Friday, 11 November 2022

(10.30 am)

(In the absence of the jury)

MR JUSTICE GOSS: Jury in, please.

(In the presence of the jury)

Witness statement of DR SALLY OGDEN (read)

MR DRIVER: As your Lordship knows, this morning the jury will hear evidence that attaches to the counts per training to both [Baby C] and [Baby D].

May I begin, with agreement, by reading a statement from Dr Sally Ogden that relates to the case of [Baby C].

To assist the injury's understanding of the evidence, can I invite them to open up the [Baby C] sequence of events on their iPads and ask Mr Murphy to put it on our screen at tile 77, please.

Thank you. You will see at tile 77, members of the jury, that we have clinical notes to which Dr Sally Ogden and Dr Gibbs contributed at around 9.30 in the morning of Saturday, 13 June.

If we can click behind the tile and go to the original document, the second page, which will -- thank you. Scroll down, please. You may recall Dr Ogden taking us through various notes in relation to -- thank you, Mr Murphy, that's perfect -- her examination of [Baby C] that morning.

This additional statement from Dr Ogden will focus your attention on the last entry at the bottom of the screen that Mr Murphy has projected up for us. The words:

"Bowel sounds heard."

Dr Ogden's statement is dated 3 November 2022. She says:

"This exhibit [that's the exhibit on the screen] details my physical examination of [Baby C] at 09.30 hours on 13 June 2015. I have previously provided a statement dated 7 November 2018 where I have documented my physical examination findings.

"Within my notes I have detailed 'bowel sounds heard' during examination. I can provide the following additional information.

"I auscultated [Baby C]'s abdomen for the purpose of listening for bowel sounds as a routine step as part of an examination. As a result, I have documented that bowel sounds were heard, which can be a normal finding on examination and suggests there is some movement within the bowel.

"Listening for bowel sounds is part of a detailed checklist of what I see, feel and hear; the normal steps taken during the physical examination of a patient. Each individual finding is combined to assist with me forming an opinion and would not be taken in isolation.

"I can't recall any further details about the bowel sounds and I have not described them in any more detail. However, if they had sounded abnormal then I would have documented 'abnormal sounds', which is an important finding when present. It is good practice to document all examination findings, both for the medical records and so future doctors can make any necessary comparison for ongoing care. By reading the notes in their entirety, that examination would detail that the patient's abdominal examination at that time was normal."

That concludes the evidence relating to [Baby C] in that regard.

MR JUSTICE GOSS: Yes, thank you.

MR JOHNSON: Thank you, my Lord.

Just as a word of explanation first I'm now going to recall Professor Arthurs, the radiologist. What we are going to do is to deal both with the cases of [Baby C] and with the case of [Baby D]. I will examine Dr Arthurs on both cases and then Mr Myers will cross-examine on both.

MR JUSTICE GOSS: Thank you.

PROFESSOR OWEN ARTHURS (recalled)

Examination-in-chief by MR JOHNSON

MR JOHNSON: Welcome back, Professor Arthurs. Just for the

sake of the record would you identify yourself again, please?

A. Yes. I'm Owen Arthurs, I am a consultant radiologist and a professor of radiology at Great Ormond Street Hospital in London.

Q. Thank you very much. Could we today, please, deal individually first with the case of [Baby C] and then, subsequently, the case of [Baby D].

So far as [Baby C]'s case is concerned, did you complete a report dated 19 May 2020?

A. Yes, I did.

Q. And did you subsequently complete a report that simply referred to or set out material that you had received?

A. I did, yes.

Q. But in which you didn't supply any further opinion?

A. That's right.

Q. Did you then, together with a radiologist instructed on behalf of the defence, a Dr Katharine Halliday, sign a further report in which you gave further opinion relating to each of these two cases?

A. I did, that's correct.

Q. Thank you very much.

What I'd like to do, please, is deal with [Baby C] first, then. Did you note in your report [Baby C]'s identity, the date of his birth, his gestation and birth weight and the date of his death?

A. I did, that's correct.

Q. Did you set out in your report the radiographs, the X-ray pictures, that you had received and reviewed?

A. Yes, that's right.

Q. Thank you. I'd like to take you through those pictures, please, which we have in a bespoke file on the system, my Lord. There is a total of seven or eight pictures -- I think seven in this file, aren't there, Dr Arthurs?

A. Yes, that's right.

Q. The first is a radiograph taken of [Baby C]'s chest and abdomen on 10 June at 18.19 hours; is that right?

A. Yes, and this is the one that I currently have on the screen.

Q. Yes. Perfect, thank you.

Just to help us, please, could you point out a few things for us so that the jury can understand? We have heard, and we will hear some more evidence about the diaphragm. Is the diaphragm visible on this picture?

A. Yes. From the X-ray you can infer where the diaphragm would be. So to begin with, this is a small baby, they fit almost entirely on one size of radiograph that would be standard size. So you have from the neck and then the shoulders, you have the chest, all of the abdomen, even down to the femurs, which you can see on the bottom of the screen. In the top part you will see the heart as being the large blob in the middle, effectively the

white blob in the middle, and either side of that are lungs. The reason that lungs appear black on an X-ray is because X-rays pass through them, therefore they contain air.

Q. Yes.

A. So immediately below, where the black part ends and the two lung ends, is the diaphragm. It's an anatomical structure that distinguishes the chest from the abdomen.

Q. Thank you.

A. Below the diaphragm you can see normal gas in the stomach on the patient's left, the right of our screen, and then normal gas in the small bowel.

Q. Yes.

MR JUSTICE GOSS: Those are the dark areas?

A. The black areas, that's right, is gas, effectively.

MR JOHNSON: The bowel looks, in some ways, a bit like a string of sausages, doesn't it?

A. That's effectively what it is. It's one long tube from the oesophagus into the stomach, through the small bowel, the large bowel, down to the anus.

Q. So far as that picture is concerned, is there any abnormality?

A. No, I don't think so. The heart looks normal, the lungs are clear. There is normal gas in the stomach and the small bowel. The reason this X-ray is likely to be taken is to check the position of the some of the lines

inserted by the medical team and there's an umbilical venous catheter, the UVC, which is the big thick white tube you can see coming in from the bottom and going upwards. The only comment really that would be made on this radiograph is that the tube is in slightly too far and should be brought back down a little.

Q. So just so the jury have the complete picture, that tube appears almost to be overlaid on top of [Baby C] there, but does it pass within his body at some point and, if so, can you point out the approximate location at which it passes in?

A. The problem with X-rays is that they are two-dimensional pictures of what is clearly a three-dimensional structure. So the bottom of the line, as it comes into the radiograph, is clearly outside the patient and at some point it clearly goes inside the patient through the umbilicus, and you can imagine where the belly button would be. And then it passes inside the patient up towards the heart. So I can't point out exactly on that where the belly button is.

Q. No, right, thank you.

MR JUSTICE GOSS: Sorry. So that I've understood this, I am probably being a bit slow, in other words, because it's in two dimensions, it shouldn't be thought that it's coming in from that direction, it may be coming in outside the body in that direction, but in through the

belly button --

A. Yes.

MR JUSTICE GOSS: -- in the normal belly button place, in the middle?

A. That's right, in the normal belly button place, allowing for the fact that the baby at this point doesn't have a belly button, but has an umbilical cord, so there's an extent of cord and the catheter will pass into the cord.

This is the difficulty with interpreting a picture without the baby in front of you because, of course, the medical staff at this point will have known they'll have placed a catheter into the umbilicus, they will know where they expect it to be, and the X-ray is done to check where the position of the tip will be, not where it would be outside the patient.

MR JUSTICE GOSS: Right, thank you.

MR JOHNSON: Thank you. So that was the first picture you reviewed?

A. That's right.

Q. The second was taken -- so that's taken at 18.19 as we can see. The second, the same day, but at 22.38; is that right? Can we move down to the --

A. That's right, yes. So this X-ray, taken a few hours later, shows the same baby in the same position with the same lines and things in. You can see that big tube going into the middle of the patient has been withdrawn

slightly so we presume -- that was done by the medical team in the interim.

There's normal gas in the stomach, there's a nasogastric tube in here, and there's normal gas in the small bowel as we saw on the previous radiograph. So the most striking abnormality on this image is the right-hand lung of the patient, so the patient's left is the right of our image, is white.

Q. What does that denote?

A. And because you can see the airways as black, you can see the pattern of airways as they go out, it means there's something in the lung stopping the X-rays passing through. The most likely cause for that is infection and that goes by several different words and names that we use. We use opacification to mean whiteness, we use consolidation to mean -- and infection and pneumonia. They're almost interchangeable at that stage.

Q. When you say that on [Baby C]'s left lung, but the right one as we look at the picture --

A. That's right.

Q. -- you can see the airways, are they the slightly darker -- it almost looks like a scribble or a starburst or something like that within the whiteness.

A. And this reflects -- if you breathe in, you'll have air in your airway and then into the trachea and the

bronchi, but it won't get into an infected lung. So the lung looks white and the airways look black.

Q. By contrast do we have the right lung, which is to the left of the photograph --

A. Yes.

Q. -- which is almost like a negative of the left one?

A. So that's black, as you would expect, with a normal amount of air or gas going into it. So in layman's terms, this child has a left-sided lung infection.

Q. Yes. Thank you. The third radiograph is taken on 12 June at 12.36; is that right?

A. Yes, that's right, the 12th, 12.36.

Q. This is one that the jury has seen already. What abnormality, if any, do we see on that radiograph?

A. This is centred on [Baby C]'s abdomen. Again the diaphragm is at the top and you can see the femurs and the legs at the bottom. There is a tube that crosses the whole of the radiograph, which is oxygen tubing, which is outside of the patient. But the most striking thing about this is there's dilatation of the stomach, so the big gas bubble that you can see at the top of the picture is [Baby C]'s stomach, which is full of gas. The tubes below are then the small and large bowel with gas within them.

Q. Just so we can test our own abilities now, at the top left of the picture as we look at it, directly under the

6 for June, so 12/06, where we see that area of blackness at the top of the radiograph, is that the bottom of the right lung?

A. Yes, that's right.

Q. So the border between that area of blackness and where it starts to go white, is that where the diaphragm is?

A. That's right, that's the bottom of the right lung. Implicitly the diaphragm is there because the liver is immediately below the diaphragm, which would be white on an X-ray.

Q. Moving over to the right-hand side of the image, to the left of where the letter L appears, we see the bubble or the convexity of the circle pushing up into that area of white; is that pushing up into the diaphragm?

A. The top of the stomach is just under the diaphragm, so yes, anatomically, that's correct.

Q. Thank you. So is that a normal or an abnormal radiograph?

A. I think this is unusual. I think this is too much gaseous distension of the stomach than you would expect in a baby in this condition of this age. There is a very small tube, it's difficult to see on this radiograph, but there is a nasogastric tube in. A nasogastric tube in the stomach would allow free passage of air usually upwards, so it's unusual to have that degree of gas and we've just seen two previous

radiographs with a normal degree of gas on them in the stomach.

Q. Does this radiograph tell us anything about the infection of the lungs?

A. No, you can't see the left lung on this radiograph.

Q. Thank you. Can I move to your joint report then and deal with the conclusions that you have drawn from this series of radiographs, please.

My Lord, I'm looking in the joint report at Dr Arthurs' review of the group 3 cases, as he describes them, and paragraph 3 of that report sets out the case of [Baby C].

What conclusions did you draw overall from this series of radiographs, please?

A. I can read directly from our joint report, which is that:

"Both experts agree that the radiographs show left-sided chest infection, but also marked gaseous dilation of the stomach and the small bowel. Both experts agree there are several potential causes, which would include CPAP belly, sepsis, NEC or exogenous air administration."

I think that's the main conclusion.

Q. Yes. So, so far as the stomach bubble is concerned, as I'll call it, the possibilities are CPAP belly, someone pumping air in, sepsis and NEC; are they potential

causes for this as well?

A. They are potential causes for dilatation and small bowel dilatation. I think they were not found in this case.

Q. You list a series of possibilities but then there may be other evidence which impacts on whether any of those possibilities remain possibilities?

A. Yes. So they are effectively differential diagnoses for this appearance; that's not to say that they happened in this case.

Q. No, okay.

I think it was pointed out to you that this particular radiograph showed that there was no gas in the rectum and I think you were asked to comment on whether or not that had any significance in this context.

A. That's right. So if you see where the legs are, you can imagine -- if you imagine where the two legs are coming in, in between those would be where the rectum comes out. So an observation has been made that there isn't any gas in that particular location. So that's relevant if [Baby C] were a newborn who had never passed any faeces, meconium, and that this was his first X-ray, because that might suggest that there's a blockage in the bowel.

Q. Yes.

A. As we know, that's not the case. So the presence or

absence of gas in a baby who is passing meconium freely has almost no relevance.

Q. Thank you. Can we go to the case of [Baby D] next, please, unless there are any other relevant features in your view in the case of [Baby C].

A. No, that's fine. I think we've covered it.

MR JUSTICE GOSS: Just before we do, I should have mentioned before evidence was called that at 11 o'clock we will observe the 2 minutes' silence. I can't actually see the digital clock, which will be accurate to the second.

MR JOHNSON: It is.

MR JUSTICE GOSS: If you can keep an eye on it. When we get to 11 o'clock, we will sit in silence -- you can sit in silence as well, Mr Johnson -- for 2 minutes to observe that silence. Thank you.

MR JOHNSON: Dr Arthurs, your report in [Baby D]'s case was the same date as that of [Baby C]'s case; is that right.

A. That's right.

Q. And again you set out the radiographs that you received in her case; is that right?

A. Yes, it is.

Q. I want to deal with those next, please, if we may.

MR JUSTICE GOSS: Is your screen not working?

MR MYERS: It's not, my Lord, but I'm assisted by my computer which has Professor Arthurs' images.

MR JOHNSON: I would like to adopt the same routine, please, if we may, Dr Arthurs, and identify the pictures in question.

Is the first a radiograph of [Baby D], taken on 20 June at 22.22 hours?

A. Yes, that's right.

Q. We can see above this one has been typed in red "tile 43". That's just cross-referencing this to the jury's sequence of events.

What do we see or what do you see there, Dr Arthurs, that in any way is abnormal?

A. That's abnormal? Very little. You can see again the heart is white in the middle, the centre blob. Both lungs are black and pretty clear on this radiograph. Implicitly below that are the diaphragms. The white structure creating a triangle, if you like, on the left of your screen is where the liver would be. Then there is gas in the stomach on the right. And the bones in obviously the skeleton are visible. As far as I can see, I don't think there's an abnormality here.

Q. Just for completeness at the bottom left-hand side of the picture, which is the right-hand side of [Baby D], we see part of the bowel?

A. Sorry, yes. Then the small bowel, yes.

Q. So that's 22.22 hours on the 20th.

Moving on to the second picture, which equates to

tile 132. This gives us a rather more extensive view, doesn't it?

A. Yes. This is effectively the whole body, to include the chin, going all the way down to the lower limbs. The main finding here is the --

MR JUSTICE GOSS: Sorry, can we just have a time for this?

MR JOHNSON: I beg your pardon, yes. It's 21 June at 13.32.

MR JUSTICE GOSS: Sorry to interrupt you.

MR JOHNSON: It's my fault.

MR JUSTICE GOSS: So we've moved on to the next day?

MR JOHNSON: Yes. It's about 15 hours, 14 or 15 hours later.

Can you just talk us through what we can see here, please?

A. Yes. There are two features on this radiograph. One is quite obvious and one is quite subtle. The quite obvious one is that the umbilical venous catheter, which is one of the white lines that comes up from the bottom, goes into [Baby D] and then goes up and you can see it goes up into the heart and is kinked. So the comment that we would make on that radiograph is that the UVC has been pushed in too far and needs withdrawing.

The subtler abnormality here is that at the bottom of the patient's right lung, so on the left of the picture, just where it meets the diaphragm, there is a little bit of opacification. I think that was raised

at the time as being a right-sided infection and I would agree that could represent a right-sided infection or pneumonia. But you can see the magnitude of that is nothing like what we saw with the previous case.

Q. Yes. The third picture was taken after [Baby D]'s collapse on 22 June at 01.51.27. It equates to tile 216 in the sequence of events. So far as that line that was in the previous picture that was in too far, what do we see, if anything, by contrast in this picture?

A. By this time it's clearly been withdrawn and now lies a little bit short of the heart, just under the liver. So where that triangle of white is on the patient's left, at the top of where the small bowel gas is overlaid.

MR JOHNSON: It's 10.59.10 at the moment.

MR JUSTICE GOSS: Yes. We'll wait for another 35 seconds and then start 2 minutes, but as I say, fortunately the digital clock will tell us to the second.

(Pause)

It is now 11 o'clock.

(A two-minute silence was observed)

Thank you.

MR JOHNSON: So just going back to this third picture then, please, Dr Arthurs, you told us just before that 2 minutes that the line had clearly been withdrawn.

A. Yes.

Q. Can we see the tip of the line there in the middle of a loop almost?

A. Yes, it's in the middle of what looks like a loop, a circular loop, at the top, and actually the tip is within -- that's right, that's correct, where the marker is. Thank you.

Q. Is the loop inside the body or is the loop outside the body?

A. I can't tell on this radiograph, but it's almost certain to be outside the body.

Q. Yes. So it may well be that the line has been taped on the outside of the body and then --

A. That's right, yes.

Q. -- then it's gone in, okay. Thank you?

MR JUSTICE GOSS: In fact, there is a sort of rectangular white area. Could that be the tape? You see it below the loop there (indicating).

A. It could be. It could just be where the tube overlaps on itself as well, but that's likely to be where the umbilicus and the belly button is. That's right, my Lord.

MR JOHNSON: Is there anything unusual about this appearance?

A. No, I don't think so. Only with reference to the previous radiograph, which showed a little bit of infection at the right lung base, so on the left-hand

side of our image, there in fact on that image the diaphragm looks pretty clear.

Q. Yes.

A. So if that was infection, you could see from the size of it, effectively, that it may have been cleared by that point. So if it was there, it was pretty mild.

Q. Yes. So if the clinical picture was that this was a child who had improved, would the radiographic picture be consistent with that as a proposition?

A. Yes. There isn't an exact match always with when children get sick and when they have radiographic appearances. What I would say is over the three radiographs that we have, if you were to tell me that this baby was in air for all that time or didn't need any treatment for their infection, that would be consistent.

Q. We then have a series of radiographs from Alder Hey, which were taken after the death of [Baby D]. I want to move, if we can, rather than looking at them all, because I don't think we need to look at them all -- can we concentrate, Mr Murphy, on page 10 of 14, which is J2380?

If you would, please, Mr Murphy, could you turn this through 90 degrees and make it a bit more visible?

Is there anything unusual in this image, please, Dr Arthurs?

A. This is a standard lateral radiograph that would have been taken after [Baby D] died. So instead of being taken from the front, it would have been taken through the side. You can see the spine at the bottom and you can see the bowel gas, the bubbly circles which are black. The umbilical venous catheter is still in and you can see that as the tube that comes in from the top and goes down. What's striking about this radiograph is the line just in front of the vertebral bodies, just in front of the spine. So there is a black line that follows from left to right. If you could magnify that portion that might help.

So there's a black line that follows immediately in front of the spine. It's black because there is air and that's where the two main big blood vessels in the body are, the aorta and the IVC.

Q. So just -- these are all your daily work -- the aorta is what, please?

A. The aorta is the big blood vessel that carries oxygenated blood to all the organs in the body and they return, through a large vein called the inferior vena cava, back to the heart.

Q. So out through the artery, return through the vein?

A. Through the vein, that's right.

Q. Is this in effect the main highway of the plumbing of the circulation?

A. That's right, and there are two big vessels that run up and down the body, the aorta and the vena cava.

Q. Protected from behind by the spine?

A. Yes.

Q. From the front by?

A. Everything else.

Q. Exactly, yes. Well designed!

So what can we see in whichever -- can you tell the difference on this quality of image as to which of the two it is?

A. It's not about the quality, it's the fact that both tubes would overlie each other if you were to take the image in this plane. So I can't tell which of those tubes effectively the gas is within.

Q. What is the significance of that amount of gas, if any?

A. The significance, as I think I've presented already in this courtroom, is that that is an unusual appearance and that is not a typical appearance that we see in children who have died without an explanation.

Q. What potential mechanisms is that amount of gas consistent with?

A. So that amount of gas has been seen previously in babies who have died of sepsis, overwhelming infection. It's also seen in sudden unexpected death in infancy, in trauma, road traffic accidents and the like. And it is also seen in two of the other children in this case.

Q. Yes. Is one of the other two [Baby A]?

A. That's right, who we reviewed, yes.

Q. We'll leave the third for in due course.

Is this case, in other words the case of [Baby D], the other case that you were referring to when you gave evidence about [Baby A]?

A. That's right.

Q. That this was the only time you'd seen more air in a child than in the case of [Baby A]?

A. That's right.

Q. Is this appearance consistent with somebody injecting air into a child?

A. Yes, I think that's one of the explanations that needs to be considered.

Q. Have you ever come across a baby with this amount of gas in the great vessels for which no cause was found?

A. No, that's correct.

Q. Did you reach a conclusion, on the basis of the clinical history, as to what was the most likely or the most plausible explanation for this appearance?

A. In the absence of any evidence that suggested that [Baby D] had died of overwhelming sepsis or any of the other explanations that we've put forward, I considered that the radiographs are consistent with, but not diagnostic of, external intravenous air administration.

MR JOHNSON: Would you wait there, please? I'm sure there

will be some more questions for you.

Cross-examination by MR MYERS

MR MYERS: Professor Arthurs, if it's all right with you and with everybody, it's probably most sensible if I deal with [Baby D] first since we've just been looking at her and we've got your evidence on that, and then we'll have a look at [Baby C].

So dealing with [Baby D] first of all, is it right that when you looked at the post-mortem images of [Baby D], you identified normal post-mortem gas dilation in places where you would normally expect to find it?

A. Yes, that's reasonable, yes.

Q. And that includes intracranial, so in the head area?

A. Yes.

Q. That might be a generalisation, but there. Intracardiac, so in the heart region. And also bowel?

A. Yes, that's right.

Q. Thank you. I'll ask you about the image we've looked at, we don't need to go back to it, we've just seen it. As for where that gas or that air was, is it right that it could be either in the aorta or in the IVC or in both, it's just difficult to tell because of how the structures lie?

A. Yes, that's right.

Q. So it's one or both of the great vessels as it's put.

Now, we looked at the question of the significance

of gas in the abdominal vessels when you were last giving evidence, Professor Arthurs, and I don't propose to go back through all of that. I might just rehearse some key points and see if you agree or disagree.

But as a starting point would it be right to say that, generally, the significance of gas in the large abdominal vessels at post-mortem isn't known?

A. Yes, that's reasonable.

Q. And when you last gave evidence, we looked at, and you were kind enough to look at with me, the work that you had done with cases at Great Ormond Street to try to assess how often one might find gas in those abdominal vessels post-mortem.

A. That's right.

Q. You found, on the survey that you were able to conduct, in about 25% of the cases, there was gas that could be described as post-mortem gas?

A. In about a quarter of cases we found that gas was in those locations --

Q. Right.

A. -- for which there was typically an explanation, that's correct.

Q. You've got the histories of what had happened and you found gas in about a quarter, however we characterise that, and that could be considered to be post-mortem gas?

A. That's right.

Q. So for that reason, subject to the history in [Baby D]'s case, it is possible for this to be post-mortem gas?

A. Well, it is post-mortem gas in the sense that it's gas that we're seeing after the baby has died on a radiograph, so yes. The question here is whether it's explained, is maybe what you're getting at.

Q. When I'm referring to post-mortem gas like this, and the jury recall when we dealt with it last time, there are natural processes, once a body has died, that lead to gas appearing in the various parts of the body?

A. That's correct, yes.

Q. And that's what you and I are referring to earlier when I mentioned about intracranial, intracardiac and bowel gas?

A. That's right.

Q. And so with the study that you did where you say you identified a quarter of them where there was gas, that was explicable as natural gas built up post-mortem?

A. No, so I think that I need to clarify that. We often see gas in different locations, as you've described, as a normal feature in normal babies who have died. We see those on post-mortem X-rays.

The 25% was referring to in how many babies do we see gas in those great vessels if we were to go back and look through a large number. Having done that, in how

many of those was there an explanation or was there no explanation forthcoming? And that's where I gave evidence to say that we saw that typically, so in those particular locations, usually attributable to causes such as infection, sudden unexpected death in infancy, road traffic accidents.

Q. Yes, but the gas you're describing is a post-mortem build-up of gas in those cases?

A. Yes, that's right.

Q. So subject to the clinical history in [Baby D]'s case, it is possible for this to be natural post-mortem gas but it depends on what the explanations are and the history?

A. Yes.

Q. Thank you. As for the possible explanations for this that may arise, and one has to consider that in the whole picture, air administration from outside is one possibility?

A. Yes, that's correct.

Q. And that could either be deliberate or accidental, depending on all the circumstances?

A. I presume so, yes.

Q. I've asked you about post-mortem gas. Other possibilities that you acknowledged, and in fact we looked at some of these last time when you gave evidence, was the result of sepsis or infection. I know

you're nodding, but you have to say yes or no for the transcript to picks it up.

A. Yes, if there's evidence of overwhelming infection, then that could be at attributed to that.

Q. You were also able to explain that where there has been resuscitation, CPR, that also can lead to gas emerging in the great vessels?

A. Yes, we don't think that resuscitation causes gas, but we think that the normal gas that's in the post-mortem state could be re-circulated if there's vigorous cardiac resuscitation. That's right.

Q. So it encourages the gas to come out of solution in the blood, in effect?

A. I think it more redistributes the gas, in effect.

Q. Redistributes, all right.

So depending on the history, those are all things that can go to explain why it is that we see the gas?

A. Yes.

Q. Radiographs are supportive of but not diagnostic of air embolus?

A. Not air embolus, so --

Q. Exogenous air administration?

A. These are images that show you where the gas is. The images can't give you an explanation, but the clinical history can.

Q. So there may be a number of explanations but one of them

is exogenous air administration?

A. Yes, that's right.

Q. Thank you, Professor Arthurs, that's what I wanted to ask about [Baby D]'s case.

I'm going to ask next about [Baby C]. Just to clarify one or two matters, the first image I would like to ask you about was the X-ray we saw and it's in the bundle of X-rays for [Baby C] and it was the one -- I think it's page 2, Mr Murphy -- which is 10 June 2015 at 22.38.

MR JUSTICE GOSS: Yes, it's the second one we looked at.

MR MYERS: It was the second, thank you, my Lord.

This is an X-ray, the second X-ray taken that day of [Baby D].

Page 1 was the first one. You identified for us -- is it the left-sided consolidation in the lung?

A. That's right.

Q. In the left lung, thank you. Did you regard that as consistent with a clinical sign of infection?

A. Yes.

Q. Was it your view, again depending on all the clinical factors we bear in mind, that a left-sided chest infection could be a significant factor in the death of a severely growth restricted baby?

A. Yes, that was the conclusion I came to.

Q. I would like to ask you next about the following

photograph, which is at page 3 -- I say photograph, sorry, radiograph. That was for 12 June at 12.36.

A. Yes.

Q. Just a few questions about this, please, Professor Arthurs. When you were asked about the findings in the joint report, you agreed that this included left-sided chest infection and also marked gaseous dilation of the stomach and the small bowel.

A. That's correct.

Q. Just as to that and the question of the dilation of stomach and small bowel, it can sometimes be a little difficult, can't it, to distinguish the small from the large bowel? Maybe not for you, but can it be difficult to distinguish small from large?

A. I'm not quite sure that I can comment. I think others may find it difficult to distinguish between areas of bowel, that's correct, but this is the type of thing I do every day in my clinical practice.

Q. So you're able to say with some degree of certainty that what we see here is marked gaseous dilation of the stomach and the small bowel?

A. Yes. Do you want me to explain the...?

Q. I don't want to hold you back if there's a relevant explanation, but there's no challenge from me as to your description in that way.

A. Okay.

Q. I don't challenge what you say about that.

As for the cause of the dilation, or possible causes of this dilation, on 12 June, subject to the overall picture, what you considered was, first of all, whether there's any question of NEC. That can be an explanation but that depends on all the circumstances and whether we find other evidence of NEC?

A. The comment was made, looking at this radiograph, by some of the other experts that there's lucency on the left-hand side of the image as we're looking at it.

So the big circle of black at the top is stomach. The multiple sausages, if you like, of black going through on the right-hand side are small bowel. And then there is an area on the -- of smaller bits of black and white on the left-hand side of the abdomen. So there was a comment made about that this could be pneumatosis, which is gas within the bowel wall, which is a feature of necrotising enterocolitis.

Q. Right.

A. So I think they're referring to two separate things and so I refer to the distension of the stomach and the small bowel as being important.

Q. Yes.

A. And the possibility of NEC along the flank has been raised on that radiograph, but as far as I know, no NEC was found in [Baby C].

Q. I'm just going through the possible things. So that's one of them.

Sepsis or infection can explain what we see here; that's correct, isn't it?

A. That's correct.

Q. It's possible that some sort of obstruction or twist in the gut could account for this. Just pausing there, when you gave evidence to the jury earlier, you explained that in a situation like that it's relevant as to whether or not there has been faeces or meconium passing out of a baby.

A. That's right.

Q. If the bowels have been opened and therefore faeces or, perhaps if it's a very newborn baby, meconium has passed out, that would not be consistent with an obstruction because it would suggest there's been movement through the bowel?

A. That's right, it's not consistent with an inherited obstruction.

Q. Obviously, if one of the findings is that the bowels have not been opened over that period, then that possibility becomes one for further consideration?

A. So I think this baby is 4 days old at the point that this has been done.

Q. Yes.

A. So as you know, when we're asked to perform radiographs,

we're given a clinical history as to why that should be done to justify it. So a baby who hasn't had his bowels open for 4 days, that would be in the clinical history as to is there an obstruction on this radiograph. I don't think this is the clinical scenario that we're talking about here.

Q. It may be, actually, Professor Arthurs, about no bowels opened and we've been through that, we have access to that, which is why I keep it within the area you can deal with, which is depending on the clinical history it may be consistent or may not be consistent with an obstruction.

A further explanation for what we see on this image is excessive administration of air via the NGT, the nasogastric tube. And one other possible explanation for what we see here, depending on all the circumstances, is what we understand is called CPAP belly. Is that correct?

A. Yes, because both of those are a way of introducing air into the stomach.

Q. Yes, right. CPAP belly is when air, in effect being blown in through the CPAP system, has accumulated in the stomach and passed into the bowel and in effect inflates it?

A. Technically, that's correct, yes.

Q. Can I just ask one final question and it's just to do

with the photograph -- the image, sorry, we looked at, before this one, the image at page 2. When you were giving evidence initially, you described that we could see the NGT in the stomach; is that correct?

A. Yes, that's right.

Q. Is that the tube or the white line that appears to have a coil in it?

A. That's right. It's coiled in that direction in the stomach.

Q. Is that coiled because as it is put down into the stomach, it's a thin, small tube and it rolls round as it's put inside?

A. It's a bendy flexible tube, yes.

MR MYERS: All right. Thank you, Professor Arthurs.

Re-examination by MR JOHNSON

MR JOHNSON: Can we go back to radiograph number 3 for [Baby C], please?

You were going to give us an explanation for why it is, Dr Arthurs, that you can be sure that this is the small bowel as opposed to the large bowel that is inflated; could you tell us?

A. Anatomically, the small bowel is free to move around, so when you distend it full of gas, gas rises, so it lifts it up. So typically the area you'll see a small bowel full of gas is in the middle, as we can see in this image.

The large bowel is fixed to the outside of the abdomen, ascending on one side and descending on the other, so the gas that you see on the outside of the flanks, effectively, and the outer peripheries of the bowel is large bowel.

So it's not that difficult to look at this image and to say, gosh, the stomach's dilated and then there's some gas that's gone through into the small bowel and the large bowel is not dilated.

Q. Yes. I think someone used the word mesentery at some stage as to the fixing of the large bowel.

A. The mesentery is the blood supply to the small bowel and the large bowel. It's like an apron, almost, that feeds the bowel.

Q. Thank you. The issue of bowel obstruction: is another word for that volvulus?

A. These are all different ways in which the bowel can be blocked. One of the ways which you have to consider in newborn babies is a blockage they were born with, a congenital obstruction, and that can occur at any level. It can occur above the stomach, just below the stomach, at any one of a number of different levels through the bowel.

You can imagine if the bowel was blocked at a particular level, you see air dilated above that point and the stomach and wherever else. So it gives you

a marker of where it could be that the bowel is blocked.

Q. Do we have any such marker on this image?

A. No.

Q. If there was a blockage in the bowel, is that something -- given the date of this image, which is a day or two before [Baby C] died, would one expect the blockage, if it was there, to be found at a post-mortem examination?

A. More commonly it will be found before the baby dies. So babies get -- we know this is a common clinical occurrence, we know babies are born with obstructions. They tend to block very early in the first 12, 24, 48 hours. They have an X-ray which looks like there's a blockage with gas in the middle and nothing below. They then don't pass any meconium and they go to theatre for an operation.

And I think in one of the other cases that we discuss here, that's exactly what happened. So small bowel congenital obstruction is a well-recognised, well-documented medical occurrence.

Q. Yes. Is there any evidence for that on these images?

A. No. Not on the imaging, not really on the clinical history, and none was found at autopsy, as far as I am aware.

Q. So is it a credible explanation for [Baby C] having problems, a bowel blockage?

A. No, not a congenital inherited bowel blockage.

The other term that you raised was volvulus, which is where the bowel twists on itself. Of course that isn't an inherited blockage. That can happen in small babies. You can sometimes get this sort of appearance where, if the bowel twists on itself, you'll get blockage above that point, so you would get gas in the small bowel and the stomach above that point. Again, that's often a surgical emergency, the baby will go to theatre, they may not survive the surgery, but certainly that would be found, documented and documented at autopsy.

Q. So if that possibility existed, again it would be found if there was a post-mortem examination?

A. Yes, I would expect that to happen.

MR JOHNSON: Yes, thank you.

Does your Lordship have any questions?

Questions from THE JUDGE

MR JUSTICE GOSS: There's just one matter, which -- I didn't want to interrupt Mr Myers, but it was when you were being asked about this image, radiograph 3, it was put to you that there was evidence of left-sided lung infection. Is that right, Mr Myers? I don't know whether in fact you were --

A. On a previous radiograph, my Lord?

MR JUSTICE GOSS: On a previous one because you can't see

the left lung on this one.

MR MYERS: It was on the number 2 on the evening of 10 June, my Lord.

MR JUSTICE GOSS: Yes. I think it was put to you, when you were invited to look at this image, because you then went on to ask questions about this image. I'm sure it wasn't intentional, I was just clarifying it. I don't know if anyone --

MR MYERS: We can check. I'm pretty clear, my Lord, I put up the image from 10 June at 20.15. I was asking questions about left-sided consolidation on that one.

MR JUSTICE GOSS: You did. Then you went on to 3 and you repeated at that point, I think -- I don't know whether anyone can look at the transcript. But anyway. For the avoidance of any doubt, because you agreed with it, the proposition, as I recall. But you can't see...

A. It's true that [Baby C] has a left-sided chest infection, but only on the radiographs that show that, that's correct. So this chest radiograph shows that.

MR JUSTICE GOSS: This is?

A. Number 2, I think, in your pack. Then number 3, which is an image of the abdomen, which doesn't show the chest, he still has a chest infection but it's not supported by that X-ray.

MR JUSTICE GOSS: It cannot be seen on the picture because it's out of the camera shot, essentially?

A. Yes, that's correct.

MR MYERS: If I did, I wasn't meaning to ask that. I don't have any recollection that I did but it's entirely --

MR JUSTICE GOSS: It may be me. I was trying to get a note of it. Anyway, the point is, on the earlier image there was the left-sided --

MR MYERS: Yes. That's what I certainly meant to focus upon and on this one, it was the question of dilation (overspeaking) --

MR JUSTICE GOSS: Exactly, it was the stomach.

MR MYERS: Apologies if there was any confusion, my Lord.

MR JUSTICE GOSS: As I say, it may be me.

Right. So that's it for today, Professor Arthurs. Thank you very much for coming again. You will be coming back again on a date that is convenient to you, as I understand it. Thank you very much.

MR JOHNSON: Can we have a short break?

MR JUSTICE GOSS: It's a bit earlier than is normally the case.

MR JOHNSON: I'll explain to the jury exactly what's going on. We are about to call Dr Bohin. It's not an issue of screening, but there needs to be some arrangements made in court, so we have Dr Bohin, then we have the interviews summary, and we also need to deal with half a dozen corrections to the original sequence of events as well and that is the day. So we're reasonably

confident that we'll get through that before the normal close of business. I don't want to make any promises in case I can't keep them.

MR JUSTICE GOSS: No, no. At the moment the issue we're addressing is, this is a natural breaking point, we've heard Professor Arthurs, we're now going back to Dr Bohin -- you'll remember her, she's given evidence before -- so we'll break now for our 10 minutes and then we'll resume. Thank you very much.

(In the absence of the jury)

MR MYERS: I'm grateful. What happened, I dealt with the question of [Baby C] and his -- [Baby D] and her lung. Moved to [Baby C] and referred to it as [Baby D]. It appears to be that's what I did, which is why I appeared to refer back to a different image. I apologise for that.

MR JUSTICE GOSS: That's why I didn't interrupt you, but I wouldn't want the jury to -- it's clear what the situation is in relation to these radiographs.

MR MYERS: Can I ask one matter, my Lord, and it comes out of the questioning at the end with Professor Arthurs. It's something that's troubled me a little with some of the questions from the experts on the issue of obstruction and the gut.

There's been reference at times to the post-mortem and the autopsy. Because of the way the evidence is being dealt with, we are not dealing with the detail of

the post-mortem at this point, although from the prosecution experts there have been references to it with regard to [Baby C]. And certainly the impression created at the moment is there's absolutely nothing remarkable about [Baby C]'s gut from the post-mortem.

Actually, it's not as simple as that. The pathologist, who conducted the post-mortem, George Kokai, whose statement begins at page 987, deals with the abdominal cavity, and at page 992, he says:

"The stomach. All loops of bowel and mesentery show normal rotation pattern apart from descending colon, which crosses the mid-line into the right lower abdominal cavity and connects to the sigmoid colon, which is in the normal position."

And your Lordship may or may not recall or may know that the descending colon comes down the left side and would normally join the sigmoid colon on the left side.

Dr Kokai's autopsy identified the colon crossing the midline into the right abdominal cavity and then connecting to the sigmoid colon. The significance of that is something that Dr Marnerides will consider when he gives his evidence and that's something to be looked at with him. But it's a little concerning to us that quite naturally, the impression created at this point is that there is nothing on the post-mortem analysis

which depicts this as anything other than a conventionally structured bowel, and as matters stand, from the autopsy by George Kokai, it's not as simple as that.

There's some disadvantage to the defence in this situation because, of course, it's going to be possibly some months before we hear from Professor Marnerides.

MR JUSTICE GOSS: I hear and understand what you're saying. What I'm proposing to say is that there has been reference, or there was reference, by Professor Arthurs to post-mortem findings, that the jury will hear evidence in relation to the specific post-mortem findings, and they should take the evidence relating to the post-mortem findings from the pathologists and not from the clinicians, if you're content with that. If we start going into details, it becomes very complicated at this stage.

MR MYERS: I can see that, my Lord. I just wonder whether it would be possible at least to urge them to wait until they hear the evidence as --

MR JUSTICE GOSS: Exactly.

MR MYERS: It's particularly the evidence as to the anatomy of [Baby C]'s bowel, even if one were not to say to them what we expect. Because the impression at the moment, most definitely, and the one that they will take from this, is there is nothing unusual about his bowel,

and there is certainly something unusual about it, the significance of that Dr Marnerides will deal with.

I have endeavoured to observe the requests of various witnesses not to go into the pathology, although I note in passing at times it hasn't stopped them from doing so. But it's getting increasingly difficult to take that line when experts are making assertions or giving opinions on the basis of matters that the jury don't yet have and I find myself not in a position, trying to abide to the way we are dealing with this, of not raising it with those experts.

It does seem to me important that the jury know that, at the very least, the position with [Baby C]'s bowel may be a matter of significance in fact when we come to the pathology.

MR JUSTICE GOSS: I'll say that.

MR MYERS: I'd be grateful because ideally I would like them to know what Dr Kokai says, but that's a matter entirely for your Lordship. But there is a significant disadvantage to us if they leave this evidence now with the view that when we have talked about the gut, we've been talking about something that is flatly contradicted and without any basis on the pathology. It does cause us concern, my Lord.

MR JOHNSON: I completely understand my learned friend's sensitivity. If he looks at the question I asked, what

I said was:

"If there was a blockage, would it be found at post-mortem?"

And that was the question. It wasn't, "Was there an abnormality?" It was:

"If there was a blockage would it be found."

And there is no blockage.

MR JUSTICE GOSS: Yes. Well, this is the difficulty of descending into details and drawing particular attention to it.

MR JOHNSON: In effect, I was inviting him to defer -- that was him --

MR JUSTICE GOSS: Exactly. He was saying that if there was a blockage --

MR JOHNSON: Someone else's department.

MR JUSTICE GOSS: It's not for him to say. He was saying he couldn't say from the radiological point of view whether there was or wasn't.

MR JOHNSON: Yes.

MR MYERS: Perhaps, my Lord, if I may respectfully suggest, the answer may be to let the jury know that evidence as to the actual structure of [Baby C]'s gut will be dealt when we when come to the pathologists --

MR JUSTICE GOSS: Exactly.

MR MYERS: -- and we'd be grateful if they wait until that, or however your Lordship puts it, until making any

findings.

MR JUSTICE GOSS: That was what I was rather clumsily trying to say to you, Mr Myers. I will say that, that they will hear evidence as to the structure of [Baby C]'s gut and bowels from the pathologists.

MR MYERS: That should deal with it for this point. Thank you, my Lord.

MR JUSTICE GOSS: I'm quite content to say as well that Professor Arthurs, they will recall, could not say from a radiological point of view what the structure was; all he could do was interpret the radiographs as he saw them.

MR MYERS: We're grateful for that, my Lord, thank you.

MR JUSTICE GOSS: Good. Thank you very much. Well, we'll have 5 minutes if that's all right. Will that be sufficient for the reconfiguration? Thank you.

(11.40 am)

(A short break)

(11.45 am)

(In the presence of the jury)

MR JUSTICE GOSS: Members of the jury, a matter was discussed after you left. It related to the questioning of Professor Arthurs and the question of whether there was a blockage in the small bowel. You'll remember he said from a radiological point of view he can't say whether there was a blockage or not and he explained

about if there is a blockage, it's usually an emergency and so on and so forth.

But I just wanted to assure you that you will hear detailed evidence from the pathologists as to any post-mortem findings in relation to that. So bear in mind that you're going to hear further evidence about the bowel of [Baby C] and not to assume that that is all the evidence you're going to hear about it. All right?

MR MYERS: I'm grateful. My Lord, may I apologise for any confusion that arose. This is a different point but in the course of the photographs I think at one point I did refer to the [Baby C] photograph as [Baby D]. That was the issue about which one applied to which. That was my fault.

MR JUSTICE GOSS: I know it was accidental and we all make misstatements accidentally sometimes.

MR MYERS: Thank you, my Lord.

MR JUSTICE GOSS: Thank you very much.

DR SANDIE BOHIN (recalled)

Examination-in-chief by MR JOHNSON

MR JOHNSON: I formally recall Dr Sandie Bohin, please.

Dr Bohin, would you, for the sake of the recording, please identify yourself?

A. Yes, my name is Dr Sandie Bohin and I'm a consultant paediatrician.

Q. Thank you, Dr Bohin. I want to recalibrate slightly and concentrate exclusively on the case of [Baby D], please. Did you provide your views on the case of [Baby D] in a report dated 3 December 2020?

A. Yes, I did.

Q. I'd just like to take you through that report, please. Could we start at your paragraph 2.3 --

A. Yes.

Q. -- and just deal formally with the material that at the time you wrote the report you considered.

Did you have [Baby D]'s medical records from the Countess of Chester Hospital?

A. Yes.

Q. Did the medical records also include the X-ray images?

A. Yes.

Q. Material from Alder Hey Children's Hospital --

A. Yes.

Q. -- in Liverpool, some of which the jury has seen this morning. The statement of Dr Arthurs, the previous witness?

A. Yes.

Q. A statement from Dr Marnerides, who is the expert pathologist from whom the jury will hear in due course?

A. Yes.

Q. And also, the initial sift statement and the May 2018 statements of Dr Dewi Evans?

A. Yes.

Q. Was your role to peer review Dr Evans' views and conclusions?

A. Yes, it was.

Q. Thank you. You've explained what a peer review involves before. Did the same comments apply to this instance?

A. Yes.

Q. Thank you. You set out in your section 4 the relevant chronology. I'll deal with that, if I may, because we've been jumping about a bit and I just want to recalibrate us all, not least myself.

[Baby D] was born on 20 June 2015 at 4.01 in the afternoon?

A. Yes.

Q. She was 36 weeks -- 37 days plus 1 by the time she was delivered.

A. 37 weeks plus 1, yes.

Q. She was a good weight, at 3.13 kg?

A. Yes.

Q. You set out in your chronology the fact that [Mother of Baby D]'s, [Baby D]'s mother, membranes had ruptured over 60 hours before [Baby D] was born?

A. That's correct, yes.

Q. You point out in your report that at that stage you had not received the gynaecological or obstetric records, but has that deficiency now been addressed?

A. Yes, I've seen those notes now.

Q. One of the things you mentioned concerning [Baby D]'s birth, which I don't think has been dealt with directly so far, is the fact that there was something called delayed cord clamping. That's your paragraph 4.4. What does that mean and what does that tell us, please?

A. When babies are delivered, the umbilical cord, which attaches the baby to the placenta, continues to pulsate for some time after delivery. And in days gone by, the cord used to be cut immediately, but now we know that there's an advantage to the baby to wait for around 2 minutes, so that the cord continues to pulsate and actually the baby gets some extra blood, as it were, during that time. So blood goes from the placenta to the baby and that has advantages to the baby. So it's routine practice now to delay the clamping of the cord if the baby is in good condition. This is true for premature babies and term babies.

But of course if a baby is born in extremis, the priority is to save a life and not to delay clamping the cord, is to clamp and cut the cord and take the baby to a Resuscitaire, where intervention, if required, can be carried out.

So the fact that there was delayed cord clamping here told me -- and it was for 2 minutes in the notes -- that [Baby D] must have been in reasonable condition or

they wouldn't have undertaken that manoeuvre, they would have cut the cord immediately.

Q. You note, and this is a feature to which we will return when we come to your opinion, that at 12 minutes of age [Baby D] was floppy and dusky in her father's arms.

A. Yes.

Q. That thereafter she had to be given five rescue breaths and was bagged for 2 minutes?

A. Yes.

Q. She was reviewed in the theatre and she began to grunt. If you wouldn't mind reminding us, what does grunting indicate?

A. That's a sign in babies of respiratory distress. It's a noise they make when breathing out and it indicates that they're in some distress.

Q. That grunting was later remarked on by one of the midwives as being significant; is that right?

A. Yes. I think the grunting didn't start in the operating theatre, the grunting started later when [Baby D] was reviewed on the post-natal ward by the SHO.

Q. Yes. You noted the fact that after the SHO's review, the midwifery staff had asked for a review because [Baby D] had poor colour, wasn't interested in feeding, and didn't respond particularly to her vitamin K injection.

A. That's correct.

Q. Thereafter she was reviewed and admitted to the neonatal

unit, particularly because she was dusky, poorly perfused and her saturations were low at 48%?

A. That's correct.

Q. Did you then review various features of [Baby D]'s treatment, starting with the venous blood gas results taken at 19.47 hours on 20 June?

A. Yes, that's correct.

Q. Which for the jury's reference is at tile 12 of the sequence. Did you note the fact that routine bloods were taken and that [Baby D] had been given benzylpenicillin and gentamicin, two antibiotics?

A. Yes, that's correct.

Q. Which is, I think, tile 13 or thereabouts.

Did you also note that at 20.00 hours on the 20th, she, that is [Baby D], had been put on to CPAP in 40% oxygen?

A. Yes, that's correct.

Q. You noted Dr Brunton's evidence that at 9.45 that night [Baby D] had improved but was still not normal?

A. Yes.

Q. And that [Baby D]'s respiratory rate, her breathing rate, was 80 to 90 a minute with subcostal recession?

A. Seventy to 90 per minute, yes.

Q. Sorry. Just remind us, please, what subcostal recession means and indicates?

A. Subcostal recession is indrawing under the ribs with

each breath, and it indicates respiratory distress. The reason babies do that is because it's their diaphragm that causes that, that's the strongest muscle they have, and so they use that to help their breathing and it draws the tummy in.

Q. You recorded that Dr Brunton, the registrar, had decided to intubate and ventilate [Baby D] --

A. Yes.

Q. -- which is the jury's tile 35.

That the X-ray taken at 22.22 hours that evening showed the breathing tube, the ET tube, in a good position?

A. Yes.

Q. There was no NG tube or orogastric tube in place at that stage, but there was a fairly -- what you describe as a fairly large stomach bubble?

A. Yes.

Q. You record a rise in [Baby D]'s temperature from 38.0 degrees at 10.30 to 39 degrees at 11.30 that night.

A. That's correct.

Q. And that [Baby D] was settled and in 30% oxygen by the following morning, and at 9 o'clock was put on to CPAP?

A. That's correct.

Q. And that information, I think, was contained in Dr Newby's notes, which are behind tile 107.

Moving on to your paragraph 4.17, please, Dr Bohin.

At 13.25 hours, did you record or refer to Dr Chowdhury and Dr Rylance's notes at tiles 127 and 133 respectively, concerning the insertion of a UAC and a UVC?

A. Yes, that's correct.

Q. And the fact that the UVC -- I think the UAC was removed and what was thought to be the UAC was in fact a UVC, was in too far, and had been pulled back at that stage?

A. Yes, that's correct.

Q. So that in effect is the clinical records relating to the material that Dr Arthurs showed us this morning?

A. Yes, that's correct.

Q. Did you also refer to the fact that -- over the fact that there was what you describe as a patch over the right hemi-diaphragm that could be a consolidation or infection?

A. Yes, that's correct.

Q. Is that the image and the matter to which Dr Arthurs made reference this morning?

A. Yes, it is.

Q. So as we were looking at the picture, if we visualise it in our minds' eye, at the top left-hand edge of the picture, just above the diaphragm, an area of white --

A. Yes, that's correct.

Q. -- which is the bottom of the right lung?

A. Yes.

Q. Next did you record the fact that [Baby D] remained well all day, her saturations were 100% in air, in other words with no additional oxygen, but that she was receiving breathing support via CPAP?

A. Yes.

Q. Did you next refer to the blood gas results at 23.52 and 01.14?

A. Yes.

Q. How did you describe those results?

A. I said they were satisfactory.

Q. Next you record that at 01.30, there was a call to a nurse, as you describe her, we know now to be Caroline Oakley, by two others, who we now know were Lucy Letby and Mrs Percival-Calderbank, when [Baby D] had desaturated.

A. That's correct.

Q. You noted the description of discolouration to [Baby D]'s trunk, leg, arms and chin?

A. Yes.

Q. You refer to the information at tile 214, namely the attendance of Dr Brunton at 01.40 hours on a crash call?

A. Yes.

Q. That Dr Brunton had noted:

"Mottled +++ with dark brown/black tracking lesions across [Baby D]'s trunk"?

A. Yes.

Q. And that her heart rate was at that stage at 130 beats per minute?

A. Yes.

Q. Next, you record the fact that Dr Newby was called.

A. Yes.

Q. A fact which is to be found in the sequence at tile 218, that Dr Newby had noted poorly perfused hands and feet and "two bruised" areas on the abdomen resembling purpura?

A. That's correct.

Q. And that an additional antibiotic had been added to [Baby D]'s list of medications?

A. That's correct.

Q. You note the fact that the skin discolouration disappeared.

A. Yes.

Q. And that [Baby D] settled with normal saturations and a normal -- what you describe as a normal blood gas?

A. That's correct.

Q. Is that picture, just taking a step back, consistent with an infection, with an event concerned with an infection?

A. It could be, but she did recover very quickly from that and so I would be surprised if an infection alone would cause that catastrophic a collapse. So that would be unusual, but it could be consistent with an infection,

just an unusual presentation, in my opinion.

Q. Next, by reference to tile 236, the medical team were called again at 3.15 that morning. [Baby D] was distressed -- sorry, upset, distressed and crying. Saturations were reduced to between 70 and 80%. She was given 100% oxygen via CPAP.

A. That's correct.

Q. On this occasion, less marked but similar skin discolouration was noticed?

A. Yes.

Q. But [Baby D] recovered pretty quickly and in fact was taken off CPAP?

A. Yes, she was.

Q. Then we have [Baby D]'s terminal collapse at 03.45 that morning, which is tile 253. We've heard the circumstances of that. The cardiorespiratory resuscitation was not effective, she was given five doses of adrenaline, two of bicarbonate, and two boluses of saline.

A. That's correct.

Q. Resuscitative efforts were, unhappily, unsuccessful, were stopped at 04.21, and [Baby D] was declared dead at 04.25 hours.

A. That's correct.

Q. You record the fact that in the initial post-mortem, the cause of death was given as pneumonia with acute lung

injury?

A. Yes.

Q. And you also refer to, in a couple of sentences, the opinion of Dr Marnerides, the pathologist, from whom the jury are yet to hear.

A. Yes.

Q. And what I'd like you to do, if you would, please, Dr Bohin, is to give us your opinion, from the paediatric perspective, and therefore I invite you to look at section 5 of your report, which is our page 1324.

So far as [Baby D]'s general presentation at birth was concerned, what conclusion did you draw?

A. I think [Baby D] was in good condition at birth. She was given Apgars of 8 at 5 minutes and 9 at 10 minutes, and also had had the delayed cord clamping at 2 minutes, which the staff wouldn't have undertaken if she was in poor condition.

Q. You refer to, and we have on the way through noted, the fact that at 12 minutes, [Baby D] lost colour and became floppy in her father's arms. Did you have a view in relation to that?

A. Yes, I did, because in my working life, day to day, I attend caesarean sections, particularly emergency caesarean sections, which most consultants wouldn't normally do, certainly for term babies. But I do and

I know that parents, especially first-time parents, are desperately keen that have their baby with them as soon as possible. So babies who are in good condition are given to their parents to have what we've already heard of as skin-to-skin, which has a lot of positive benefits to parents.

I mean no disrespect to [Baby D]'s parents at all here, quite often, particularly with first-time parents, they're not very confident about the way they hold babies and babies can easily put their chin on to their chest and have their head flop forward. If they do that, that can collapse slightly their windpipe because, unlike in adults where the windpipe is fairly rigid, in babies it's not formed as a complete circle, so can collapse. And I see this fairly regularly -- it's usually a dad that alerts us to the fact that the baby looks a funny colour and it's usually because the baby's popped their chin on their chest, and once you reposition the baby -- and sometimes you may need to give inflation breaths -- the baby appears fine.

So I can't tell in [Baby D]'s case whether this was a clinical collapse because of illness or just a mechanical blockage because of unusual positioning of the head.

Q. So equally consistent with an inexperienced dad?

A. Oh, yes. Yes, and I mean that in no disrespectful way

at all.

Q. On behalf of the dads of this world, I forgive you!

The grunting that you recorded, is that uncommon after a C-section delivery?

A. No, not at all. Babies who are born by caesarean section retain lung fluid, so the babies' airway when it's inside mum is full of fluid, and if babies come out the usual way, their chest has a big squash as it comes out of the birth canal and so that fluid is expelled. When babies are born by caesarean section that doesn't happen and so a lot of fluid can be retained. And that can be one of the causes that babies grunt after birth. Infection is another, but it's commonly called TTN, which means transient tachypnoea of the newborn. That means transient increased breathing rate of the newborn and it usually resolves itself within 24 hours or so.

Q. Thank you.

You move on at paragraph 5.4 of your report to record the fact that [Baby D] continued to grunt and that was coincident with a drop in her temperature to 36.3 degrees. What conclusion or opinion did you reach from that combination of circumstances?

A. Newborn babies with an infection don't necessarily have a temperature in the way that adults and older children do. In fact it's probably more common for them to get cold and not be able to maintain their temperature. So

a temperature of 36.3 is indicating to me that [Baby D] was not able to maintain her temperature and that, in association with grunting, would make me worried that she had -- she was developing an infection or had an ongoing infection.

Q. And should [Baby D] have been screened at that stage?

A. She certainly should have been screened at that stage.

Q. Did a review eventually take place when [Baby D] refused to feed and had poor colour?

A. The review took place subsequently, a bit later, when she refused to feed, yes.

Q. Was it that that led to her admission to the neonatal unit?

A. Yes.

Q. In general terms were the investigations undertaken by Dr Brunton and others in the neonatal unit appropriate and was the treatment that was given to [Baby D] appropriate?

A. Yes.

Q. You move on to note the fact that [Baby D]'s temperature rose to 39 degrees. Her heart rate also rose. She was in an incubator and the nursing records suggested that the temperature was set at -- I don't think you record the actual rate it was set at, but you draw a conclusion as to whether or not it was too high. Could you tell us about that, please?

A. Yes. Newborn babies, if they're well, and they're born at term, usually maintain their temperature reasonably well, unlike premature babies. So the nursing staff in a neonatal unit are very used to premature babies coming into the unit and needing to be kept warm, so they will set the incubator quite high in order for that to happen. Term babies don't need to have the temperature on the incubator quite so high because they're usually okay at maintaining their temperature.

I think probably what happened here is because when [Baby D] arrived, her temperature was low at 37.3, the nursing staff increased the incubator temperature in an attempt to raise [Baby D]'s temperature back to the normal range, but I think probably they overdid it and so her temperature went up and her heart rate went up correspondingly, which is what you'd expect. Then when they turned down the incubator, her temperature stabilised again.

Q. Okay. So in terms of inferring from those circumstances whether or not the rise in temperature was related to infection or to environmental issues --

A. I think it was environmental. I think it was iatrogenic. I think it was caused by the high incubator temperature.

Q. Could you give us that long word again?

A. Iatrogenic. It means somebody caused it.

Q. Okay. Outside influences?

A. Yes.

Q. I think it's in the glossary.

Did [Baby D] continue to improve on CPAP?

A. Yes, she did.

Q. I think at that stage, so we're now talking about the early -- sorry, no, I think she was needing 50% oxygen at that stage; is that right?

A. Yes, she was, she was needing 50% oxygen. She improved when she was put on to CPAP but she still required around 50% oxygen, so quite a high oxygen requirement.

Q. What about her corresponding respiratory rate at that stage?

A. Her respiratory rate was high. So two things going on: she needed oxygen, quite a lot of oxygen, and her respiratory rate was above normal.

Q. And is that the reason why the decision appears to have been taken to intubate and ventilate [Baby D]?

A. Yes. Breathing at that rate is hard work for babies, and therefore rather than wait for babies to get tired, if you can see that they are working hard and their oxygen requirement and their respiratory rate is high, it's much safer and better for the baby to intervene and offer the baby the next stage of respiratory support rather than wait for the baby to collapse and then offer that respiratory support. So the clinicians looking at

her just felt that she would tire if she was left to continue breathing at that high rate.

Q. We have seen this morning the chest X-ray that was taken following [Baby D]'s intubation. But what conclusions did you draw from that X-ray, please?

A. I thought the X-ray showed evidence of some retained lung fluid, but I didn't think it showed evidence of infection.

Q. What did you think about the clinical picture?

A. The clinical picture of [Baby D], I felt, was consistent -- the clinical picture was consistent with infection, even though the X-ray wasn't. That was because her white cell count, which is a marker of infection, was high, and within the white cells of the body are a number of different sorts of white cells. In [Baby D]'s case her neutrophil count was high, and that is usually indicative of a bacterial-type infection, and that was high in [Baby D].

Q. Okay. We've heard that the C-reactive protein reading was normal, but we've also heard many times that that doesn't mean that there isn't a problem; do you agree with that?

A. Yes. You can't look at that in isolation, you have to look at it in the round with the clinical picture and the patient in front of you.

Q. The following morning at 9 am, [Baby D] was extubated, the

ET tube removed, and attempts were made to put in a line through the -- put in lines, I should say, through the umbilicus; is that right?

A. Yes.

Q. You refer to the fact that the arterial line was in the wrong place and had to be removed and that the venous line had to be pulled back as referred to by Dr Arthurs from the radiographs.

A. That's correct.

Q. You in effect express a view consistent with what Dr Arthurs has told us, that the X-ray shows evidence of infection in the lower right of [Baby D]'s lungs; is that right?

A. That's right. There's a small patch of consolidation or infection.

Q. In summary, what conclusion did you reach as to [Baby D]'s progress and status between being extubated at 9 o'clock in the morning and her first collapse at about 1.30 the following morning?

A. Well, she was well and stable. She needed some help with her breathing in terms of CPAP, but that was in air and her saturations were normal. So the observations were also normal. So this was a baby who was improving. Yes, she clearly had an infection, had a pneumonia, but she had responded to treatment and was improving. So she wasn't cured of her pneumonia, she clearly still had

it, but had improved and was getting better.

Q. We heard evidence that the decision was taken by Dr Brunton to start feeding [Baby D] with breast milk. What does that tell us as to [Baby D]'s progress?

A. Well, you wouldn't want to start feeding a baby who was unstable in any way, and I'm sure if Dr Brunton felt that she was likely to deteriorate and need to go back on the ventilator, he wouldn't have started feeds at that time. So the fact that he made that decision indicates to me that she was stable.

Q. Thank you. You refer next to [Baby D]'s collapses. Could you tell the jury what you took into account and what you found to be significant so far as those collapses were concerned?

A. The thing that was striking about the collapses were that they were -- all three of them were sudden and unexpected because, as I've just stated, [Baby D], certainly prior to the first collapse, was stable and even after the first collapse she recovered very well. So these were collapses that came out of the blue, they weren't expected, there was nothing leading up to them that would make people concerned. The collapses were sudden.

She recovered very quickly with the first two episodes, sadly not with the third. And two of the episodes were associated with an unusual mottling of the

skin. So these -- all the episodes were perplexing to me and didn't have any clear cause.

Q. Did you find [Baby D]'s recoveries after the first two -- the nature and speed of her recoveries after the first two incidents to be of any significance?

A. She seemed to recover very quickly once the team resuscitated her or give her intervention -- not resuscitation, they gave her intervention -- and she recovered remarkably quickly and was back to being stable again if you look at her observations.

Q. So far as the -- I'm looking at your paragraph 5.14 now. So far as the second episode was concerned, was there anything unusual about that?

A. Well, it's reported from the nursing staff present that she became very distressed and was crying, and it's common in term babies who are put on to CPAP that they will often fight the CPAP machine, they find it uncomfortable, because whether it's given by mask or prongs, you have to develop a seal in order to administer CPAP and that can be uncomfortable. So premature babies, if they're ill or term babies if they're ill, will often just lie there and allow CPAP to be administered. But a baby who is relatively well and feisty will fight the CPAP and will become upset.

So that is a known fact. But [Baby D] had not previously been upset on CPAP, she'd allowed the CPAP to

be given, so the fact that she became upset then was a concern to me. She had tolerated CPAP well prior to that.

Q. So far as the undoubted infection that [Baby D] had, did you reach a conclusion as to whether that been acquired before birth or after birth?

A. I think this was a congenital infection and it was acquired before birth.

Q. But having acquired that infection, how did you view [Baby D]'s progress once she'd been admitted to the neonatal unit?

A. Well, [Baby D] became unwell in the hours after birth. I think the administration of antibiotics was late, but once she got to the neonatal unit, she was investigated and treated appropriately.

Q. Was [Baby D]'s presentation, as recorded by the treating medical staff, consistent with that of a baby on a path of deterioration who was going to be dead within a few hours?

A. No. No, [Baby D] didn't give -- the clinical team knew that she had an infection and I can review her notes and I can see that she's got an infection, but there was nothing to indicate that death was imminent.

Q. In the context specifically of pneumonia, how did you summarise [Baby D]'s position, please? I'm looking at your paragraph 5.17.

A. Well, I can read that, I said:

"Although [Baby D] had pneumonia [and as far as I know no one is questioning that, I don't think], she was clinically well, she was in air and had normal blood gases. She had no respiratory compromise at all and this is not the picture of a baby with a pneumonia severe enough to kill her."

Q. Just so that the jury can understand, what is the typical picture of a baby with a pneumonia severe enough to kill them that ends in death?

A. Usually babies will show a gradual decline and deterioration and an increase in the kind of care that they need. So their respiratory rate will continue to climb, they will not tolerate being on CPAP and their blood gases will decline, so they will need to move from CPAP to more invasive ventilation. Their blood parameters will alter and become abnormal. They may need extra drugs to help with their blood pressure. So there is an altogether slow clinical decline rather than a sudden collapse.

Q. What conclusion did you draw as to the likely mechanism by which [Baby D]'s collapse had been provoked?

A. Well, taking into account the suddenness of the collapses, the very quick recovery of two of them, I was clear that this wasn't the infection that had caused the collapse. So I was looking at something else and the

something else had to be something unusual and something odd. And of course, the clinical condition also showed us that she had episodes of this unusual skin discolouration, which the medical team described.

And excluding other things -- we all make a differential diagnosis and you cross off things that don't fit with that clinical picture and the scenario that's put before you. So I excluded lots of other things and came to the conclusion that [Baby D] had air administered to her and that was the cause of the collapses.

Q. And by what -- into what part of her had the air been administered to cause these collapses?

A. Well, intravenous air, either through the UVC or the peripheral cannula that she had in her hand.

Q. A question may occur to the jury as to, if that is the mechanism in all three instances, why did she recover so quickly from two and die on the third occasion? And can you provide an answer to that conundrum?

A. I can speculate as to why I think that, which is obviously what you're asking me.

Q. Yes.

A. We know from animal studies that with air embolus, it's the volume of gas and the speed at which it is delivered that is fatal or can prove fatal. So I think if the volume in the first two cases, the volume of air

administered was small, that wouldn't have been enough to kill [Baby D]. But what we do know is if a large volume of gas is administered into a vein, when it gets to the right side of the heart, if the volume is sufficient, it causes a gas lock within the heart and then causes sudden circulatory collapse. And I think probably that is what was the ultimate issue with [Baby D] with the third collapse in that the volume of air was larger than it had been previously and caused the circulation to stop.

Q. Is there any other feature of [Baby D]'s presentation over those three collapses that you identified as being consistent with your conclusion that this was a case of air being introduced to [Baby D]'s circulation?

A. The suddenness of the collapse, which was completely unexpected given the preceding clinical picture. In two of the cases she was resuscitated. In two of the cases there was the very graphic skin discolouration, which does fit with previous cases of air embolus seen in adults and to a lesser extent in children. And of course, there's then also the issue of air in the great vessels found on post-mortem radiographs.

MR JOHNSON: Thank you, Dr Bohin. I'm sure there will be more questions for you, if you'd wait there, please.

Cross-examination by MR MYERS

MR MYERS: Dr Bohin, I just want to understand why you're

saying, and go over this with you, [Baby D]'s cause of death is air embolus. You have said in the absence of infection, that something else had to be unusual and odd.

A. Something else killed [Baby D], which I felt was unusual and odd.

Q. You said taking into account sudden collapse and quick recoveries, if not infection, that something else had to be unusual and odd.

A. Yes.

Q. Right. That's your starting point, looking for something unusual and odd; yes?

A. I wasn't looking for something unusual and odd. I'd already looked at the clinical picture and excluded things. Once I'd excluded conditions in my differential diagnosis, commoner things, they'd been excluded so I was left then with something unusual and odd.

Q. You said to the jury:

"There were episodes of discolouration. Excluding other things I concluded air administration caused collapse."

A. Yes.

Q. That's what you said to begin with; yes?

A. Yes.

Q. So looking for something unusual and odd, episodes of discolouration, excluding other things, that led you to

air administration; is that correct?

A. Yes.

Q. You also went on to add that it was sudden. That was something you bore in mind?

A. Yes.

Q. You've also made reference to air in the great vessels?

A. Yes.

Q. But that's a matter we've heard from Owen Arthurs. I'm not going to ask you about that, there's various explanations for that, aren't there?

A. Dr Arthurs has already given his evidence on that.

MR JUSTICE GOSS: I think potential explanations.

MR MYERS: Potential explanations.

You also at the end, dealing with this, said to the jury she was resuscitated twice.

A. Yes.

Q. Can you explain why does resuscitating her twice have anything to do with demonstrating this is an air embolus?

MR JUSTICE GOSS: She did actually correct herself.

A. I said intervention.

MR JUSTICE GOSS: You said resuscitate to being with.

A. And then I said intervention. I said that's probably a poor term, that she required intervention on the first two episodes.

MR MYERS: We'll be coming to the terminology in a little

bit. Whether intervention or resuscitation, why should that go to pick out air embolus rather than something else causing her desaturation?

A. Because I'd already excluded other causes for the collapses.

Q. We'll look a bit more closely at some of what you said to us. But before I do, can I just confirm this: you made reference to [Baby D] being distressed at one point in your evidence, didn't you?

A. Yes.

Q. Is that of any relevance, are you suggesting?

A. It can be, in cases of children on CPAP, which I explained, but it can also be a feature of children or adults -- not children, adults -- who have received air embolus. They can become distressed.

Q. Of adults. What's the basis of applying that to a neonate in the position [Baby D] was in?

A. The literature, as I think I said when I last gave evidence, is very poor on this and most of the literature is based on what researchers have seen in adults. There's very, very little on children. So it may be that they also get distressed in the same way that adults do.

Q. But the literature is poor?

A. Yes, it is.

Q. So there's a poor basis in terms of saying that a baby

that gets distressed is getting distressed because of an air embolus, isn't there?

A. Babies can get distressed for all number of things and air embolus is one of those things, in my opinion.

Q. In your opinion, but in fact you are speculating when you say that if adults get distressed that may be a cause of distress for a neonate in this position, aren't you?

A. But most of the opinion is based on evidence that is in the literature and very little of it relates to neonates. Very little.

Q. And neonates have different systems from adults, don't they?

A. Not as far as I'm aware, no.

Q. You're a consultant neonatologist, aren't you?

A. Yes.

Q. Isn't there a reason why we have specialist neonatologists?

A. Yes.

Q. You can't just apply what you get with adults and say, "This must apply to babies, newborn babies", can you?

A. Sorry, I thought the question was that babies had different systems to adults and I said no because I don't think they do.

MR JUSTICE GOSS: Is it biological systems, is that what you understood it to be --

A. Yes.

MR JUSTICE GOSS: -- that it was suggested that babies were different from adults biologically?

A. Yes.

MR JUSTICE GOSS: I think perhaps a bit clearer as to what you're suggesting.

MR MYERS: Neonatal babies may have different physiological systems from adults, mightn't they?

A. They don't have different systems; their physiology may be different from adults, yes.

Q. What applies to adults may not necessarily apply to neonates?

A. But it may.

Q. But you need to have a basis to see that before you assert that it does, don't you?

A. A lot of what we do in medicine in neonates relates to what people have previously done in adults. So for a lot of the care we give to neonates there is no neonatal basis for it at all.

Q. Neonates may get distressed for very many reasons, mightn't they?

A. Yes, I said that, yes.

Q. And the levels of distress and the causes may be different from adults, mightn't they?

A. They might be but they might also be the same.

Q. Yes. So what is your basis for saying that if adults

get distressed by an air embolus, that is a reason for why [Baby D] was crying on this occasion?

A. I didn't say that that was the only reason. I said that was part of the constellation of features.

Q. I'm looking at that particular feature and asking you: what is the basis for saying that is why she was getting distressed?

A. Because in my opinion that forms part of what -- how an air embolus can present.

Q. So do you disregard what the treating doctors and nurses say about the CPAP having upset her?

A. I don't disregard it.

Q. So it's in fact consistent with CPAP upsetting her, the distress; do you agree?

A. CPAP hadn't upset her before. But it had -- she appeared distressed on that second occasion. But for the time she was on CPAP before, it hadn't upset her, which was why I came to the conclusion that actually she was quite content on CPAP.

Q. Let us understand what you're saying. On the one hand, you're taking some research that applies to adults who are distressed with an air embolus and you're saying that may show why [Baby D] was upset; yes?

A. Possibly, yes.

Q. And on the other hand you're saying when the physician and the nurses say that they thought it was because she

was upset on CPAP, they may have got that wrong in fact?

A. I don't think the nurses -- none of the nurses said she was upset on CPAP. I think it was -- one of the registrars, I think Dr Brunton, made a decision to take her off CPAP because he thought that that might be making her upset. And that was after she had recovered from the second incident, so he didn't see her distressed on CPAP. He took her off because he thought it might be contributing to her distress, as far as I remember.

Q. One moment, please. I don't mean to be rude.

(Pause)

In any event, you say that may be wrong when it is said that she was distressed because of CPAP?

A. I don't know who said she was distressed. Dr Brunton took her off CPAP because she may be distressed. I don't see anybody wrote that she was distressed on CPAP.

Q. Did she continue to be distressed when she'd been taken off CPAP?

A. With crying and being --

Q. There's no suggestion she did, is there?

A. No.

Q. We know there's a period during which Caroline Oakley performed various cares, aren't there, with [Baby D]?

A. Yes.

Q. And we know that period to some extent runs up to the point of the third collapse, don't we?

A. Yes.

Q. And at no other point do we hear anything about [Baby D] being distressed, do we?

A. No.

Q. We don't hear about [Baby D] getting distressed before the first collapse either, do we?

A. No, she was stable of CPAP then.

Q. So the one occasion that we have [Baby D] being distressed is the one occasion when the treating physician was of the view it could be the CPAP distressing her?

A. No, that wasn't what he said.

Q. It coincides with the point when she was taken off CPAP because of concerns that it was distressing her, doesn't it?

A. No, I'm sorry, I can't agree with that. He took her off CPAP after the second event, after she'd recovered from the second event, because what had been reported to him prior to the second event was that she was upset on CPAP and he therefore took the decision to take her off in case CPAP was upsetting her. He didn't review it. It was something that was put to him by the nursing staff, so that was his way of treating her then, but in response to what he'd been told by the nursing staff. He didn't see that.

Q. Don't you accept that someone there said she should come off CPAP because she was distressed?

A. No, he said she should come off CPAP in case the CPAP was distressing her. He didn't see it. It was a therapeutic intervention that he thought might help [Baby D], but he hadn't seen it first-hand.

Q. So in terms of air embolus making a neonate cry, she doesn't cry on event number 1, does she?

A. No.

Q. She doesn't cry on event number 3?

A. No.

Q. And we're clear she is crying at a time when someone decided to take the decision to take her off CPAP in case CPAP upset her?

A. No, she wasn't crying when she was taken off CPAP. She had recovered from the second event by the time she was taken off CPAP. She wasn't crying at that stage; she was crying prior to the second event.

Q. Are you just trying to find any available detail actually to support this air embolus theory, Dr Bohin?

A. No, absolutely not.

Q. Because if you're right, we might expect to see distress on each occasion, mightn't we?

A. No, because the clinical presentation of air embolus is variable and, as I said in my previous evidence, you don't need to have every single element of -- every

single clinical sign of air embolus for there to be an air embolus.

Q. You just take whatever bits are available and try and work them into your theory, don't you?

A. No, I absolutely don't.

Q. And you have seized on this distress, that the clinicians have linked to the CPAP and you are just working it in, aren't you?

A. No.

Q. And not only are you doing that, but you are basing it on research you say to do with adults, aren't you?

A. I'm basing it on the available research on adults, children and animals --

Q. You told us adults.

A. -- that is available. I looked at all the research that is easily available and there's very little on neonates.

Q. Discolouration. Discolouration can be caused by conditions other than air embolus, can't it?

A. Yes.

Q. There can be many different reasons, can't there?

A. Yes.

Q. You don't actually know what the discolouration on [Baby D] was like? You don't know, do you? You haven't seen it.

A. No, I haven't.

Q. You don't have a picture or a photograph of it, do you?

A. No.

Q. We have various descriptions from witnesses dealing with this. You cannot say whether what one witness is describing they saw on one occasion with one child is the same as what another witness is saying on another occasion with another child? There's no way of knowing that, is there?

A. No.

Q. You cannot say, or you do not say, what discolouration is specifically distinctive of an air embolus, do you?

A. No.

Q. Or do you?

A. No.

Q. Right. So any discolouration then?

A. No.

Q. Come on, tell us then. Which one?

A. Sorry, which one what?

Q. Help us: which discolouration indicates an air embolus?

A. The discolouration described by the clinical staff, both the nurses and the doctors who saw [Baby D], the patchy discolouration that came and went is compatible with an air embolus, taking into account the clinical situation that we had.

Q. But we know there are lots of different discolourations that may be exhibited by a neonate for many different

reasons, don't we?

A. Neonates can get discolouration, they can get rashes. None of the known discolourations or rashes that I have seen in a neonate are anything like approaching what was described by the clinical staff treating [Baby D]. Now, I wasn't there and obviously I didn't have -- there hasn't been a photograph taken of it, so like everyone else, I'm left to glean information from what the clinicians wrote at the time. And what they wrote at the time is not compatible with any other known pathology that I know of in a neonate.

Q. No, and right at the beginning of dealing with you and Mr Evans in cross-examination, Dr Evans, in the questioning, I identified a number of possibilities in cases where medical opinion is called for. One of them is it may be not possible to identify a particular cause, for example. Do you agree?

A. Yes.

Q. Right. So there may be various explanations for what happens, it may not always be immediately clear what explanation applies?

A. That's correct.

Q. If you're going to use discolouration as a way of identifying an air embolus, we need to have something which marks that out as an air embolus rather than anything else.

A. I'm not using discolouration alone. As I've already said, it's the constellation of features, not just of the clinical discolouration, although that absolutely forms a part of it, because what has been described by clinicians, quite consistently, does not fit with any other known pathological process that I have seen in a neonate.

Q. What I would like you to help us with is what makes it fit specifically with air embolus rather than whatever else may be out there.

A. Because those type of skin lesions have been previously described in air embolus.

Q. What description are we looking for that marks it out?

A. We're looking for these patchy -- not mottling, I won't use that term because that will confuse people into thinking that mottling that we see in babies when they are in extremis for other reasons -- these were -- in some cases they were described as tracking lesions, in some cases they were described as circular/oval lesions with a reddy-brown discolouration that came and went.

Q. You're telling us what various practitioners have described to us. I'm asking you to help us with what specific presentation are we meant to be measuring that against that shows it as an air embolus rather than anything else or even anything unknown?

A. There is no single diagnostic feature of an air embolus.

Q. What about the discolouration, I'm asking you, Dr Bohin?

A. I can only go on what other people have described in their series(?), in adults and in children, where skin lesions have been identified, and they describe similar lesions.

Q. So there is no presentation of discolouration that we can use that establishes that is an air embolus that you can point to?

A. Yes, in the Lee and Tanswell paper that we discussed last time, the cases there where there was skin discolouration was described -- sorry.

Q. You carry on.

A. In that paper the skin discolouration described was remarkably similar to the skin discolouration described by the clinicians here.

Q. Can we put up, please, page 24946. It's a J number. Could we enlarge the section which has the highlighting over it, Mr Murphy?

We looked at this before, so we're familiar with it. Out of the 50 or so cases, and there are four or five of them, 11%, where discolouration was identified and it was described, from this one study as:

"Blanching and migrating areas of cutaneous pallor were noted in several cases and in one of our own cases we noted bright pink vessels against a generally cyanosed cutaneous background."

That's what we have in the description in particular of one case from this study; do you see that?

A. Yes, I do.

Q. First of all, we have had many different descriptions across the children where air embolus is alleged in this case so far. They do not conform or all conform to this, do they?

A. I think they're pretty similar.

Q. Nowhere in the clinical notes or in the clinical notes for any of the children that we have seen have we seen anyone talking about "bright pink vessels against a generally cyanosed cutaneous background". We haven't seen that description in any clinical note made at the time, have we?

A. We've seen brown, reddy-brown patches on a background of a child that's cyanosed. So I think we have.

Q. We've seen "dark brown +++ tracking", haven't we?

A. Yes.

Q. That's not this description, is it?

A. Well, it is, because tracking could be against the vessels so --

Q. Could be?

A. Yes.

Q. Have you seen anything that matches this with any degree of precision?

A. I think it's fairly similar to be honest.

Q. You think dark brown is similar to this? "Dark brown/black across the trunk" is in the notes from Dr Brunton for the first time [Baby D] collapsed.

A. Yes.

Q. We can see what's there and I suggest to you that doesn't conform to dark brown tracking across the trunk. Does it?

A. I think what we're looking at here are the features that -- you can get skin discolouration with an air embolus. I think the actual details of that, they've described their case and the clinical team here have described what they've seen in [Baby D]'s case. So there is skin discolouration.

Q. We can take this down, Mr Murphy, thank you.

You, Dr Bohin, are using just various descriptions of discolouration and saying it's air embolus without any precision at all, aren't you?

A. No, I'm absolutely not. I'm looking at the case as a whole. I'm trying to find out why [Baby D] collapsed on three occasions and was not resuscitable on the third.

Q. Do you agree we in fact have no particular presentation to measure this against, do we, the colour of an air embolus?

A. Sorry, could you rephrase the question?

Q. Would you agree there's no uniform presentation to measure this against?

A. There's no uniform presentation. We can only go on what others have seen and reported in the literature. It's rare, so no.

Q. And the only description you point to in the literature, which you have raised just then, is that one description we've seen in Lee and Tanswell, isn't it?

A. Yes.

Q. And you agree -- well, that's the one you point to. We've got three distinct events with [Baby D] in the early hours of the morning on 22 June, haven't we?

A. Yes.

Q. One at 1.30, one at 3 o'clock, one at 3.45; yes?

A. Yes.

Q. We've had a description of a vivid discolouration on the first one of those, haven't we?

A. Yes.

Q. I make it plain, I suggest to you that does not match the description in Lee and Tanswell; you say it does.

A. I say they're remarkably similar, yes.

Q. I'm not going to keep repeating that, but [Baby D] makes a full and relatively rapid recovery on that occasion, doesn't she?

A. Yes.

Q. We've seen in the notes a less marked discolouration on the second event, haven't we?

A. Yes.

Q. And [Baby D] makes a full and a relatively rapid recovery, doesn't she?

A. Yes, she does.

Q. Sadly, the third event, which did result in death, there was no evidence of any discolouration at all, was there?

A. No.

Q. Now, if these are three distinct incidents, it follows when we look at that third incident, discolouration provides no basis for identifying cause of death on that occasion, does it?

A. Discolouration doesn't, but there are other features that in my opinion do.

Q. She isn't distressed on the third occasion, is she?

A. No.

Q. There is no discolouration on the third occasion?

A. No.

Q. Just help us, what are we left with?

A. We're left with a catastrophic collapse from which she doesn't recover and air in the great vessels on post-mortem.

Q. Well, there have been two collapses beforehand, haven't there?

A. Yes.

Q. The third event may follow from the first two events, mightn't it, if there's some mechanism at work?

A. No, I don't think so.

Q. So what we're actually left with is the rapidity, you say, of a collapse and air in the great vessels?

A. It's not just the rapidity of the collapse, it's the catastrophic nature of the collapse. [Baby D] then had the final episode, which was a complete circulatory collapse, from which she could not be resuscitated. For most pathological disorders in children when they have a collapse, you are able to resuscitate them at least in the short term, even if they don't survive in the long term. It is very unusual for us to have no obvious cause of a collapse and for us not to able to resuscitate a baby.

Q. If we want to identify air embolus with any precision, you're relying upon, in fact, what Owen Arthurs says about air in the great vessels, aren't you, and that's it?

A. Well, it wasn't just what Owen Arthurs said, I was given the X-rays, so I could see the air in the great vessels. But yes, Dr Arthurs has given his evidence this morning.

Q. Well, he's the expert dealing with paediatric radiology, isn't he?

A. Yes, he absolutely is.

Q. Yes, and so we have what he says about that.

A. Yes.

Q. All right. The inability to resuscitate you identify as a characteristic of an air embolus, don't you?

A. No.

Q. Well, we've talked about how it can be fatal in the case of [Baby A]. But you know whatever happened with [Baby D] to cause events 1 and 2 self-evidently wasn't fatal, was it?

A. No.

Q. In fact, she made a full and relatively rapid recovery on both occasions?

A. She did.

Q. Which, in principle, is inconsistent with air embolus, isn't it?

A. No, I don't think it is.

Q. Do you agree that air embolus in the research and the literature that we have is nearly always fatal?

A. No, what we know is that it depends on the volume and speed of delivery of the gas. So it isn't always fatal at all.

Q. Well, first of all, in the reported cases do you agree that it is invariably fatal?

A. No, it's seen in -- as I've said, most of the literature is based on adults and it's seen in adult practice around particular types of surgery, and it isn't fatal, there is a treatment.

Q. And animals, you've said?

A. Yes.

Q. Do you agree that animals have got different

physiological systems to neonates?

A. Animals do, but it's clearly not ethical to do some of these studies in humans, so we're left with doing animal studies, and quite often the piglet is used because the physiology of a piglet is very similar to the physiology of a neonate. So some of the studies were in piglets.

Q. I'm not looking at the question of how difficult it is to do research, I'm looking at the question of how safe it is to rely upon what you say comes from one area and apply it into another. You understand that, Dr Bohin?

A. Yes, I understand that.

Q. Right. So first of all, a piglet, a rat, a monkey or a dog cannot be said to mirror the conditions of a neonate, can they?

A. Animal models can be made to be very close to -- not a rat. We don't do experiments on monkeys anymore, very rarely, but the piglet model is used quite a lot in neonatal research.

Q. Do you agree, whether using a piglet or a dog, you cannot just extrapolate that to the effect on a baby, can you?

A. Not directly, but sometimes that's the only method of research that we have.

Q. Yes, a paper you cited, the Gordy paper, refers to rabbits and dogs, doesn't it?

A. Yes.

Q. Right. But you must -- do you not agree, just because something is the case with a rabbit or a dog, it doesn't follow it's going to be the same with a neonate 3 days old, does it?

A. It may not be, no.

Q. What basis do you have for saying how much air over what period of time is fatal and how much air over what period of time in a baby weighing 3kg is not fatal? What basis do you have for that?

A. I've only got the evidence in the literature.

Q. Which is based on dogs and rabbits?

A. Yes. It's based on dogs and rabbits because it's not ethical to inject humans with air to see who survives and who dies.

MR MYERS: That may be the case, but we're looking at the basis for what you're saying, not the difficulties of research.

My Lord, I'm going to move to an entirely different topic.

MR JUSTICE GOSS: Yes, if that's a convenient point to have a break. Could you be ready to continue at 2 o'clock, please?

2 o'clock, members of the jury. Thank you very much.

(In the absence of the jury)

MR JUSTICE GOSS: It would be helpful -- I'm not asking for

a categoric time -- but about how much longer are we going to be?

MR MYERS: I think I will be about 35 minutes to 40 minutes, my Lord, not longer than that.

MR JUSTICE GOSS: That's fine.

MR JOHNSON: If we start at 2.00 and my learned friend's estimate is right, we'll definitely be finished by 3.00.

MR JUSTICE GOSS: Thank you very much, that's helpful.

(12.58 pm)

(The short adjournment)

(2.00 pm)

(In the presence of the jury)

MR JUSTICE GOSS: Yes, Mr Myers.

MR MYERS: My Lord.

Dr Bohin, I'm going to look at [Baby D]'s condition -- not all of it, but aspects of it -- during the 36 hours that she was alive, and I'm going to suggest to you that you have disregarded or minimised certain facts that go to show how unwell she was. Do you agree or disagree with me?

A. What, that you're going to show me?

Q. No. Do you agree or disagree that you have sought to minimise certain facts that show how unwell she was?

A. No, I have not.

Q. Could we put up, please, slide 118 on the screens? If we go behind that to page 2214.

I'm going to ask some questions about this first -- sorry, in a moment. But I'm going to suggest to you, right really from the moment of birth, there is no doubt that [Baby D] was very unwell; do you agree or disagree?

A. I disagree.

Q. You pointed out that the Apgar scores show 8 at 5 and 9 at 10. They're actually recorded on here but we know that's what they recorded, Dr Bohin. Yes?

A. Yes.

Q. Do you agree?

A. Yes, I do.

Q. Then we come to a point, 12 minutes later, when we see a description about how [Baby D] presented.

Putting aside whether the Apgar scores are a proper reflection of the moment of birth, I'm going to suggest there is no doubt that by 12 minutes of age she was very unwell indeed; do you agree or disagree?

A. No, at 12 minutes of age she had an event, which needed some sort of intervention. As I explained, whether that was an illness or a mechanical obstruction, we can't tell from what is written there.

Q. We've heard a lot about the importance of looking at the whole clinical picture with a baby, haven't we?

A. Yes.

Q. Wouldn't you agree that if we look at the whole picture, the clinical picture over [Baby D]'s life, that event at

12 minutes indicates she was very unwell?

A. No, it indicates that she had an event which needed some intervention.

Q. You suggested that it may be down to the way in which her father was holding her, haven't you?

A. No, I have suggested that's one possibility, that the way she was held meant that her head flexed on to her chest and obstructed her airway.

Q. Yes.

A. I said that was one of the possibilities, I didn't say that was the only possibility.

Q. You said:

"Not very confident... fathers... new fathers can be very unconfident about holding a baby. The chin can go on to the chest and it can cause a collapse. I can't tell if it's a clinical collapse, meaning through ill health, or a mechanical blockage."

Yes?

A. Yes.

Q. That's what you said. When you said mechanical blockage, you meant that's down to the father not holding the baby correctly, didn't you?

A. No. I'm not -- I've made it very clear that I was not holding [Father of Baby D] responsible for this. I said any new parent is often very nervous about holding their baby and it's very easy, even for nursing staff when

they're holding babies, for the baby's chin to fall on to their chest and accidentally compromise the airway. So I was not holding [Father of Baby D] responsible for that.

Q. When [Mother of Baby D] gave her evidence she described how when [Baby D] was delivered and lifted over for her to see,the screen, she was asked what the impression was that she had of [Baby D]'s state, and she said:

"Not alive. She seemed very lifeless. She didn't scream. There was no sound."

Just so we can be quite clear, what do you say that may be due to? What are your choices with that, Dr Bohin?

A. Just been delivered by caesarean section. The cord hadn't even been cut so [Baby D] had just been taken from her mother's abdomen. And the practice of the obstetricians is to hold the baby up to let the parents see the baby very quickly. If a baby is in extremis, the obstetricians wouldn't have done that, the cord would have been cut, and she'd been given to the medical team to intervene to resuscitate her. The fact is she was held up for her mother to see and then they waited 2 minutes before they cut -- clamped and cut the cord. They wouldn't have done that if the baby was in extremis.

Q. I am going to move on but I am going to suggest to you, in light of the whole clinical picture, that has far

more to do with the likelihood of infection than anything about the way her father held her. Do you agree or disagree?

A. I'm saying you can't tell which of those things it is, whether it is a mechanical obstruction or an illness from infection.

Q. We'll move on and we can see in the note describing:

"In her dad's arms, lost colour, floppy. Five rescue breaths. Two minutes IPDV."

A. I think that should be IPPV.

Q. IPPV:

"Then reviewed by the SHO. On arrival, good respiratory effort. Then starting to grunt in theatre. Reviewed at 1.5 hours by the SHO. Grunting but otherwise obs okay."

A. And examined normally.

Q. Yes. And then:

"Bleeped again as midwife not happy with her colour, lack of response, poor feeding. Brought to unit for screen. On arrival, looked dusky and poor respiratory effort."

If one is to look at the whole of that picture, that's consistent with an infective process, isn't it?

A. The grunting and the low temperature, which isn't mentioned there, is consistent with an infective process and by the time she was transferred to the neonatal unit

with low saturations and a poor respiratory effort, yes, it was clear there was an infective process going on.

Q. I am suggesting it was obvious right from the outset she was unwell, but you disagree with that.

A. Yes, I do.

Q. And I suggest to you you are minimising how unwell she was and you disagree with that.

A. I'm not minimising everything -- anything. I'm taking all the evidence put in front of me and making a decision based on that.

Q. Before she went to the neonatal unit [Mother of Baby D] gave us some evidence about how [Baby D] presented when she actually had the chance to hold her. I'd like you to help us with whether this is consistent with an infective process rather than anything mechanical. She said:

"I was really worried because I obviously couldn't move so they brought her to my chest."

This is some time after the initial presentation:

"We had skin-to-skin and she didn't really have any movement, she was quite limp. She didn't have a good colour. She looked a bit grey. Then a bit purple. Not really an even colour. She seemed to struggle to breathe. She was making those grunting noises, she wasn't really responsive. There was a split second when she sort of opened her eyes a little bit and looked at

me -- that's the one picture I've got of her -- and then no response. I tried to breastfeed her and she was completely limp, so yes, I was quite worried."

We can see on the notes where there's reference to "no feeding". That's a very poorly baby, isn't it, Dr Bohin?

A. That's the interpretation of a very worried mother. But I can't think that the midwifery staff would be allowing a baby who was limp with a poor colour to remain on the post-natal ward. I don't know what time -- how old [Baby D] was when [Mother of Baby D] made those comments, but she was poorly by the time she went to the neonatal unit. [Mother of Baby D] was clearly worried about her daughter and she may have been poorly at that time, but I can't think that the midwifery staff would allow her to feed or attempt to feed and stay on a post-natal ward if they were concerned about her clinical condition.

Q. They, the staff, or one or more members of staff looking after her before she went to the neonatal unit failed to ensure that she was received antibiotics at the appropriate time, didn't they?

A. It wouldn't have been the midwifery staff's role to give her antibiotics at any time. It was the medical staff that would have been giving antibiotics.

Q. And there was a failure to give them, wasn't there?

A. They failed to give them in a timely way, yes.

Q. That's the day she was born. I'm not going to go through all of that; you've been asked about it this morning.

We know that she was ventilated overnight. Do you agree that's consistent with a child that's suffering from infection?

A. It's consistent with, yes.

Q. You told the jury that when we get to 21 June, [Baby D], you said, remained well all day. Do you agree with that?

A. Yes.

Q. We've heard that that morning, when she was taken off the ventilator, her blood gases deteriorated and we've seen the chart, dropping below the appropriate level.

A. Yes.

Q. Do you not agree that's an indication of being in less than optimal health?

A. She was taken off the ventilator and didn't initially manage and therefore the medical staff intervened and gave her the support that she needed.

Q. And a healthy child would manage off a ventilator, wouldn't she?

A. No, not always.

Q. So you don't regard the fact that her blood gases deteriorated when she came off the ventilator as a sign of bad health?

A. Sorry, that wasn't the question you previously asked me. Yes, the poor blood gases is a sign that something may be amiss. The fact that she didn't manage off the ventilator isn't necessarily a sign of poor health, which is what you asked me in the previous question.

Q. All right. Do you agree the low blood gases are a sign of bad health?

A. They can be. But a single blood gas would not be interpreted in isolation, so you would look at a trend and you would put it in the clinical context of what else was happening with the baby at the time.

Q. Up until 12 o'clock the blood gases remained low, didn't they? That was a trend?

A. You'd have to show the blood gases because I can't --

Q. Can we put up slide 12, please. You can go behind that.

We can look at the top half, please. Scroll down a little bit more actually. Thank you. We can see these. Can you cease these clearly, Dr Bohin?

A. Yes, I can see them.

Q. If we look at 10.14, which is after she'd been taken off the ventilator and just before she had to go on to the CPAP, her blood gases show acidosis, don't they (overspeaking) --

A. Yes, they do.

Q. Yes?

A. Yes.

Q. 12.10, even though she's been on put CPAP, the blood gas has worsened slightly, hasn't it?

A. A little bit.

Q. Yes. So up to that point there's a movement of travel that is not so good; would you agree?

A. I'd say the blood gases have deteriorated.

Q. Right, deteriorated. That's not the same as remaining well all day, is it?

A. Well, she came off the ventilator because that was the right thing to do. She didn't manage, was started on respiratory support. It took a while to settle, so we've got a 10.14 gas, which is sub-optimal, and so she started CPAP. Two hours after that the blood gas had not improved, but 2 hours after that it had and was normal.

Q. Yes, it did. And an unwell baby can have periods of improving and deteriorating, can't it?

A. Not quite like that.

Q. A baby can improve, don't you agree, and then deteriorate?

A. Yes, they can improve and slowly deteriorate.

Q. They could deteriorate rapidly, couldn't they?

A. You'd have other signs -- you wouldn't just go on a blood gas, you'd have other signs. You'd look at the other clinical parameters.

Q. Like if they had pneumonia in their lungs or something

like that?

A. No, you'd look at the other clinical parameters. We know that [Baby D]'s got pneumonia in her lungs through all of these blood gases.

Q. Does that influence at all your view on whether she is well all day, that she had pneumonia?

A. No, because she did have pneumonia, there's no doubt about that, and I was very clear about that this morning, she does have pneumonia. But she had responded to antibiotics and was improving and she managed off the ventilator for a short time and then was coping on CPAP. She didn't need to go back on the ventilator so actually her other parameters had improved.

Q. Do you agree that she didn't cope very well off CPAP that day --

A. She didn't --

Q. -- later on?

A. Later on that day?

Q. Yes. Let me remind you. We can go to the slide if you want but we've seen reference in the clinical notes and in the nursing notes that at about 7.15, when she was given period off the CPAP, she desaturated, didn't she?

A. Yes, and was out back on very quickly. There wasn't a blood gas in between, I don't think.

Q. No, but however quickly she was put back on, the fact that a baby desaturates without breathing assistance

like that is a sign of or a potential sign of poor health, isn't it?

A. No, not necessarily. You have to take everything into context. It was reasonable to try her off CPAP and you can't keep babies on CPAP forever so it's reasonable to try them off when you think they are stable enough to try off. So the clinical team made what I think was a good judgement call to try her off CPAP. She didn't manage, the CPAP is immediately available to put back on and things are safe.

Q. So she wasn't stable enough to stay off CPAP then, was she?

A. No.

Q. No. And that is not a sign of being well all day, is it?

A. It's not a sign of a deteriorating baby, it's a sign of a baby who needs a small bit of respiratory support, who is in air, whose saturations are normal, but is otherwise stable. She couldn't manage off CPAP, it's perfectly acceptable while she is being treated for her pneumonia to CPAP until such time as she didn't need it any longer.

Q. You told the jury that between 23.52 and 01.14 that morning her blood gases were satisfactory; do you remember saying that?

A. Yes.

Q. And in fact, in your report which you were referred to, paragraph 5.17, you said that she had normal blood gases. You say at 5.17:

"Although [Baby D] had pneumonia, she was clinically well, was in air and had normal blood gases."

A. Yes.

Q. Do you see that? Now, you have just said then about it's okay for her to be on CPAP, she's all right if she's not deteriorating. With all of that in mind let's look at what happens after 18.44. So let's scroll down, please, and see what follows.

If we look at 2352, as against 18.44, that is a deterioration isn't it?

A. It's a change. I personally wouldn't be worried about that because she's remained in air.

Q. First of all, is it a deterioration in terms of blood gas?

A. No, not necessarily. You have to take it in the round. If I saw that blood gas, I wouldn't be particularly concerned about it.

Q. Is it an improvement in blood gas?

A. No.

Q. Is it the same as the one before?

A. No.

Q. What is it then by reference to the one before?

A. It's different.

Q. It's different. Not as good, is it?

A. It's not as good but it's marginal so it isn't a concern, it wouldn't be a concern to me.

Q. It's not normal, is it?

A. But neither is it very abnormal and in the clinical context it wouldn't be a concern to me.

Q. We know the various clinical features, I'm not going to list them all. We see at 01.14 a blood gas. And what's the direction of travel in terms of blood gas between 23.52 and 01.14?

A. There's more of a metabolic component in that blood gas, in that the pH has drifted down very slightly, but the base excess has gone -- increased to minus 8.9. So there's now much more of a metabolic component rather than a respiratory component.

Q. That doesn't make it better, does it? Metabolic acidosis is still a problem, Dr Bohin?

A. I didn't say they were better. I said they were no different. I didn't say it was better, I didn't say it had improved.

Q. You said there is now a base excess of minus 8.9. Is that better 0or worse than a base excess of minus 5.6?

A. It's worse than a base excess of minus 5.6.

Q. Are you sure you're not trying to minimise in any way how poorly [Baby D] was?

A. I'm not trying to minimise anything and I would like to

make it clear my duty is to the court, to look at all the evidence, in an impartial way, that's put before me and I think that is what I have done.

Q. Well, when you say these blood gas readings at 23.52 and 01.14 are normal in your report, they are not normal blood gas readings, are they?

A. They are not a concern to me. If I'd seen those blood gases in the clinical context of [Baby D] at that time I would not be concerned.

Q. The detail -- the detail of the neonatal condition and readings relating to it can provide early warning signals, can't they?

A. Yes.

Q. And the point of having a unit with specialists who can see the detail is to look out for, for example, signals like that, isn't it?

A. Sorry, signals -- like what?

Q. Looking out for details.

A. Yes.

Q. The whole point of having a unit with specialists to look at the details is to pick up the subtle signs that may indicate the direction of travel for a little baby, isn't it?

A. Yes.

Q. And if practitioners choose to disregard details, there's not much point in the unit monitoring them at

all, is there?

A. I think you need to look at people's expertise and background and their experience in looking after sick children and making decisions based not out of a textbook but from their clinical experience and looking at the infant's clinical condition in the round. And in my experience, if I'd seen those blood gases, I would note the trend but I wouldn't be particularly worried about them. Somebody else may see them and may have a different view. My view, which is what I'm being asked to give in the court, is that I wouldn't be concerned about them. I would note the trend and, if the trend continued, I would intervene.

Q. What's the point of having these details at all then?

A. To look for trends and put it into a clinical context so that you can intervene if necessary.

Q. And we see, do we, at 23.52 and 01.14, certainly within the parameters we have, a deterioration in that trend don't we?

A. I don't think that there's a deterioration. I think I've probably already said that.

Q. Dr Evans in his reports didn't actually refer to these two readings, though he did, he didn't refer to these ones at all, he didn't include the ones that you call normal. Did you notice that about his reports when you did yours?

A. No.

Q. Are you scrutinising Dr Evans closely, Dr Bohin?

A. Yes, but there are lots of other things that he didn't write down, I assume. But no, I... I didn't scrutinise every single reading, every single observation for every single baby in his reports.

Q. At the same time as we have this blood gas reading, we also have low sodium levels, don't we, with [Baby D]?

A. Yes, they're marginally low.

Q. They may be a little bit low but isn't some of the skill of neonatal medicine to be able top look at small details?

A. Yes.

Q. And we know, do you agree, keep this in mind, she had pneumonia at this time, didn't she?

A. Yes.

Q. And do you agree or disagree that she had been very well -- very unwell within a 12-hour period before this?

A. No, I don't think she was very unwell. I think she had a pneumonia, it required respiratory support, and she was responding appropriately to that respiratory support and to the antibiotics that she had been given.

Q. So when you say she had been well all day, does that take into account how she performed when taken off CPAP? Can I be clear about that?

A. But I think that's just a minor blip in clinical care.

Looking at the overall picture, she had not had any major deteriorations throughout the day and so that was why I made that comment.

Q. Well, I suggest to you that when you put together what she had in terms of her history to this point and what we see on the blood gas and the sodium, she couldn't possibly be described as "well all day". Do you agree or disagree with me?

A. I disagree with you.

Q. If we just consider the events at 01.30 and 3 am. Both of them could be regarded as warning signs that [Baby D] was unwell, couldn't they?

A. They could.

Q. As to the decision, let me ask you this, to take her off CPAP after the second one of those events, you heard the evidence of Dr Newby, didn't you, when she talked about that decision?

A. Yes.

Q. Did you hear that?

A. Yes, I did.

Q. She could come off in that situation -- in fact, it was before the second event. She said that after the first event, there would be a low threshold to intervene by way of ventilation if there were further desaturations.

A. Yes.

Q. Right. So after the first event, Dr Newby had said

there was a low threshold to intervene. There then was another desaturation, wasn't there?

A. Yes.

Q. And if one were to follow through the logic of what Dr Newby said about a low threshold to intervene, that would have been a proper time to increase the type of ventilation, wouldn't it?

A. Not necessarily because (a) Dr Newby wasn't there at the time, Dr Brunton was the clinician who was faced with [Baby D]. He had been told by the nursing staff that she had been distressed and so by the time he got there, she had recovered from her desaturation and, because of the story given to him about being distressed, he felt it prudent, rather than take the step to give medication to paralyse her and put her back on the ventilator, he was faced with a baby who was then -- by then in air and saturating normally and felt the right decision was to try her off CPAP, knowing that if that hadn't worked he could put her back on. And I think that was a reasonable decision to make.

Q. When you said earlier to the jury his decision that she could be fed with breast milk shows how stable she was because Dr Brunton wouldn't have decided to do that if she was unstable, one alternative is that was simply a bad decision, isn't it?

A. It's not a bad decision if you look at the clinical

parameters at the time because there was no clinical reason not to feed her. Everything else was stable in terms of heart rate, respiratory rate, saturations, she was in air. All of that was stable so there was no clinical reason not to feed her. So you know, in defence of him, I don't think that was a bad decision.

Q. I'm not talking about the decision to feed. What I am saying is when you say that he felt she could be fed and that goes to show she must have been stable, it may just be that taking her off CPAP was a bad decision, not that he then could feed her so she must have been stable.

A. I think taking her off CPAP was a reasonable decision to make given the clinical parameters he was faced with.

Q. There is nothing that we have seen for the time he took her off CPAP to suggest that, in terms of respiration, she would perform better off it than on it, is there?

A. No.

Q. The collapse that happens at 3.45 could be explained as consistent with a worsening physical condition because of an infective process, couldn't it?

A. No, because -- no, I don't agree with that at all. She remained in air -- if she had a deteriorating pneumonia or other condition you would expect her not to be in air, to have increased oxygen requirement, you would expect her respiratory rate to have gone up, and you would have expected her to be desaturating and she

wasn't doing any of those things immediately prior to that final collapse.

Q. Well, I suggest to you, we know she was born with pneumonia; do you agree with that?

A. Yes.

Q. We know that certainly throughout her very short life she was ill at times with respiratory illness. Do you agree with that? Respiratory infection.

A. She had a respiratory infection, yes.

Q. Do you agree it made her ill at various points?

A. She required a brief period of ventilation early on, yes.

Q. Do you agree she had respiratory difficulties throughout her life?

A. No.

Q. Do you agree she couldn't actually breathe for any period of time without getting some sort of assistance?

A. No.

Q. She couldn't though, Dr Bohin. She's on CPAP nearly the whole time.

A. She was taken off the ventilator and managed for an hour and a half before she went back on CPAP.

Q. And she's put back on CPAP because her blood gases deteriorated, didn't they?

A. And then she was stable on CPAP.

Q. Yes, and my question was: do you agree that she couldn't

manage breathing properly without the assistance of CPAP?

A. At that time, yes, because she was still recovering from her pneumonia.

Q. So far as we know she couldn't cope with coming off CPAP at least up until the point that she was taken off after event 2, could she?

A. Sorry, I'm not -- I don't understand the question. She was on respiratory support, so we wouldn't have known whether she could manage or not unless we took her off to see.

Q. And do you agree that when she died, I don't think there's any dispute on this, the post-mortem identified pneumonia in her lungs and acute lung damage?

A. That was the interpretation of the initial pathologist, yes, that the right lung showed pneumonia, the right lung more than the left lung, but there was evidence of pneumonia in both lungs with hyaline membranes, which is an indication of acute lung injury.

Q. So if we put the whole clinical picture together, as we are encouraged to do, all of that makes it entirely possible that infection could have been causative in death, doesn't it?

A. No, I think [Baby D] died with pneumonia not because of her pneumonia.

Q. And you have minimised the clinical factors showing how

bad the infection was, haven't you?

A. No, I have not done that. I have looked at all the evidence in the round, which is what I'm supposed to do as an expert witness.

Q. What you have done is to be, with regard to [Baby D], influenced by the allegation you're looking at rather than the underlying medical facts; that's what's happened, isn't it?

A. No.

MR JOHNSON: Does your Lordship have any questions?

MR JUSTICE GOSS: I don't, thank you.

Thank you, that's it at this stage, Dr Bohin. Thank you very much. You know you'll be coming back again. What I said before obviously still applies.

(The witness withdrew)

MR JUSTICE GOSS: Right, Mr Johnson.

MR JOHNSON: I have two things to do, my Lord. One is to recall Kate Tyndall to deal with one or two corrections to the sequence, which will take 5 or 10 minutes, and then (overspeaking) --

MR JUSTICE GOSS: Fine. So we'll carry on, obviously, we've only been going half an hour.

These corrections, you're going to put them in evidence, what they are?

MR JOHNSON: Yes, I'm going to adduce the evidence of the corrections and they'll be automatically updated on the

system. There is a piece of paper just to prove how old-fashioned I am as well.

MRS KATE TYNDALL (recalled)

Examination-in-chief by MR JOHNSON

MR JOHNSON: Welcome back, Mrs Tyndall. Would you just identify yourself for the sake of the recording, please.

A. I'm Kate Tyndall, intelligence analyst.

Q. Thank you very much. I think you have a few corrections to make as to the sequence of events, first of all, and then you have a piece of paper which has a diagram on it to help the jury as well. Is that right?

A. Yes.

Q. Thank you. If Mr Murphy could help, do we start with slide 143?

A. Yes.

Q. I think the tile there, for some reason, the 21st said the 12th, the number had been inverted.

A. Yes.

Q. Is that right?

A. That was corrected.

Q. So that's now been corrected as we can see there. I think these are slightly out of sequence, it's my fault. Just go back to slide 83, please. If we go to the equipment settings, the jury may remember that the wrong document was behind this. If we look, it's now the correct document.

A. Sorry, I don't think that's slide 83. I think that's my mistake. It's slide...

Q. Sorry, I should have checked before we started.

A. Sorry, I didn't have this version of the viewer in front of me to make the --

Q. Sorry, do you know which tile it was? Do you want the sequence to -- can I help you with the paper version?

A. I think it's slide 201. I apologise.

Q. No, no, don't worry. I think we all go a bit number-blind after a while.

Shall we try 201 and see if that's the right one, if we can, please? Can we go to the document, please?

A. Sorry, this is quite embarrassing, isn't it?

Q. Don't be embarrassed. Let's come back to that, if we have to, on Monday and continue with --

A. Okay. In the sequence, it's line -- no. Sorry, I will revisit that. I apologise for that. I think it's slide 97. Try 97.

Q. It's all right. It's Friday afternoon. We're all human.

We're back to the blood gases.

A. This is where the mistake's written. It's page 83 in my sequence and I've written slide 83 and it should be slide 97, I apologise.

Q. We can see why you have made the mistake because in the bottom right-hand corner of the page it says 83. So

that's obviously your defence, if I may suggest it to you. So that is now correct anyway.

A. Yes.

Q. Thank you. Could we go to slide 145 next, please. This originally -- sorry, it's just the tile which was incorrect. Thank you, Mr Murphy.

That originally said "[Nurse A]", didn't it?

A. Yes.

Q. It's now Kate Bissell, which is the correction.

We have a similar mistake on both slides 220 and 231, which both said "[Nurse C]" and should be Caroline Oakley. If we go to 220 and 231, we'll see now the name Caroline Oakley, hopefully. There we are. So Caroline Oakley is correct. 231 as well, please. That one hasn't been corrected. Should that one...

(Pause)

A. Sorry, that should say [Nurse C]. I think it was the other way round. No, it should say Caroline Oakley, I think.

Q. This one?

A. If you go into the document behind it. I think that's a mistake in my...

Q. It's all right. If we look at this --

A. Or is it slide 237? I took these from an email, I think.

Q. So that should say Caroline Oakley, shouldn't it --

A. Yes.

Q. -- where the cursor is at 244?

A. Yes, that's a mistake in my (inaudible).

Q. It's all right, don't worry. It should say Caroline Oakley. If we go back now, it still says [Nurse C], so we still need to correct 231.

A. And 230 as well. I think 230 might be the same.

Q. Let's check that now. Then we can just show these first thing on Monday when they've been corrected. Let's go to the document, please, to see whether it should be [Nurse C] or Caroline Oakley. It should also be Caroline Oakley, shouldn't it?

A. Yes.

Q. That's all right. We'll ask Mr Murphy to correct that over the weekend. 230 to 231.

Slides 232 and 233 previously said "Sunday" and now say Monday; is that right?

A. Yes.

Q. So they have been corrected, as we can see.

A. Yes.

Q. If we just go back to 168, finally, please. This is the handover. This is the map and the piece of paper that we have for the jury, isn't it?

A. Yes, this is as a result of the NNU being gone through and a new map has been produced, which will be the same going forward, which will show the babies -- the map

within the SOE will show the babies at the start of the shift and there will be a map within the NNU review, which will show the locations of the babies, as far as we can determine them, at the end of the shift.

Q. Okay. So because it's been identified that some of these babies changed status or arrive or depart during a shift, what you have done is -- we have the position at the beginning, which is what we see on the screen, isn't it, at the moment?

A. Yes.

Q. And what you now have for us, which perhaps we can put in between pages 1 and 2 of the [Baby D] neonatal review, so the white folder, please, ladies and gentlemen --

A. Those are the ones with the four holes in.

Q. Yes. Those are to go to the jury, please, and my Lord.

So if we just take a second to cross-reference -- sorry, I'll wait for the jury.

(Pause)

So without spending overlong on this, we can see that all the information, so far as nurseries 4, 3 and the TCU are concerned, remains the same as it was at the end, as it was in the beginning?

A. Yes.

Q. Nursery 2 at the beginning and the end was the same?

A. Yes.

Q. Nursery 1 at the beginning and the end was the same?

A. Yes.

MR JUSTICE GOSS: Sorry, can we just pause for a moment? If you put it -- it's been suggested you put it between 1 and 2 in the [Baby D] section. It should be the last section in there.

MR JOHNSON: Okay.

MR JUSTICE GOSS: I was hoping we were going to have this sooner rather than later because it makes life easier.

MR JOHNSON: To have it on paper?

MR JUSTICE GOSS: Exactly.

MR JOHNSON: We'll print what we've got on the tile and put that in in front of this and then we can have beginning and end.

MR JUSTICE GOSS: Because it's the bottom right-hand corner which is where you've got the additions?

MR JOHNSON: Yes. So we see, don't we, that the baby FI was taken from -- Lucy Letby was FI's designated nurse at the beginning of the shift, but from 23.00 hours was transferred to Caroline Oakley?

A. Yes.

Q. And there was a baby admitted during the shift, who's now on the bottom right-hand corner, whose designated nurse was Kathryn Percival-Ward after 5.30 am, so towards the end of the shift?

A. Yes.

Q. Thank you very much. So all, therefore, it remains for us to do with the electronic sequence of events is to alter those two [Nurse C]s to Caroline Oakleys at 230 and 231.

A. Yes.

MR JOHNSON: Perhaps, my Lord, we can just do that and show them to the jury some time on Monday without putting the witness to the inconvenience of having to reappear to explain that to us.

MR JUSTICE GOSS: Absolutely, do it. It's going to be changed on our iPads, so by Monday morning, I assume it'll all be as it should be?

MR JOHNSON: Yes.

MR JUSTICE GOSS: Well, it's corrected in the way that's been described. All right. They really are not huge changes of significance, but you must get it right though.

MR JOHNSON: Exactly. There will still be a mistake somewhere, I'm sure. We're doing our best to eliminate them. Thank you very much.

MR JUSTICE GOSS: Thank you. There's no need to come back on Monday.

(The witness withdrew)

Summary of interview with LUCY LETBY re [Baby D] (read)

MR JOHNSON: Ladies and gentlemen, this is the summary of the interview of Lucy Letby relating to [Baby D].

I should say that the original is very long and this is very short. It's just to give you an idea.

MR JUSTICE GOSS: You'll remember that this is what's happened before, so that you know what the defendant said when she was asked about the events concerning [Baby D]. You're going to get much more detail later in the case; this is but a summary.

MR JOHNSON: So when Lucy Letby was asked on 4 July 2018 about [Baby D], Lucy Letby said she did not remember [Baby D]. She was taken through the notes and Lucy Letby agreed that she had been involved in [Baby D]'s care but said that she still had no recollection of her.

Lucy Letby explained that when drugs were administered, two nurses would usually be present but not always. During the interview on 11 June 2019, Lucy Letby did not recall who she had cared for that shift, nor did she recall calling Caroline Oakley back into the room when [Baby D] collapsed, although she accepted it was possible she had.

Lucy Letby did not think that Caroline Oakley would have gone on her break if she thought [Baby D] needed care or treatment unless she'd handed over to someone in her absence. Lucy Letby denied administering air into [Baby D]'s body. She could not remember [Baby D]'s collapses and only remembered the medication with which she had assisted because it was entered in the notes.

Lucy Letby maintained that she didn't do anything deliberately to [Baby D].

Lucy Letby was asked about the Facebook searches she had undertaken in respect of both [Baby D]'s parents, [Parents of Baby D], days after [Baby D]'s death. She told the police that she couldn't remember doing the searches.

Lucy Letby was asked about messages she had sent to [Nurse A] on 22 June 2015 after [Baby D]'s death. She couldn't recall why she said [Baby D] looked like she was suffering from overwhelming sepsis but thought from the content of the text, it looked like [Baby D] was rescreened and this had been done to indicate an infection.

Lucy Letby was then asked why, later that day, she reiterated that Yvonne Farmer had said that Dr Newby felt it may have been meningitis. She said she couldn't remember if Yvonne Farmer had said that to her.

So that's the short summary, my Lord.

MR JUSTICE GOSS: Right.

MR JOHNSON: That is the evidence in the case of [Baby D], subject to Dr Marnerides, and there may be one or two other minor issues or other issues that we will return to in due course.

MR JUSTICE GOSS: That apart, that completes the prosecution evidence -- and, of course, the interviews in detail --

MR JOHNSON: Of course.

MR JUSTICE GOSS: -- in relation to [Baby D]. So on Monday morning, we'll move on to the next baby or babies.

MR JOHNSON: Yes, it's [Babies E & F] next.

MR JUSTICE GOSS: The twins. Again, the next counts on the indictment, obviously. All right? So another weekend, members of the jury. You well know what your responsibilities are. I'll see you to start at 10.30 promptly on Monday morning. Thank you very much.

(In the absence of the jury)

MR JUSTICE GOSS: I know, Mr Johnson, the summaries have been read into the record and I could get them off the transcript, but it'd be very helpful if I could just have the sheets.

MR JOHNSON: Yes, we'll send them all. Would you like them of a piece at the end or as we go along?

MR JUSTICE GOSS: As and when they're available, it would be helpful for me to fit them in and I am going to seek some help to see if I can cut and paste from the transcript without a very prolonged and difficult process. Thank you very much. 10.30 on Monday morning.

MR JOHNSON: Would you like paper or electronic copies of the summaries? I have two here if you want.

MR JUSTICE GOSS: May I have both, please?

MR JOHNSON: Of course. We'll make an exception for you,

my Lord, and give you both.

MR JUSTICE GOSS: Thank you.

(2.49 pm)

(The court adjourned until 10.30

on Monday, 14 November 2022)

I N D E X