same bag?

A. I think we'd have to then think about how much insulin was actually administered in that particular bag and was it actually diminishing in amount as time went on.

MR JOHNSON: Wouldn't that involve it not being mixed thoroughly into the bag?

A. It would, yes.

Q. And is that a realistic possibility or not?

A. I think -- well, it depends how it was given, how it was added, I suppose. But in the transport of the bag and setting up of the bag, it would probably get mixed reasonably well.

Q. Just taking it one stage further back then and looking at the 10th, I'm just wondering -- trying to help with what inferences we can safely draw from this evidence. Assuming again that the bag is changed at 02.30 when it changes from 12.5% to 15%, looking at those blood glucose readings, 2.3, 2.2, 2.2, 2.9, 3, 2.8, 2.7, 2.9, is that indicative of a diminishing amount of insulin being administered or not given that the rate is relatively constant?

A. Yes. You've still got a relatively high rate being administered, but, yes, you could interpret it that way, I guess, as well.

MR JOHNSON: That's very helpful. Thank you. Does your Lordship have any questions?

MR JUSTICE GOSS: No, I don't, thank you. I've already asked enough, I'm sorry.

Further cross-examination by MR MYERS

MR MYERS: Can I clarify one thing? It's not a new topic, it comes out of an answer from Professor Hindmarsh to those questions.

That last bag we looked at, 11 April 2016 at 01.45, one of your answers was when you were asked about sticky insulin, you gave an alternative: it could be a diminishing amount as time goes on. Do you remember saying that as an answer to the question?

A. Mm.

Q. Did you mean by that that, well, you can't assume, if someone has interfered with them, they're putting exactly the same amount of insulin in each bag each time?

A. Well, that's correct, yes.

Q. So if it's less that's put in one of the bags, it's likely to run out sooner?

A. Could be, yes. But that's back to the mixing.

Q. Yes. But that's what you meant by diminishing amount as time goes on?

A. Yes.

Q. We have the analysis for one sample, don't we?

A. From the bag.

Q. We have the analysis on one occasion taken at 18.26, don't we?

A. Sorry, you mean in terms of the plasma insulin concentration?
Q. Yes.
A. Yes.
Q. All right. You were raising the point it might be different amounts put in at different times?
A. It could well be.
Q. All right. I just wanted to be clear.
A. When I gave the figure of what it might need to take to produce that insulin concentration, it is a -- as I said earlier today, it is a conservative estimate. I don't think people would sit down and precisely draw up 0.1ml.
MR MYERS: I'm not going to ask -- I'm limiting to my questions to the point I asked leave to deal with and I have dealt with that, so thank you, Professor Hindmarsh.
MR JUSTICE GOSS: Thank you very much, Professor Hindmarsh. That completes your evidence. You are free to go and will not be required again. So thank you very much for coming again this year to give evidence, further evidence.

(The witness withdrew)

MR JOHNSON: Dr Dewi Evans, please.

DR DEWI EVANS (recalled)

Examination-in-chief by MR JOHNSON

MR JOHNSON: Welcome back, Dr Evans. For the sake of the recording would you identify yourself, please?
A. Dr Dewi Evans.
Q. Thank you, Dr Evans. Have you written three separate reports in the case of [Baby L]?
A. I have.
Q. Dated 18 March 2019?
A. Yes.
Q. 21 October 2021?
A. Yes.
Q. And another dated 21 October 2021?
A. Yes.
Q. Is the essence of your evidence contained in the first of those three reports?
A. That is correct.
Q. Were you asked by Cheshire Police to consider the case of [Baby L]?
A. Not in the first instance, no.
Q. I know that, but did they come to you and ask you to consider it?
A. Yes.
Q. Was the reason they asked you to consider it that he was the brother of [Baby M]?
A. That is correct, yes.
Q. This, as a matter of fact, was the 60th case from the

hospital that you were asked to review; is that right?
A. Yes.
Q. Can you remember now when it was that you were asked to review it?
A. It's dated 18 March, so presumably around about that time, early 2019.
Q. All right. Did you in your report review the records relating to [Baby L]'s stay at the Countess of Chester?
A. I did.
Q. And did you identify the disproportionate ratio between the plasma insulin reading and the plasma C-peptide reading?
A. Yes, I did. There had been no concerns regarding insulin with [Baby L], but when I went through the notes I found this very high value of 1,099 of insulin and this low value of C-peptide at 264. I think we've heard that it should be the other way round.
Q. Yes. Did you suggest to the police that they should approach a specialist in endocrinology to review your findings?
A. I did.
MR JOHNSON: Thank you. Would you wait there, please, in case there are any questions?
MR MYERS: I have no questions, thank you.
MR JUSTICE GOSS: Thank you very much, Dr Evans.

(The witness withdrew)

MR JOHNSON: My Lord, I could call Dr Bohin, who will give --

MR JUSTICE GOSS: Well, can she add anything?

MR JOHNSON: No, absolutely not. It's only if my learned friend --

MR MYERS: We agree with that situation.

MR JUSTICE GOSS: Thank you very much.

I think there's some evidence to be read, is there?

MR JOHNSON: No, we've dealt with that at an earlier stage.

MR JUSTICE GOSS: Oh right.

MR JOHNSON: Sorry, I think your Lordship is referring to Dr Arthurs, who we will be hearing from in due course, but actually he's got, predictably, nothing to say on [Baby L].

MR JUSTICE GOSS: I saw him there, but I couldn't quite...

MR JOHNSON: It's just to make the point that there is nothing. We have already had that with [Baby F]. We often make these lists for our own benefit just to make sure we don't forget anything.

MR JUSTICE GOSS: So that then completes the evidence for this afternoon and does that complete the evidence for [Baby L] and [Baby M]?

MR JOHNSON: And [Baby M].

For your Lordship and the jury's information,

we will be turning to [Baby K] on Monday. We anticipate that that won't take more than a couple of days, maybe into Wednesday, possibly -- yes, into Wednesday. As long as we get a clear run, not beyond Wednesday. Then we'll move on to the next child after that, [Baby N].

MR JUSTICE GOSS: All right. There you are, members of the jury. You've heard where we're going next week in terms of the evidence.

I've explained to you several times now about not starting on another child in the afternoon because of the logistics of the parents being able to come here and it's a good natural breaking point so far as consideration of the evidence is concerned. So we'll meet again at 10.30 on Monday morning, please, and in the meantime, of course, no research about anything to do with or anyone involved in this case and no communication by any means with anyone about anything to do with this case, except when you're all 12 of you together in one room in private and no one can hear what you're saying, but each of you can hear what anyone else is saying. Thank you very much.

(In the absence of the jury)

MR JUSTICE GOSS: Mr Johnson, coming back to the issue that was raised at the end of yesterday's hearing, I now have

the application, the formal application. I have the objection to the application provided by Mr Myers and I have your response to Mr Myers' objection, and I have -- I haven't watched the whole of the video recorded interview, but I have watched parts. In particular, I have watched the two highlighted parts which are referred to in the arguments.

MR JOHNSON: Well, they are particularly the parts on which we seek to rely.

MR JUSTICE GOSS: What I'm at the moment a little -- I understand that there is no witness statement as such.

MR JOHNSON: No.

MR JUSTICE GOSS: But there would not presumably be a problem with the salient parts, and I emphasise the word "salient", because there's still a lot that hasn't been excluded from this record of interview that to my mind is wholly irrelevant, about descriptions of members of the staff and this sort of thing.

MR JOHNSON: Well, yes. I haven't been involved in that process.

MR JUSTICE GOSS: An awful lot -- as far as I can tell the material matter is the state of the babies and the particular event in question --

MR JOHNSON: Yes.

MR JUSTICE GOSS: -- and the evidence in relation to that,

which is but a very small part, and the transcript clearly explains or clearly reproduces what is said by the witness. What it doesn't reproduce is him pointing to the back of his hand.

MR JOHNSON: And also it's the movements that he's --

MR JUSTICE GOSS: Well, maybe I haven't watched it closely enough.

MR JOHNSON: It's this (indicating) sort of thing.

MR JUSTICE GOSS: Is that agreed, Mr Myers?

MR MYERS: I was going to say --

MR JUSTICE GOSS: Oh, Mr Maher is going to do it.

MR MAHER: Your Lordship will see in fact at 32 minutes on the counter, you are quite right, he turns to his veins -- when he's talking about the question of veins and he breaks down and becomes quite distressed, he rubs his hands several times and the distinct movement my learned friend Mr Johnson makes, he waves his hands to indicate "body", but in fact he says "body" within the ABE interview anyway. Those are the hand movements that are made by the witness.

MR JUSTICE GOSS: It's not as though he's going like this (indicating) or anything?

MR MAHER: No, he just does this (indicating).

MR JUSTICE GOSS: I'll watch it again, but at the moment, Mr Johnson, another way of doing it would be to call him

to give evidence to do that.

MR JOHNSON: Well, the problem -- well, we're actively considering that if the application was refused. We have welfare concerns, which is the whole point of the ABE interview.

MR JUSTICE GOSS: I have not got any formal evidence from him as to his not -- as it being appropriate for him to have special measures of this kind. I've just been looking at the act and there has to be evidence of a mental disorder or some particular vulnerability.

MR JOHNSON: He articulates all that at the beginning of the --

MR JUSTICE GOSS: Well, I know. I'll go and look at it again, but I can say I am concerned about a great deal of what it would be proposed to place in front of the jury according to the transcript that I have got.

MR JOHNSON: Right. Well, I'll have to revisit that with those...

MR JUSTICE GOSS: I know there are lines through some, but there are... Just at random, and I have just opened it at page 29 of the transcript, and I don't know, memory boxes, is that all going to be wanting to be adduced? [Mother of Babies O, P and R] seeing the boys. There are descriptions of the doctors and the hygiene and all this stuff. There's masses of it in there.

MR JOHNSON: I don't think that particular -- I haven't been privy to the details of the exchange. That isn't something we've sought to put in.

MR JUSTICE GOSS: I think you need to look at that in any event. There needs to be focus on -- and I will in the meantime go and look at it again.

MR JOHNSON: I'm sure we could arrange to play it in court if your Lordship wants to and we can make our competing submissions about it.

MR JUSTICE GOSS: Well...

MR MAHER: No objection to that, my Lord.

MR JUSTICE GOSS: It might be easier, then we can all see and people can actually point to what they're saying or refer to what they're saying they say is the probative and the prejudicial -- probative value and the prejudicial effect.

MR JOHNSON: Yes. If your Lordship would rise for a couple of minutes and we can set it up.

MR JUSTICE GOSS: Certainly. When you say a couple of minutes, do you mean a couple of minutes?

MR JOHNSON: No more than 5, please.

(2.56 pm)

(A short break)

(3.06 pm)

Housekeeping

MR JUSTICE GOSS: I've listened to the relevant passage and watched it, about five or six times, and the quality, I'm afraid, on a small laptop is not good, so I'd welcome being able to hear it on better equipment.

MR JOHNSON: We've sorted it out now anyway between us without need for a ruling.

MR JUSTICE GOSS: Oh, you've sorted it out anyway? Right.

MR MAHER: My Lord, we are very keen for the family members not to come to court if it could be avoided. Given the prospect of that, we are confident we can deal with the matter in a different way.

MR JUSTICE GOSS: Now that I've studied the actual passage carefully -- well, I won't say what provisional view I was forming, but I think this is a good way of dealing with it.

MR MAHER: Thank you.

MR JUSTICE GOSS: But I stand by what I said about there's a great deal of editing that should be done.

MR ASTBURY: It may come as no surprise that I had a part in that. It's difficult to balance the narrative and what we anticipate the defence would want. With this sort of agreement, I think the words "slash and burn" were suggested.

MR JUSTICE GOSS: Obviously, the important thing,

Mr Astbury, is just to confine it to what are the issues in relation to the evidence that this witness gives and to remove -- for example, what follows after that, there is another emotional reaction, which to my mind should not be played to the jury, and so I'm saying this in a way to try and assist.

MR ASTBURY: Thank you. It is very helpful, thank you.

MR JUSTICE GOSS: That, really, this could be narrowed down, this witness's evidence, very significantly. Apart from that particular passage, I would have thought -- as I say, I haven't watched the whole thing through, but we don't want emotion, unnecessary emotion, only when it's necessary because of the actual evidence that's being given.

MR ASTBURY: We think between us we can probably agree a summary of what's said to reduce having to read the transcript. We'll work on it over the weekend.

MR JUSTICE GOSS: Exactly. Well, thank you very much. That's very helpful if I may say so.

I can't remember whether I've -- I don't have a calendar here in front of me -- whether I indicated -- there's one.

MR JOHNSON: The 13th and the 17th were the two dates that we have between now and Easter.

MR JUSTICE GOSS: Yes.

I'm pretty sure 17 March. Friday, 17 March and Monday, 3 April.

MR JOHNSON: Previously, it was Monday, 13 March. Those were the dates we've had.

MR JUSTICE GOSS: Is that a juror? 17 March is for a juror, and Monday, 13 March for me.

Monday, 3 April, I could probably sit for 2 hours in the morning, but it wouldn't seem to me to be very helpful to do that.

MR JOHNSON: Just for your information, we have got Dr Marnerides booked in for a three-day slot at the end of March.

MR JUSTICE GOSS: Right.

MR JOHNSON: I think it's the last 3 days of March.

MR JUSTICE GOSS: Well, I won't say anything about 3 April yet. We'll wait and see. If necessary, if we needed a bit of time on the Monday morning... I could probably sit until at least 12.30. So I won't say anything to the jury yet because obviously it would just be a short day, but it would have to be the morning.

MR JOHNSON: I think between us we're reasonably confident that we can -- it's essentially six cases he comments on.

MR JUSTICE GOSS: Right.

MR JOHNSON: So 3 days is a --

MR JUSTICE GOSS: Well, anyway, it's there. As I say, I will say nothing apart from the 13th and 17 March. Is there anything else?

MR JOHNSON: No, thank you.

MR MYERS: No, thank you, my Lord. We would like to speak to Ms Letby at the conclusion of the hearing.

MR JUSTICE GOSS: That's been acknowledged as usual by the senior officer. Thank you very much.

(3.13 pm)

(The court adjourned until 10.30 am on Monday, 27 February 2023)

I N D E X