

28 February 2023
Baby K

CONTENTS

MS JOANNE WILLIAMS (continued)
Examination-in-chief by MR ASTBURY (continued)
Cross-examination by MR MYERS
Re-examination by MR ASTBURY
Questions from THE JUDGE

DR RAVI JAYARAM (recalled)
Examination-in-chief by MR ASTBURY
Cross-examination by MR MYERS
Re-examination by MR ASTBURY
Questions from THE JUDGE

Witness statement of MS ELIZABETH MORGAN (read)

DR SRINVASARO BABARAO (affirmed)
Examination-in-chief by MR ASTBURY
Cross-examination by MR MYERS
Re-examination by MR ASTBURY
Questions from THE JUDGE

Tuesday, 28 February 2023
(10.30 am)

(In the presence of the jury)

MS JOANNE WILLIAMS (continued)

Examination-in-chief by MR ASTBURY (continued)

MR JUSTICE GOSS: Yes.

MR ASTBURY: Thank you, my Lord.

Nurse Williams, we had, I think, yesterday finished looking at the observation chart that you had completed and which began at 02.45. Just staying with some of the records that you made, please, I'm going to ask Mr Murphy to put up tile 37 next, please.

If we look at the first line there, do you recognise your signature on the first line?

WILLIAMS: Yes.

ASTBURY: That, correct me if I'm wrong, please, indicates a dextrose or the commencement of a 10% dextrose infusion. We can

see the rate, as we read across, being administered intravenously and that beginning at 03.00, is that, on 17 February?

WILLIAMS: Yes.

ASTBURY: Thank you. By that time, there was an intravenous line for [Baby K] for that dextrose to be delivered?

WILLIAMS: Yes.

ASTBURY: Can we then go on, please, to the next tile, tile 38, and look behind that, please.

This is, as it says, a blood gas record. We've seen these before. Are they your initials on the right-hand side of the first, I think, two lines in fact?

WILLIAMS: Yes.

ASTBURY: So we can see there at 03.03 -- is that a venous blood sample --

WILLIAMS: Yes.

ASTBURY: -- taken?

WILLIAMS: That's correct.

ASTBURY: And the results across that particular line. So this would, would it, have been shortly after [Baby K]'s arrival in the NNU?

WILLIAMS: Yes.

ASTBURY: With the first observation at 02.45 and then the intravenous dextrose and the blood gas record being taken?

WILLIAMS: Yes. The blood gas would have been taken while inserting a cannula. That's why it's a venous sample.

ASTBURY: Thank you. Could we look next, please, at your nursing note for that first period of time that you spent with [Baby K]. It's at tile 39. To the top left, please, Mr Murphy and the first section of that nursing note.

I'm going to go through it with you, if I may, and if you have anything to add or it reminds you of anything significant, please let me know.

"Baby girl born at 25 plus 1 gestation" is your note. This is made at 04.48, so in retrospect once the opportunity arose; is that right?

WILLIAMS: That's correct, yes.

ASTBURY: You've noted there that it was a footling breech delivery which you told us yesterday. "Baby born in fair condition", you describe it, with the caveat to see the medical notes for the full details; is that correct?

WILLIAMS: Yes.

ASTBURY: You've noted that [Baby K] was intubated at approximately 12 minutes of age with a size 2 endotracheal tube, that Curosurf was given. We have heard that's a surfactant; is that right?

WILLIAMS: That's correct.

ASTBURY: She was brought through to the unit and placed in the humidified incubator; is that correct?

WILLIAMS: Yes.

ASTBURY: You've noted her weight at 692 grams. You've noted that you commenced ventilation; is that correct?

WILLIAMS: Yes.

ASTBURY: You told us yesterday a little bit about that. You put the rate, the concentration of oxygen, and you put there that a high leak was noted. Can you tell us what a high leak is, please?

WILLIAMS: A high leak is noted on the ventilator, so it gives you a percentage of the leak. It's part of an observation that we do as part of the checks for the ventilator.

Obviously, if there was any concerns, I would just highlight that to the medical team.

ASTBURY: Okay. So is it as the name suggests, air escaping one way or the other?

WILLIAMS: It sometimes can be with the size of the tube, the ET tube.

ASTBURY: Where and in what direction is the air leaking, if that makes sense? Is it leaking on the way into the baby, is it leaking on the way out or both?

WILLIAMS: I don't know if I'm honest. I don't know if it's an amalgamation of both.

ASTBURY: That's something that the monitors would have detected; is that right?

WILLIAMS: No.

ASTBURY: How would you have detected that?

WILLIAMS: Only on the ventilator itself, the machine.

ASTBURY: All right. Would the ventilator have an alarm to alert you to that?

WILLIAMS: Yes.

ASTBURY: And would you have raised that with anybody?

WILLIAMS: Yes, because obviously when we take observations every hour, part of our observation is to note the percentage of leak on the ventilator.

ASTBURY: Okay. Were there any concerns about the leak and its impact on [Baby K]'s ventilation?

WILLIAMS: I don't remember at the time. Obviously I would have been highlighting it to the medical staff, but looking at the clinical picture of [Baby K] and her -- if she was stable and ventilating well, the clinical picture with the blood gases.

ASTBURY: So is this right, the ventilator is telling you there's a leak? Are you looking elsewhere for the potential impact of that leak?

WILLIAMS: You're looking at her condition.

ASTBURY: Right. What was she, as a matter of fact, connected to, a monitor?

WILLIAMS: Was she connected to a monitor?

ASTBURY: Yes.

WILLIAMS: Yes.

ASTBURY: Would that be the Philips monitor that we have heard about in nursery 1?

WILLIAMS: Yes.

ASTBURY: Would that have alerted you to any, for example, drop in saturations?

WILLIAMS: Yes.

ASTBURY: Or any other impact of that particular problem?

WILLIAMS: It would -- obviously the monitor is there to pick up heart rate, saturations and respiratory rate, so they would pick up those things if there was a deterioration.

ASTBURY: Okay. Now, if [Baby K]'s ventilation over that period had been compromised, would you have been alerted to that by the Philips monitor?

WILLIAMS: Sorry, repeat the question?

ASTBURY: If there'd been any problems with [Baby K]'s ventilation, whether it be the tube or the ventilator itself, would that Phillips alarm have alarmed you to any deterioration in her condition?

WILLIAMS: If clinically she wasn't getting the required ventilation support then, yes, the alarms would go off.

ASTBURY: Just describe to us what the -- about the alarms then, please. So you told us that the monitor is reading saturations --

WILLIAMS: Correct.

ASTBURY: -- heart rate -- and what was the third thing you mentioned?

WILLIAMS: Respiratory rate.

ASTBURY: Respiratory rate, okay. So at what point and in what circumstances would an alarm be sounding?

WILLIAMS: So depending on the parameters that it's set -- it's a preterm infant, so you have two types of alarms. So if the baby desaturated or heart rate dropped, you would be alerted in a softer alarm. But if it fell below that further it would be a more persistent alarm.

ASTBURY: Who sets the parameters?

WILLIAMS: We do.

ASTBURY: Would they be standard parameters --

WILLIAMS: Yes.

ASTBURY: -- for a baby of that gestation in that condition?

WILLIAMS: Yes. They are set as standard on the Philips monitor on every admission, but as our job on admission or at some point every shift we should be checking what those parameters are and if they are acceptable for that baby.

ASTBURY: Do you happen to remember what they were for [Baby K]?

WILLIAMS: I don't.

ASTBURY: All right. Had they fallen below whatever was required, there would have been an alarm?

WILLIAMS: There would have been, yes.

ASTBURY: Initially what you describe as a soft alarm?

WILLIAMS: Yes.

ASTBURY: And then a more urgent alarm?

WILLIAMS: Yes.

ASTBURY: All right. The soft alarm, just describe what that consists of, please.

WILLIAMS: That's where if there's a desaturation or a slight decrease in heart rate, that would start to warn you.

With a red alarm, it's more persistent, like I said, it comes up red and you have it as amber and red.

ASTBURY: What colour is the first alarm?

WILLIAMS: Amber.

ASTBURY: Does it make a noise?

WILLIAMS: Yes.

ASTBURY: The second alarm, if it goes even lower, below another threshold, presumably, it's red?

WILLIAMS: Yes.

ASTBURY: Is the noise the same?

WILLIAMS: No.

ASTBURY: What's the difference?

WILLIAMS: It's less soft, it's more alerting you.

ASTBURY: Okay. Is there a way to disable the alarm on the Philips monitor?

WILLIAMS: Yes, you can acknowledge it, you can pause the alarms.

ASTBURY: Are they the same thing or are they two different --

WILLIAMS: Sorry, I apologise, because we now use new upgraded Philips monitors, but in this instance with [Baby K] it would have been an older version. So there is a pause alarm, which you can pause first or you can pause it for a number of minutes if you were doing a procedure or anything.

ASTBURY: Okay. So the alarm can be paused, what, in advance of when you know there's going to be a drop in a particular reading or is it only once the alarm's activated?

WILLIAMS: Usually once the alarm is activated.

ASTBURY: Is it possible to disable the alarm in advance?

WILLIAMS: Do you know, I can't remember on the old ones. You can on the new Philips monitors, but I couldn't be 100% sure.

ASTBURY: You've already told us that it's possible for a nurse to adjust the parameters whereby the alarm does or doesn't sound.

WILLIAMS: Yes. The alarm limits, yes.

ASTBURY: Do you have any recollection of [Baby K]'s breathing being compromised during that first hour that she was in the neonatal unit?

WILLIAMS: Not to my recollection, but obviously looking at my notes, it'd just be through my...

ASTBURY: When you noted the high leak on the ventilator, would you have checked the ventilation at that stage?

WILLIAMS: Yes, I would have checked that obviously she's clinically stable --

ASTBURY: Right.

WILLIAMS: -- and made sure that the tube was still in place.

ASTBURY: So would you have inspected the tube and its position?

WILLIAMS: I would have looked at where it was measuring at the lips.

ASTBURY: Right. Now, I asked you about that hour because there came a point where you went to visit [Baby K]'s parents; is that right?

WILLIAMS: That's correct, yes.

ASTBURY: At what stage did you feel able, if at all, to leave [Baby K] to see her parents?

WILLIAMS: I feel it's obviously really important to make sure that the family are kept updated, so I wouldn't have left [Baby K] if it wasn't the case that it was stable to do so.

ASTBURY: Okay. So would you have satisfied yourself that that was the case?

WILLIAMS: If I've left then yes.

ASTBURY: We've heard that when taking over as a designated nurse in the usual way, there would be checks on the equipment and the alarms at the outset of the shift. Would that have been the case during the course of your time with [Baby K] up to then?

WILLIAMS: Yes, but obviously I have gone through for the delivery of [Baby K]. The intensive care spaces should always be checked and they're checked every night.

ASTBURY: As far as you know, did [Baby K] have any issues when you left her to speak to her parents?

WILLIAMS: Obviously that she was born extremely premature, so...

ASTBURY: Anything beyond that? Any concerns about her condition, her stability, the equipment, anything at all?

WILLIAMS: No. She was with other -- you know, other members of staff while I went and updated.

ASTBURY: So even though, am I right, you satisfied yourself it was appropriate to go, did you still ask someone to keep an eye?

WILLIAMS: Yes, there will always be someone.

ASTBURY: Do you remember asking anyone in particular?

WILLIAMS: No.

ASTBURY: When you left [Baby K], can you recall whether she was active or not?

WILLIAMS: [Baby K] was quite active and that's not uncommon for preterm babies for this stressed period when they've just been delivered, so I do remember her being quite active.

ASTBURY: Do you happen to recall whether at the point you left her she'd had any morphine administered at that stage?

WILLIAMS: Not without looking at my notes.

ASTBURY: All right. Well, we'll look at your notes now, but could we first look, so we have a timeline, at the swipe data at 03.47, Mr Murphy? If we can go back to the front of the presentation.

So we have the benefit of the swipe data. I'm not going to ask Mr Murphy to go behind it, but that's the swipe data that indicates that you left the neonatal unit at 03.47. Is that consistent with your recollection? Does that sound about right for when you went to see [Baby K]'s parents?

WILLIAMS: Only on recollection of my notes.

ASTBURY: Right. Let's go to the -- I asked you about the morphine. Can we go, please, to tile 50, Mr Murphy? If we can look behind it.

This is one of the documents that we have in the bundles for the jury, the small paper bundle. I'm happy to distribute them now or just continue with the witness electronically if that's deemed more appropriate. It's a bit difficult zooming in, that's the problem, on some of the entries. So I'm happy to circulate them now.

MR JUSTICE GOSS: Speaking for myself I'd like them now if we're going to look at this document.

MR ASTBURY: Divider 14, please.

(Handed)

So jury bundle 2, please, and behind divider 14.

Only two pages for now.

So two pages, the first page being the observation chart we looked at last thing yesterday. If I can ask everyone to turn to the second page, please, which is the neonatal intensive care chart. I'm afraid the copying is very small, so I hope this assists. We can always ask Mr Murphy to zoom in if necessary.

It should be on your screen, Nurse Williams.

WILLIAMS: Yes.

ASTBURY: Thank you. Can I just remind you to keep your voice up, please? I'm told that I'm allowing it to drop and I apologise.

WILLIAMS: Sorry.

ASTBURY: It's my fault. On the right-hand side, we can see the columns with various entries in from on the form, 01.00, thank you. And we can see that your first entry is 03.30 and under the column which says "Morphine", we can see "commenced". Can you see that?

WILLIAMS: Yes.

ASTBURY: So on the face of it, does that suggest that morphine began at 03.30?

WILLIAMS: Yes.

ASTBURY: Okay. I'm going to ask you to look now, because there's some contradictions within this, which I'm going to ask you, if you can, to explain, please. If we go to the left-hand side of the page, and we look down to the freehand columns at the very bottom, Mr Murphy. They're on their side, unfortunately. So as we look now on the left, your initials are in those first five hourly entries?

WILLIAMS: Yes.

ASTBURY: And we have, and we can look at the time if we need to -- it says 03.50. Is that 100 micrograms per kilogram of morphine? Do you see that?

WILLIAMS: Yes.

ASTBURY: Is that your handwriting?

WILLIAMS: No.

ASTBURY: Does that relate to a bolus or an infusion?

WILLIAMS: A bolus.

ASTBURY: All right. So as far as this page is concerned, the infusion began at 03.30 and there was a bolus at 03.50?

WILLIAMS: According to those, yes.

ASTBURY: According to the file. I'm going to ask you, please, next to look at a document behind tile 69.

This is an infusion chart. Only one entry. If we can look at that, please. We can see the first dose, 17 February 2016, 03.50, which is the time we have just seen for the bolus. But is that a different rate or quantity to that that was recorded as a bolus?

WILLIAMS: Yes, because it's -- that's an infusion.

ASTBURY: Right. So according to this document, the infusion began at 03.50?

WILLIAMS: 03.50, yes.

ASTBURY: Is that your handwriting?

WILLIAMS: No. It's my signature, but it's not my handwriting. It would have been a doctor who would have prescribed it.

ASTBURY: Right, okay. If we look up towards the top right, it says "Doctor's signature". Is that likely to be the doctor who filled in the column we're looking at?

WILLIAMS: Yes.

ASTBURY: And your signature relates to the administration of the infusion rather than any other material; is that right?

WILLIAMS: Yes.

ASTBURY: So you haven't filled that time in at 03.50?

WILLIAMS: No.

ASTBURY: Was that your handwriting on the other chart we looked at where it said "Commenced at 03.30"?

WILLIAMS: On the first side, yes.

ASTBURY: Yes, all right.

WILLIAMS: But 03.30 is between that hour and that's where I've written commenced. So it could not be 03.30 exactly, it could be 03.45, 03.40.

ASTBURY: Okay. Just knowing the time that you left, at 03.47, you can't assist with whether it was before or after the 03.47?

WILLIAMS: I don't remember.

ASTBURY: All right. But we know there was a line fitted from at least 3 o'clock because that's when the dextrose began?

WILLIAMS: Yes.

ASTBURY: Go back to you leaving the unit then, please. When you left the unit, do you recall how [Baby K] was presenting at that point?

WILLIAMS: No, other than, like I said, if she wasn't stable on the ventilator, I wouldn't have left.

ASTBURY: How far, how long to get to where [Baby K]'s parents were?

WILLIAMS: It's next door, the labour ward. I can't remember what room mum was in.

ASTBURY: Do you remember the conversation with her parents?

WILLIAMS: No.

ASTBURY: Do you remember anything about it?

WILLIAMS: I remember that I would have updated them and given them a treasure box, hopefully a photograph, which is usually what we try and do for every admission.

ASTBURY: A treasure box, is that something that is prepared for the parents at that early stage?

WILLIAMS: Yes. They are premade, they're journey boxes to keep mementos in.

ASTBURY: Are you able to estimate how long you were with [Baby K]'s parents?

WILLIAMS: I can't remember, I'm sorry.

ASTBURY: How long would that ordinarily take?

WILLIAMS: Every family's different, every baby's different.

ASTBURY: Of course. All right. Did you make your way back to the neonatal unit once you'd spoken to them?

WILLIAMS: I would have thought so.

ASTBURY: Okay. And what, if anything, did you find when you got back to the neonatal unit?

WILLIAMS: So I remember walking back into the neonatal unit and hearing the alarms sound.

ASTBURY: Can you remember whether it was the red or the amber alarm?

WILLIAMS: Red alarm.

ASTBURY: Did you know where that was coming from?

WILLIAMS: Nursery 1.

ASTBURY: Did you go into nursery 1?

WILLIAMS: Yes, I would have.

ASTBURY: What did you see?

WILLIAMS: I'm so sorry, I'm really struggling to find -- to remember. Obviously, other than my notes.

ASTBURY: Okay. Do you have any independent recollection of your return to nursery 1 at that point?

WILLIAMS: Other than that, you know, it seemed like an emergency.

Something was going on and I walked back into it.

ASTBURY: Do you remember how you felt having come back to that situation given what you have told us so far?

WILLIAMS: Well, upset, but you do... It's always frightening to go back into a situation like that.

ASTBURY: All right. Do you remember any conversation with anybody when you got back into that room?

WILLIAMS: Not in the room necessarily, but I did, you know -- Dr Jayaram, who was on, had asked me how this had happened. I thought the ET tube was secure, but I wasn't there, you know.

ASTBURY: Let's just approach that. So you remember speaking to Dr Jayaram, but you can't remember who was doing what in nursery 1; is that right?

WILLIAMS: No. I think Caroline Oakley and Lucy were there.

ASTBURY: Do you remember when this conversation took place with Dr Jayaram?

WILLIAMS: No, not on the timescale. It wasn't nursery 1. It might have been near the nurses' station.

ASTBURY: Tell us, please, then what the thrust of the conversation was.

WILLIAMS: I just remember him asking me after we'd stabilised [Baby K] again -- I believe we re-intubated... Then just asking how it had happened. Just a very relaxed "How's it happened" question.

ASTBURY: Your first recollection with me a moment or two ago was that he mentioned the tube. Do you remember what was said about the tube?

WILLIAMS: No, just that obviously -- sorry, what do you mean?

ASTBURY: I don't want to put words in your mouth. When you first told us about the conversation, you told us something he asked about the tube or he made a comment about the tube.

WILLIAMS: How did the tube dislodge? How did it move?

ASTBURY: Right. I think you also told us, again I don't want to put words in your mouth, the context in which he was asking you that, bearing in mind the evidence you've given to us about before you left [Baby K] on her own.

Can you recall that?

WILLIAMS: Sorry?

ASTBURY: You told us that -- you've answered questions about the tube, how secure it was, how it would have been inspected and how it had been secured as far as you were aware.

WILLIAMS: Mm.

ASTBURY: You then told us what Dr Jayaram said. I can read it back to you from the record if necessary. I'm just wondering whether that had a bearing on anything he'd said.

WILLIAMS: Can you read it?

ASTBURY: Let me just be careful, I have to approach this with a bit of caution. Just bear with me a second, please, my Lord.

MR JUSTICE GOSS: Certainly.

(Pause)

MR ASTBURY: I asked you:

"Question: Do you remember any conversation with anybody when you got back into that room?

"Answer: Not in the room necessarily [was your reply] but Dr Jayaram, who was on, had asked me how this had happened. I thought the ET tube was secure, but I wasn't there, you know."

So I'm trying to help with the detail, please, of the conversation that took place. Did you have any conversation with Dr Jayaram about how you'd left [Baby K]?

WILLIAMS: I don't remember.

ASTBURY: This took place after [Baby K] had been stabilised, you told us?

WILLIAMS: Yes.

ASTBURY: Did you play a part in that?

WILLIAMS: Yes, I would have.

ASTBURY: Did you continue to be her designated nurse?

WILLIAMS: Yes.

ASTBURY: Going back to your notes, just to assist you now, please. The remainder of your notes are -- perhaps if we go to tile 84, please, Mr Murphy. Before we do that, I'm sorry, I'm jumping about, but just before we do that, do you recall when [Baby K] was -- whether [Baby K] was re-intubated after you'd come back from visiting the parents?

WILLIAMS: Yes.

ASTBURY: And do you remember any detail about the tube that was used on this occasion?

WILLIAMS: Again, from my notes, that it was a bigger tube that we used.

ASTBURY: I just want to look, please, when it comes to tubes at that document we looked at a little bit earlier behind tile 50 and in our jury bundle at page 2. If Mr Murphy could put tile 50 back up, please.

This is on the subject of ventilation before we leave it. Can I ask you to look at the first column that you completed, please, timed at 03.30. There's an entry for air leak or leak. Can you see that? It's about a third of the way down. The very first column looks like quite a high number. What does that represent, please?

WILLIAMS: That's what we discussed before about the percentage of leak.

ASTBURY: Is that to represent a 94% leak?

WILLIAMS: Yes.

ASTBURY: Would you have taken that figure from the ventilator?

WILLIAMS: Yes.

ASTBURY: We can see the figures are lower later, but do you recall taking any action when you saw that figure of 94?

WILLIAMS: I would have just highlighted it to the medical team.

ASTBURY: All right. Sorry to skip about, Mr Murphy. If we can go back to tile 84, please.

We can scroll down a little bit. We got up to the high leak being noted. Then we have the note of, I think, correct me if I'm wrong, the incident that you've just described to us.

WILLIAMS: Yes.

ASTBURY: "Approximately 45 minutes later, began to desat to 80s. Dr Jayaram in attendance and on examination, colour loss visible and no colour change on the CO2 detector."

Is that the capnograph device?

WILLIAMS: Yes.

ASTBURY: As a matter of interest, had you used that before you'd left [Baby K] during the course of your checks on the ventilation?

WILLIAMS: No, you don't use -- you can't use it on a ventilator.

We use it via the Neopuff. On the Neopuff.

ASTBURY: Thank you. You then put:

"[Question mark] ETT dislodged."

Is that right?

WILLIAMS: "Query", yes.

ASTBURY: Okay. Is that something you saw or is that because of the conversation that you had with Dr Jay?

WILLIAMS: Well, that's just an observation, it's a query, had the ET tube dislodged?

ASTBURY: "Removed and re-intubated on second attempt by..."

Is that Registrar Smith?

WILLIAMS: Yes.

ASTBURY: With the 2.5 ETT that you've just told us about?

WILLIAMS: Yes.

ASTBURY: "... measuring 6.5 centimetres at lips. Air entry clear and equal."

Is that "large amount of bloodstained oral secretions"?

WILLIAMS: Yes.

ASTBURY: Is that something you saw?

WILLIAMS: I would have been supporting the intubation, then -- we are there and we can support suction.

ASTBURY: Do you have any recollection of those secretions?

WILLIAMS: No, I'm sorry.

ASTBURY: Is that something -- clearly you've put it in your note.

Is it something that would cause you concern?

WILLIAMS: I think it's something to be aware of and sometimes not uncommon with multiple intubations as well.

ASTBURY: Right:

"Temperature [is that] on admission, 38.5. Was nursed on TransWarmer at delivery. Temp now 3.36.7 in 07% humidity. NeoWrap in situ."

What's a NeoWrap, please?

WILLIAMS: It is a plastic bag. They call them NeoWrap, but it is a plastic bag to keep the moisture in, so it keeps babies warm. We use them for extreme preterm babies.

ASTBURY: We can see there, we're probably going back in time now, are we:

"Cannula inserted by Registrar Smith. Commenced 10% dextrose."

We saw from your notes that that was in fact at 3.00 hours; is that right?

WILLIAMS: That's what I've written.

ASTBURY: This is, of course, written in retrospect presumably to note as much important information as you can recall; is that right?

WILLIAMS: Yes.

ASTBURY: "Commenced morphine at 20 micrograms per kilogram per hour."

Then you've mentioned the separate bolus that you identified to us, given on intubation. Can you remember whether -- at which intubation that was?

WILLIAMS: I would say from my notes that would have been the intubation on this one where we've passed a 2.5 ET tube.

ASTBURY: And it's recorded at 03.50, shortly after you'd gone to visit the parents?

WILLIAMS: (Inaudible).

ASTBURY: "Septic screen performed."

And then I think -- is that:

"Commencing antibiotics and vitamin K given"?

WILLIAMS: Penicillin and gentamicin, yes.

ASTBURY: "... as per Dr Jayaram and MRSA swabs taken."

You have noted that feet and hands are bruised.

I think we heard that was a potential result of the footling breech delivery?

WILLIAMS: That's right.

ASTBURY: "Initially active on handling but now more settled. Mean blood pressure 42 on cuff."

That's the device used, presumably, to measure the --

WILLIAMS: Blood pressure.

ASTBURY: "[Question] passing urine at delivery as the TransWarmer was wet."

What's the TransWarmer, please?

WILLIAMS: So that's obviously "[query] passed urine".

A TransWarmer is again another device that we can use to keep extreme preterm babies warm. They lay on it on the Resuscitaire.

ASTBURY: "At time of writing, registrar trying to insert umbilical lines and plan is to transfer to Arrowe Park Hospital. Dr Jayaram has spoken to the transport team. They've requested for lines to be inserted and then to contact again."

So that brings the position up as of 04.48.

It may be that it's difficult to recall, we can go back to the notes if it assists, but do you recall why a bolus of morphine was given as opposed to increasing the infusion that was in progress?

WILLIAMS: As part of an intubation procedure, we give a bolus of morphine.

ASTBURY: Okay. So that would be what was routine, standard practice?

WILLIAMS: In initial intubations, in delivery, that isn't the case because you haven't got any IV access, you don't have that. But in elective intubations, so intubations where it is not so much of an emergency, we give boluses of morphine. And as I've noted -- I've noted that she was active.

ASTBURY: Yes. Tile 90 next, please. The bottom left, please, I think. Yes, the very bottom left, please.

So at 05.07, we've got a family communication:

"Mum, dad, auntie all updated straight after delivery by Dr Jayaram."

As you told us before:

"Photos taken and treasure box and Bliss bag given."

What's the Bliss bag, please?

WILLIAMS: The Bliss bag is the -- it's the baby charity Bliss, and they have a wealth of information (inaudible).

ASTBURY: "Discussed briefly expressing. Encouraged parents to come to the unit to visit and mum and dad both touched her. Will come back to the unit once lines are inserted. Mum to be discharged to APH..."

Arrowe Park Hospital?

WILLIAMS: Yes.

ASTBURY: "... to be with baby."

Okay. Finally on your notes, please, if we can scroll up, Mr Murphy, to an addendum that you've added.

This is at 8.14 in the morning so at the end of the shift; is that right?

WILLIAMS: Yes.

ASTBURY: You have noted that:

"Baby has had two further episodes of apnoea and desaturation with loss of colour. Has been re-intubated twice and now has a 2.5 ETT measuring 6.5 at the lips."

I think, if I'm not mistaken, that was the measurement in your first note?

WILLIAMS: Yes.

ASTBURY: "Two saline boluses given. Plan is to commence dopamine. UVC sited."

So that's the venous catheter; is that right?

WILLIAMS: We've got a venous catheter but we haven't got an arterial catheter.

ASTBURY: Thank you. And care handed over to the day shift --

WILLIAMS: Yes.

ASTBURY: -- and your successor as the designated nurse.

Of those two further episodes, are you able to recollect anything about those, please?

WILLIAMS: Other than it was strange that we had intubated her and she kept needing to be re-intubated and she would have these apnoeas and desaturations episodes, but that's...

ASTBURY: Do we take it from that that -- were the collapses related to her ventilation as far as you know?

WILLIAMS: I don't know. I don't. It was -- but I hadn't got, certainly in 2016, lots of experience with a baby of 25 weeks.

ASTBURY: On each of the occasions that she was re-intubated during your shift, you remained her designated nurse; is that right?

WILLIAMS: Yes, I would have been with her, yes.

ASTBURY: And on each of those occasions would it have been your responsibility, just as you did when first she was born, to check that the ET tube was secure?

WILLIAMS: Yes.

MR ASTBURY: Thank you, I have no more questions.

Cross-examination by MR MYERS

MR MYERS: Mrs Williams, one of the last things you said in answer to questions then was that you didn't at that time have a lot of experience with babies of 25 weeks, that's right, isn't it, at that time?

WILLIAMS: Because we're a level 2.

MYERS: Yes, yes. Ordinarily, a baby of this gestation would be cared for in a tertiary unit, a level 3; is that right?

WILLIAMS: Correct.

MYERS: And you would be dealing with 27 weeks and above?

WILLIAMS: Yes.

MYERS: So although you were being asked questions about what you may or may not expect with the intubation of a 25-week-old baby, that's not something you had a lot of experience of?

WILLIAMS: No.

MYERS: Your own experience of premature neonates, Mrs Williams, is that they could be unpredictable in how they behaved?

WILLIAMS: Yes.

MYERS: And that went for the potential for deterioration as well, didn't it?

WILLIAMS: Yes.

MYERS: I'm going to ask you about some particular areas that you've dealt with in your evidence and then we'll come to the events as well as you can remember them. So that's where we're going with this.

The first thing I would like to ask is something about surfactant if you can help with that. Is surfactant a controlled drug so far as you know?

WILLIAMS: No.

MYERS: Is it a drug that you have to have prescribed by a doctor before it can be used?

WILLIAMS: No.

MYERS: So could you explain what's the process for using surfactant?

WILLIAMS: In the process of giving it, do you mean?

MYERS: Yes. From the time that it has to be used up to when it's given, what process do you go through?

WILLIAMS: Certainly then it was in -- it's in a locked cupboard, it's locked and we do keep a record, a sign-out book, to keep it. But obviously if we know that a preterm delivery is happening, certainly for an extreme prem, you would like to get the surfactant out potentially and warm it up ready.

MYERS: Is that something that's done without a prescription, without a formal prescription?

WILLIAMS: It is prescribed, it is prescribed on a prescription chart. However, again it could be signed for retrospectively.

MYERS: Let me get this right. First of all, it does have to be prescribed?

WILLIAMS: Yes.

MYERS: Does that mean a doctor has to say, "This is what you need to give the baby"?

WILLIAMS: They work out how much they want to give the baby depending on the baby's weight.

MYERS: So there should be a document indicating that a doctor has prescribed it according to that?

WILLIAMS: Yes, but it may be written retrospectively.

MYERS: All right.

WILLIAMS: They administer the surfactant.

MYERS: So we've seen, and we'll come to this in a moment, there's an electronic system for recording prescriptions on the unit. You were familiar with that, weren't you?

WILLIAMS: Mm-hm.

MYERS: So a prescription for surfactant will feature in that system, won't it?

WILLIAMS: If -- either electronically or on a paper prescription.

MYERS: All right. If we could put up, please, tile 36. I am going to ask you to help with a formal prescription, just what we see on it. Can we just go behind that, please, Mr Murphy?

Are you familiar with documents that look like this, Mrs Williams?

WILLIAMS: Obviously previously, yes.

MYERS: From when you were working at the unit at this time?

WILLIAMS: Yes.

MYERS: If we look at the top of this, starting up there, we can see this relates to, in the second box down, "Baby Girl [K]" it says?

WILLIAMS: Yes.

MYERS: This is for [Baby K]. Beneath the grey bar, it actually says "poractant alfa lung surfactant". So this is for surfactant, isn't it?

WILLIAMS: Yes.

MYERS: I would like to come down to the administration history.

Does the administration history tell us what doses there were and when they were given?

WILLIAMS: Yes.

MYERS: Right. Can you see where it says "scheduled 17/2" and it says 05.44. Thank you for putting the cursor there, Mr Murphy. And it says "administered 17/02" and then 03.00. Can you see that?

WILLIAMS: Yes.

MYERS: So moving across from there, it describes a 120 milligram dose, doesn't it?

WILLIAMS: Yes.

MYERS: And then N.WILJ. Is that your reference as a user?

WILLIAMS: Yes.

MYERS: That's you. Then a co-signer, if we look below that, it's got "doctor" and Laura Lo.

WILLIAMS: Yes.

MYERS: So Dr Lo co-signed for this dose with you?

WILLIAMS: She's the SHO.

MYERS: Okay. Where we see the time of 03.00, is that a record of the time the dose was given?

WILLIAMS: Yes.

MYERS: All right, thank you.

MR JUSTICE GOSS: From what you said, Dr Lo will have actually given the surfactant then?

WILLIAMS: It could have been the registrar.

MR JUSTICE GOSS: It would have to be a doctor, though, it couldn't be you?

WILLIAMS: It wouldn't be me.

MR JUSTICE GOSS: But she's co-signed, it would have to be a doctor, but 3 o'clock is the time it was given?

WILLIAMS: That's what we have put in.

MR JUSTICE GOSS: That's what's recorded. So far as the scheduled time of 05.44 is concerned, if we scroll up the document, please, Mr Murphy, if you look at the dose and then come to "Start: 17/02, 05.44", does this have the appearance of a prescription that's been written in retrospect?

WILLIAMS: Yes. It always will be because at the immediate time, when a baby requires surfactant, and we don't have a baby number, so there's no documentation you can do until the baby's on that system. So you can't prescribe. That's why I say sometimes it's written on a hand prescription chart -- and that's still the case now. So we've gone back and obviously countersigned it together, checking it, and normally we also keep a record in the baby's notes of the batch number of the surfactant given, so it's always traceable.

MR JUSTICE GOSS: Sorry, I just thought otherwise on the face of it there appears to be a slight anomaly there.

MR MYERS: Thank you, my Lord, yes, with those two timings.

If we go down, let me just follow through from that, please, down to the administration history detail.

Where it's got the time administered as 03.00, how would you know when you come to sign it up that that is the time it was administered, if you see what I mean?

WILLIAMS: Unfortunately, it's an estimation of the time that --

MYERS: That's where that comes from. So it's going to be that time or around that time?

WILLIAMS: Around that time.

MYERS: Next I would like to ask you about the air leak, which we had a look at. Can we put up the chart at T51, please, Mr Murphy?

I'm going to ask to enlarge that central section on the left-hand side where we've got the air leak percentage.

So we can be quite clear, the 94 that we see there, Mrs Williams, that means a 94% air leak, doesn't it?

WILLIAMS: Yes, on the ventilator.

MYERS: On the ventilator. The next time along we can see, you can look if you want to, I'm looking at my minuscule timing on the sheet I've got, and it's 04.30 or thereabouts, it's down to a 5% air leak, isn't it?

WILLIAMS: If that's what it says on there, yes.

MYERS: Yes. So 94 is a high air leak, isn't it?

WILLIAMS: Yes.

MYERS: And is that something you would have brought to the attention of the doctor or the doctors who were present?

WILLIAMS: Yes.

MYERS: That forms part of -- thank you very much, Mr Murphy.

You can see the times across the top now.

WILLIAMS: Yes.

MYERS: That forms part of the overall picture for the baby, doesn't it, the overall clinical picture -- or to be taken into account, let me rephrase that.

WILLIAMS: I was going to say because the leak -- clinically, if the baby is stable and ventilating well and you are looking at blood gases, you are looking at observations and the baby is getting what they require to support them. Then it's just part of it but, yes, it would be escalated to the medical team.

MYERS: It's a matter to keep in mind, isn't it?

WILLIAMS: Yes.

MYERS: And if for some reason the baby does not receive the oxygen that she needs, one thing that can happen is she may desaturate, the oxygen levels fall and she desaturates?

WILLIAMS: If she's not getting oxygenated, yes.

MYERS: Ideally, from your experience, the aim would be not to have a leak of 94%, wouldn't it?

WILLIAMS: Yes.

MYERS: Do you know whether an air leak may suggest that a tube is not properly fitting? I'm not asking you to guess, I'm looking for your experience.

WILLIAMS: From my experience, it can be that the tube isn't just fitting in the trachea as much as, say, a larger tube.

MYERS: We know we're talking very small sizes here, millimetres and parts of millimetres, but if the tube isn't properly fitting then air can escape from around the tube and not go into the baby; that's right, isn't it?

WILLIAMS: Like I said, I haven't got a huge amount of experience with the leak, so...

MYERS: So far as ET tubes with babies are concerned and dislodging, in your experience the tubes can move or dislodge even when they've been properly placed in the baby, can't they?

WILLIAMS: Tubes can be dislodged yes.

MYERS: They can move for instance with the movement of the baby, can't they?

WILLIAMS: Yes.

MYERS: Something we've not heard much about, but I just ask you to confirm, is that a baby that moves can cause the tube to move?

WILLIAMS: Yes.

MYERS: So it's something which requires careful observation?

WILLIAMS: Yes.

MYERS: And the system can change from one minute to the next in fact, can't it?

WILLIAMS: Yes, but that's obviously why we put things in place to secure the tube, such as the hat and clamp that we've talked about.

MYERS: Yes. But nevertheless, if a baby moves in some way, that can create (overspeaking) dislodgement, can't it?

WILLIAMS: And moving the baby, yes.

MYERS: Your recollection, you have told us, is that [Baby K] had been quite active, in fact, hadn't she?

WILLIAMS: As times, yes.

MYERS: At times, yes.

WILLIAMS: I've documented it.

MYERS: That takes me to the question of morphine next, so let's have a look at the morphine, if we could. Morphine can be used to relax the baby, can't it?

WILLIAMS: Yes.

MYERS: And it can be a sedative on the baby, can't it?

WILLIAMS: Yes.

MYERS: So a baby that's been sedated with morphine is going to be less mobile?

WILLIAMS: Yes. Less active, yes.

MR JUSTICE GOSS: They are not mobile. Babies are not mobile, even full-term babies. Mobile means moving around.

MR MYERS: I simply meant moving.

MR JUSTICE GOSS: There's a difference between being mobile and active. They can be active but -- is that why you said active?

WILLIAMS: Yes.

MR MYERS: I wasn't suggesting kind of more than getting up and moving about or anything like that.

MR JUSTICE GOSS: Active, we know what you mean. Moving limbs; is that right?

MR MYERS: Moving their body position. Thank you.

You explained to us -- I just want to go back over this if you could help us, Mrs Williams -- that when a baby is first intubated, at that stage morphine may not be given but it may be when they are electively intubated; is that correct?

WILLIAMS: Yes.

MYERS: Could you explain to us what you mean by that?

WILLIAMS: So if there was a baby who was born of any gestation who was respiratory compromised but maybe didn't need intubation at delivery, however then -- while on the unit or the blood gases reflecting that they need some respiratory support, so actually we do need to intubate a baby, then that would be done in a controlled way, with a procedure for an elective intubation. At delivery it is done as an emergency.

MYERS: Right. So in the case of [Baby K] we know that she was intubated very quickly -- she was intubated after delivery?

WILLIAMS: Yes.

MYERS: Later on would be a point when she gets morphine, is that what you mean?

WILLIAMS: Yes.

MYERS: She wouldn't receive morphine at that point?

WILLIAMS: No.

MYERS: Right. I'd like to look at the documents we have just to see when this can have happened. The prescription for morphine we have, I'm going to ask to put that up, please. It's at tile 67 so let's start there, please.

This is a prescription -- this is for a morphine sulphate injection. Can you see that at the top?

WILLIAMS: Mm-hm.

MYERS: Just to keep in mind -- I want to pause there for a moment -- we've looked at the situation where the baby, a baby, in this case [Baby K], receives a bolus and receives an infusion. That's what we've been looking at, isn't it?

WILLIAMS: Yes.

MYERS: Before we go through these, is the case that a baby may receive an initial bolus at the time of intubation and then receive an infusion going on from that?

WILLIAMS: Yes, or the other way round, because if she was already intubated initially then we could start the infusion, expecting her then to be given that continuously. But then if

she's had to be re-intubated and she's active, we made -- the doctors have made the decision to give a bolus.

MYERS: Right. So it could be that way round, could it sometimes be that both things are given at once at the point of an intubation?

WILLIAMS: You would give your bolus first and then you'd commence your infusion --

MYERS: It could be that way round?

WILLIAMS: -- continuously -- yes.

MYERS: Where we see on this morphine sulphate injection, is that relating to a bolus of morphine that's given?

WILLIAMS: Yes.

MYERS: Right. If we scroll down to see the administration details, this bolus we can see is scheduled at 05.15 on 17 February. But where it says "administered", it's got 03.50. Can you see that?

WILLIAMS: Yes.

MYERS: And then across from there, user, your user details; is that right?

WILLIAMS: Yes.

MYERS: And then the co-signer is Nurse Letby's details?

WILLIAMS: Yes.

MYERS: So when would that tell us that the bolus had been administered if we work with that document?

WILLIAMS: I would have said it's 03.50.

MYERS: Yes, all right. That's the way that the bolus is prescribed.

We looked at a handwritten document which we're going to go to now, a chart. So can we put up T69, please? Thank you.

If we look at the top of this chart, it says:

"Neonatal variable dose infusion prescriptions."

So this relates to an infusion being given, doesn't it?

WILLIAMS: Yes.

MYERS: If we just look down, we can see, in the box to the left of the bold print, it says "morphine sulphate"?

WILLIAMS: Yes.

MYERS: So this is the morphine infusion. If we look across to the right, do we eventually come to the details of the doctor who prescribed this, about five or six boxes to the right? The cursor is actually in the box now. It says "doctor's signature". Can you see that, Mrs Williams?

WILLIAMS: Yes.

MYERS: So this is prescribed by a doctor and the doctor enters in under the administration the date and the time to start, is that correct, if we look down to the administration column?

WILLIAMS: Yes.

MYERS: So this doctor has put in "Date: 17 February 18 (sic)", "Time started: 03.15 (sic)". Does that indicate when the infusion would --

WILLIAMS: Sorry, it was -- yes, 17/2/16, 03.50.

MYERS: Sorry, 03.50. Does that indicate the time the infusion would start, 03.50?

WILLIAMS: Potentially or when they're writing it up, so there may be a slight delay because we make up obviously -- get the infusion ready. So they've prescribed it at 03.50.

MYERS: So the infusion could actually begin a little bit after 3.50 but it's not going to begin before the prescription has actually been written out, is it?

WILLIAMS: (Inaudible).

MYERS: Because you need this (overspeaking) --

WILLIAMS: -- need it to be prescribed (overspeaking) --

MYERS: -- to authorise the whole process?

WILLIAMS: Yes. Then it would be double-checking the rate and volume.

MYERS: So we have an electronic prescription for a bolus with the time of administration of 3.50; we've seen that, is that correct?

WILLIAMS: Mm-hm.

MYERS: And we have an infusion prescription with the time to start at 03.50. If we look at the intensive care chart that we went to, which was at tile 68, please, if we go to the top entry on the right-hand side next to 03.30, so it's the entries adding information on the grid, thank you.

That says "commenced" at that point where it says "morphine"; is that right? Can you see "03.30 commenced"?

WILLIAMS: Yes, but that could be, as I said, 03.45. It's just within that hour period.

MYERS: Yes, that's what I wanted to go to, because this relates to the infusion, doesn't it?

WILLIAMS: Mm-hm.

MYERS: And we have just seen an infusion signed by the doctor for 03.50; that's right isn't it?

WILLIAMS: Mm-hm.

MYERS: It's not going to start it before the prescription was written out, is it?

WILLIAMS: (Inaudible).

MYERS: So although it says 03.30, in reality it's going to be between 3 and 4 o'clock?

WILLIAMS: Yes.

MYERS: And if the written infusion says 03.50 then realistically this isn't going to have begun before 03.50?

WILLIAMS: Unlikely. And you can see at the 4.30, where I have put the total, which is 0.35, so that's just short of an hourly amount according to her rate.

MYERS: Right. So this could have started at 03.50 in fact?

I know you're nodding, but you have to say yes --

WILLIAMS: Sorry, yes.

MYERS: Which is consistent with the note written out by the doctor for the infusion?

WILLIAMS: Yes.

MYERS: All right, so 03.50 on the infusion. Then if we look across to the side dealing with the bolus so it's the other side of the table, please. There's writing.

Can you see your initials at the bottom? Are those your initials at the bottom, right at the bottom of the first column?

WILLIAMS: JW, yes.

MYERS: If we look at the entry there which refers to the morphine I know we looked at it earlier but let's look at it again now. Thank you. We've seen that's "03.50, morphine"; do you see that?

WILLIAMS: Yes.

MYERS: That relates to the bolus that was given, doesn't it?

WILLIAMS: 100 micrograms per kilo, yes.

MYERS: And that relates to the electronic prescription we've seen for 03.50 with the morphine injection, doesn't it, from what we can see?

WILLIAMS: Yes, someone's written that -- that's not my writing, but someone has written that. But that's not unusual for when we're working as a team.

MYERS: So we've seen the prescription for the injection timed 03.50, and the entry in the IC chart for 03.50; that's correct?

WILLIAMS: Yes.

MYERS: And we've seen the handwritten prescription for the infusion for 03.50?

WILLIAMS: Yes.

MYERS: And the time period on this chart, you agree, fits in with that period starting at 3.50 for the infusion?

WILLIAMS: What I've written, yes.

MYERS: If we look at your note, please, let's go to the note to see what this says. None of this is asked critically, it's just to understand what lies behind what we've got.

I'm looking at tile 66, please, which is your note, Mrs Williams.

If we go to the central part of it and enlarge it.

I'm not going to suggest that the way you've written everything down here is precisely in the order that it happened because you've done your best to recall everything at 04.48, haven't you?

WILLIAMS: Yes.

MYERS: But we looked at the entry for the morphine and it's a little bit below the one we've got so far. Can we scroll down a bit? Thank you.

That says a number of things. It's got:

"Cannula inserted by Registrar Smith. Commenced 10% dextrose..."

And it's got the amount there. It also says:

"Commenced morphine."

And then there's a rate for an infusion, do you agree, where it says 20 micrograms --

WILLIAMS: Yes.

MYERS: -- per kilogram per hour? And then:

"100 microgram bolus given on intubation."

WILLIAMS: Yes.

MYERS: So that's the infusion and the intubation being -- the infusion and the bolus being described?

WILLIAMS: Yes.

MYERS: As you have explained, those two things can be given at the same time?

WILLIAMS: Yes, you can give the bolus and then start the infusion or the infusion's going and you're giving a bolus.

MYERS: All right. We've seen timings of 03.50 for both of those items on the prescriptions; do you agree?

WILLIAMS: Yes.

MYERS: So it's entirely possible they could relate to what was given to [Baby K] on the re-intubation after that desaturation?

WILLIAMS: Yes.

MYERS: I'm going to ask you about that, come to that desaturation or your knowledge of it, Mrs Williams. You explained to us the process where if the vital signs as recorded by the monitor fall below a certain level, an alarm or alarms will sound; is that correct?

WILLIAMS: Yes.

MYERS: When you came back on to the unit after being away for relatively -- was it a relatively short period you were away?

WILLIAMS: I can't remember, sorry.

MYERS: You came on to the unit and you heard an alarm sounding, didn't you?

WILLIAMS: Yes.

MYERS: An alarm was going off. You were asked questions about what you can recall regarding a conversation with Dr Jayaram when you came back on to the unit. Do you remember being asked those questions?

WILLIAMS: Yes.

MYERS: I'm going to assist you, if I can, by asking you just to look at the statement that you made, Mrs Williams, on 10 April 2018, just to see what you said then. That was closer to the time of the events that we're dealing with. Is it likely that's probably going to have a little bit more accurate detail than you can recall as you sit here now?

WILLIAMS: When I gave the statement, yes.

MYERS: All right. Could we put page 2921 up? I know you need to find that first, Mr Murphy. The statement page is 2921. It's just for the witness and his Lordship and the barristers.

Just looking at the passage, if you read the first three or four lines to yourself, please, Mrs Williams.

(Pause).

The issue arising is what it was that was said.

That's what this relates to. The first thing is when you first returned to the unit, Dr Jayaram wasn't in nursery 1, was he, he wasn't in the room where [Baby K] was?

WILLIAMS: I don't know.

MYERS: When you spoke to him, was this in the corridor outside the room as far as you know?

WILLIAMS: I remember it wasn't in nursery 1.

MYERS: It's not in nursery 1. And he was asking you things like, "What's happened, how's this happened?" That's what he was asking you, isn't it?

WILLIAMS: Yes.

MYERS: And you were replying something like, "I don't know, I wasn't here, I was with the parents"?

WILLIAMS: Yes.

MYERS: Certainly at the time you made your statement, Mrs Williams, you remember him asking you, "Who was in the room at the time the alarms went off?"

WILLIAMS: Yes.

MYERS: So that's something he asked, "Who was in the room at the time the alarms went off"?

WILLIAMS: Yes.

MYERS: He wanted to know?

WILLIAMS: Yes.

MYERS: So we can be quite clear, when you gave your evidence -- and none of this is critical of you, Mrs Williams, it's just so we are clear -- just one moment, please.

(Pause)

You were asked about any conversation. This is in evidence earlier with the prosecution. You said:

"Answer: Dr Jayaram was on. He asked me how this had happened. I thought the ET tube was secure but I wasn't there."

WILLIAMS: I have said that?

MYERS: Yes, you said that. I'm saying that because it was said to you that Dr Jayaram had said that, there may have been some misunderstanding. It's easy in the heat of evidence; I do it too.

WILLIAMS: Yes.

MYERS: But to be quite clear, your evidence was he asked you how it had happened, you thought the tube was secure, but you weren't there?

WILLIAMS: Yes.

MYERS: Finally, just one matter I would like to confirm.

Again, it's in the nursing notes at tile 66, so I'd ask if we can go to that.

It's above the section that we looked at a couple of minutes ago and you've been asked about it with the prosecution. It's about four lines down from what we can see where you record:

"Large amount bloodstained oral secretions."

Do you see that?

WILLIAMS: Yes.

MYERS: If we go up a little bit so we can see where that does fit into the flow of this, please, Mr Murphy.

It follows the section where you have set out:

"High link(?) noted. Approximately 45 minutes later began to desaturate to the 80s. Dr Jayaram in attendance."

You go through some further details:

"[Query] ETT dislodged. Removed and re-intubated on second attempt by Registrar Smith with 2 set measuring 6.5 centimetres at the lips [as read]."

MR JUSTICE GOSS: I think it's 2.5. It does look like "2 set" but the witness said 2.5.

MR MYERS: And we know as a matter of record it is in fact 2.5. That's my mistake, thank you, my Lord:

"... with 2.5 ETT measuring 6.5 centimetres at the lips. Air entry clear and equal. Large amount bloodstained oral secretions."

Can I ask you, is that certainly what you saw visible when the first tube was taken out and the re-intubation then took place? Is that where that fits in from what you can tell and what you can recall?

WILLIAMS: Obviously it's just going off my notes, I don't recall that being hugely specific/prevalent at the time.

However, I've done it enough to write it, so I've made a document of it.

MYERS: Is that to say you are not sure precisely where that fits into the order of everything?

WILLIAMS: I've tried -- and it's very difficult to write retrospectively, to try and cover a large amount that happened in a time frame, but we try and do it methodically in the sense of respiratory first and then we'll move on to either fluids, feeds, whatever it may be, and observations. So I would say that obviously large amounts of bloodstained oral secretions would have been when I was present at that intubation.

MYERS: Right. When the 2.5 ETT was put in?

WILLIAMS: Yes.

MYERS: It was seen then? All right.

You were asked whether you have any particular recollection of it now. Of course it's a long time ago, isn't it?

WILLIAMS: It is.

MYERS: You don't have any particular recollection, but in the notes you have written what it was that you saw, haven't you?

WILLIAMS: At the time.

MYERS: And that was clearly visible, wasn't it?

WILLIAMS: At the time I've written it, so I've seen it.

MR MYERS: You could see that. Thank you, Mrs Williams.

Re-examination by MR ASTBURY

MR ASTBURY: Some matters arising, please, my Lord, out of that.

Firstly, could I ask Mr Murphy to go to tile 36, please? You were asked about the surfactant and the prescription, Nurse

Williams. I just want to ask you some questions about that, please. If we can go behind it. If we scroll down to the relevant time. Below the grey box, "Administration history detail", we can see some times there all dated 17 February. We can see "Scheduled 05.44" and then we've got "Administered 03.00" and, at the end of that line, "Filed 05.48".

So this is the computer record, am I right, of the surfactant being administered, completed in retrospect after the event?

WILLIAMS: Yes, retrospectively.

ASTBURY: So the time that you've given to the event is 03.00; is that right?

WILLIAMS: Yes, that's what I've put in, yes.

ASTBURY: What does the 05.44 stand for, please?

WILLIAMS: That would be the time that they prescribed it.

ASTBURY: Right, okay. In retrospect?

WILLIAMS: Well, it will be because it's 05.44 so it's later on.

That again may be that [Baby K] wasn't put on the system, on the Meditech system, for quite some time. It was during the night and we rely on the midwifery staff to be able to do that. We can't do it.

MR JUSTICE GOSS: So they have to register the baby, so to speak, on the system before you can add all these sort of details?

WILLIAMS: Because it has to be done to make sure that they are adjoined with their mum.

MR ASTBURY: Is the 05.48 the time that the entry is completed on the computer?

WILLIAMS: That would have been the time we filed it.

ASTBURY: All right. So you're completing the entry, Dr Lo is co-signing; is that right?

WILLIAMS: Yes, she's co-signed.

ASTBURY: Would she be with you at the computer at that point?

WILLIAMS: Yes, to co-sign.

ASTBURY: (Overspeaking) with ID and whatever it is as co-signer?

So at 5.48 that morning, I think you told us that you didn't have a note of when the -- you didn't have a note of when the surfactant was given precisely?

WILLIAMS: No.

ASTBURY: So at 05.48 are you casting your mind back to when your recollection was it was given?

WILLIAMS: Again, as a team, that would have been a number of us being there when it was administered, so we would all be talking about, what time did we give the surfactant, because they were emergency things to do.

ASTBURY: Do you specifically recall Dr Lo administering the surfactant?

WILLIAMS: No, I don't remember who administered the surfactant.

ASTBURY: When you complete your nursing notes, do you try to write things in chronological order?

WILLIAMS: Try to.

ASTBURY: Can we have a look at your nursing note, please?

Perhaps tile 84, Mr Murphy. It's the larger entry, top left, please. Just looking for the -- it's line 4 down:

"Intubated at approximately 12 minutes of age with size 2ETT."

Is that right?

WILLIAMS: Yes.

ASTBURY: "Curosurf given. Brought through to unit."

Now, is that the order in which things happened or are you not now able to recall?

WILLIAMS: I would ideally -- we would take the Curosurf with us, if we had it, and give it at delivery, but I have documented that we've given it, but in the time frame, sorry, I don't remember.

ASTBURY: Okay. You can't help us with the precise time?

WILLIAMS: No.

ASTBURY: All right. You were asked about morphine and the order in which -- is it infusion then bolus or bolus and infusion?

WILLIAMS: Yes.

ASTBURY: Are you simply unable to say?

WILLIAMS: Yes.

ASTBURY: All right.

MR JUSTICE GOSS: You said it can be either?

WILLIAMS: It could be either and it's happened in -- before, either situation, we've either got an infusion running and not felt that we needed a bolus at that time, but then gone on to need a bolus. So either.

MR ASTBURY: Can we go back to this document? It's behind tile 50, please, Mr Murphy. It's our intensive care chart.

On the right, I'm going to go back to that 03.30 or thereabouts, is that fair to say --

WILLIAMS: Yes.

ASTBURY: -- where it's commenced? Do you try and keep to the times as best you can?

WILLIAMS: Yes. What we can, yes. But a lot can happen in an hour.

ASTBURY: Of course. Just looking at the 04.30 entry, was your evidence that the figure that then follows under the morphine column is consistent with being a little bit less than an hour's worth of morphine on that rate?

WILLIAMS: So the rate, if you remind me on the chart, was 0.3? It does say on the chart.

ASTBURY: 0.35.

WILLIAMS: But if we've given a bolus via the pump from the infusion, then that would have more millilitres added to it, if you see what I mean.

ASTBURY: So if the bolus is given as well, is that factored into the infusion calculation?

WILLIAMS: If we've used the syringe -- if we used the syringe that is premade, which I think it was at that time, aseptically,

then we can, or we've drawn it up and made it up ourselves from a morphine vial.

ASTBURY: So consistent with about an hour or not, is that not the case anymore?

WILLIAMS: It depends what the infusion was running at. If I can see the chart.

ASTBURY: We can go to the prescription.

MR MYERS: My Lord, I don't mean to be rude to my learned friend, but this is re-examination. It needs to be conducted in that way rather than putting a different case -- the prosecution's case to the witness.

MR JUSTICE GOSS: Yes.

MR ASTBURY: Well, if that's -- very good, I'll move on.

If we can go to the other side of the sheet, please.

You were asked about which order things took place in.

If we can look at that entry in the bottom left, please.

You mentioned that wasn't in your handwriting in your evidence-in-chief. You were asked about it again. Were you there for the bolus at 03.50? Do you recall?

WILLIAMS: I don't remember.

ASTBURY: And finally, this. You were asked about the conversation with Dr Jayaram when you came back into the unit and found that [Baby K] was being attended to. You told my learned friend that your recollection of the conversation you had with Dr Jayaram was better on 27 March when you made your witness statement than it is now; is that correct?

WILLIAMS: My recollection is what my recollection is, that I...

It's asking me what happened and that's what I said.

ASTBURY: You were asked about what was in the statement and you said your recollection was better then than it is now; is that right?

WILLIAMS: Seven years has passed, so...

ASTBURY: It's not a trick question, I just wanted to check before I show you. We've heard the statements are prepared from

a recording. Do you remember being interviewed before the witness statement was taken?

WILLIAMS: Yes, it was recorded, yes.

ASTBURY: And I'd just like, please, for the lawyers only, for you to be shown a page of that interview at K9714, please, Mr Murphy. If we can scroll down, please.

Just to remind you, can you see on the screen the transcript of what you actually said rather than the witness statement that was taken from you? And does this refresh your memory, in particular where you recall what Dr Jayaram specifically asked you?

(Pause)

WILLIAMS: Sorry, so what...

ASTBURY: In March 2018, were you able to recall, according to this, what Dr Jayaram asked you?

WILLIAMS: Yes, which is what I've said in the statement.

ASTBURY: Did you tell the police:

"[You] remember him specifically asking me, you know, saying, well, how has the tube moved, how has the tube moved."

That was your recollection then?

WILLIAMS: I'm sure I've only said it meaning to say it once, but he's asked me...

ASTBURY: But that's the question you were asked?

WILLIAMS: (Inaudible).

MR ASTBURY: Thank you, my Lord. Nothing further.

Questions from THE JUDGE

MR JUSTICE GOSS: Just so I can be clear about having an infusion of morphine and having a bolus of morphine, both are administered intravenously?

WILLIAMS: Correct.

MR JUSTICE GOSS: An infusion, obviously, is a continuous drip of the drug going into the vein, and a bolus -- what was the purpose at this time for a bolus of morphine being given,

whether it was given before or after the infusion started? We won't get into that detail because it's not clear and you have no recollection. But what was the purpose of a bolus of morphine at that time, do you know?

WILLIAMS: I would say for pain because obviously we're very aware that it is an invasive procedure.

MR JUSTICE GOSS: The pain of what?

WILLIAMS: Being intubated.

MR JUSTICE GOSS: So that would be given, what, immediately before intubation, would it?

WILLIAMS: Ideally, but not in an emergency situation at delivery.

So in this case, for [Baby K], it would have probably been to look at her pain and she was active -- and passing a tube, an endotracheal tube, is an invasive procedure for anybody.

MR JUSTICE GOSS: Yes.

WILLIAMS: And we don't diminish that for a baby who we know can still feel discomfort. So a bolus can be given for comfort to ensure that that baby is not feeling any pain.

MR JUSTICE GOSS: Yes. I know, and unsurprisingly, you can't remember details now, but on average, how long before something like an intubation procedure was to be carried out would morphine be given if it was deemed appropriate to give morphine?

WILLIAMS: Um... Ideally, we do have a policy to give -- it's a slow bolus, but obviously given, administered by nursing staff, and then we would wait 3 to 5 minutes then for the morphine to then start the intubation.

MR JUSTICE GOSS: Thank you.

WILLIAMS: There may be a period of time.

MR JUSTICE GOSS: Right.

WILLIAMS: If it's safe to do so.

MR JUSTICE GOSS: Right. Thank you very much.

Does anyone wish to ask anything arising? I just thought it was important to have that. Right.

Well, thank you very much. That completes your evidence. Is the witness likely to be required again?

MR ASTBURY: I will have to check. Just give me a moment.

(Pause)

MR ASTBURY: Not scheduled.

MR JUSTICE GOSS: You haven't been made aware that you're likely to be required? So the likelihood is you won't be required to give evidence again, but just in case, as I said to you before, don't talk to anyone about this case until it's all over. Thank you very much for coming back to give evidence again and for coming back again today, I know it's been inconvenient for you.

Stay where you are.

We'll have our ten-minute break, members of the jury.

(In the absence of the jury)

MR JUSTICE GOSS: Please can members of the public now leave the courtroom? Thank you very much.

(12.03 pm)

(A short break)

(12.13 pm)

(In the presence of the jury)

MR ASTBURY: My Lord, I recall Dr Jayaram, please.

DR RAVI JAYARAM (recalled)

Examination-in-chief by MR ASTBURY

MR ASTBURY: Could we begin again with your name for the record, please?

JAYARAM: Yes, Ravi Jayaram.

ASTBURY: You've given evidence before, you know to keep your voice up and also, forgive me from time to time if I interrupt, but it's because a note is being made of precisely what you say.

Doctor, you have come along today to assist us with your care of a baby by the name of [Baby K] --

JAYARAM: That's correct, yes.

ASTBURY: -- and in particular, the early hours of 17 February 2016?

JAYARAM: That's right.

ASTBURY: Were you the consultant on duty that particular night?

JAYARAM: I would have been. I'd have taken over being on call on the day before at around 4 o'clock.

ASTBURY: With heard that [Baby K] was born at a gestational age of 25 weeks.

JAYARAM: That's correct.

ASTBURY: And arrived at 02.12 in the morning of 17 February?

JAYARAM: That's correct.

ASTBURY: Were you on the unit at that time?

JAYARAM: I would have been called in. So the registrar on call would have called me at home and -- in these situations, with a baby of 25 weeks' gestation, where it is very likely that there are going to be some potentially difficult situations, it would be normal practice for the consultant to actually come in and, if possible, be present at the time of delivery. Sometimes deliveries happen out of the blue and we get there after the time of the delivery, but in this situation I was present at the time that [Baby K] was delivered.

ASTBURY: [Baby K] was 25 weeks' gestation. We've heard about the distinction between secondary and tertiary units, neonatal units. Would a 25-week baby ordinarily be delivered at a secondary unit like Chester?

JAYARAM: Ordinarily, no. So until probably the early 2000s, there was less structure about things. But it is recognised that babies below certain gestations, 28 weeks at that time, are better served, if possible, to be born in a tertiary centre. So if it can be anticipated, mothers are transferred to the tertiary centres before a baby is born.

Some situations arise where a mother is already in fairly advanced labour and transfer is not possible because of the risk of a baby actually being born in an ambulance between the secondary and tertiary centres.

So from time to time babies of lower gestations are born in secondary centres and we have the skills and have the ability to manage them in the short term and stabilise them so that they can then be transferred to a tertiary centre.

ASTBURY: Thank you. Was that the case with [Baby K]?

JAYARAM: Absolutely. So in this situation it would have been the obstetricians, who are the team that look after the mothers, who would have made the decision that on balance the risk of transferring at this stage of labour would have been too great and so a decision was made for [Baby K] to be born at the Countess.

ASTBURY: Were you present at [Baby K]'s birth?

JAYARAM: I was present when she was born, yes.

ASTBURY: Did you complete notes at [Baby K]'s birth?

JAYARAM: I did -- well, retrospectively, yes.

ASTBURY: Have you had access to those notes in refreshing your memory for today's purposes?

JAYARAM: I have done, yes.

ASTBURY: Can we go to tile 28, Mr Murphy?

Your notes are over several pages. I just want to look at the first page, which is behind this tile, first. If you can take us through the note. As you say, dated 17 February and written 04.50 in retrospect as you mentioned a moment ago. You have put there -- is that 25/00?

JAYARAM: 25/40. That means that [Baby K] was born at 25 weeks' gestation, given 40 weeks is the normal gestation. So it's a common notation of gestation.

ASTBURY: Thank you. You have then put "Mum 33 years"; is that right?

JAYARAM: That's correct and no previous live births and that [Baby K] was an IVF baby.

The next comment, SR0M, that means spontaneous rupture of membranes. That means that the amniotic membranes had ruptured over 48 hours before [Baby K] was born. That's important because if there has been a prolonged rupture of membranes, there's a higher risk of infection in a baby because bacteria can cross up into the baby. It doesn't mean the baby necessarily has

infection on board, but there's a higher risk and we can anticipate potentially more problems than otherwise.

I also commented that [Baby K]'s mother had received two doses of steroids. When premature delivery can be anticipated, the obstetric and midwifery team administer steroid medication to the mothers of premature babies.

The rationale for doing this is it helps to mature the lungs. The main problem, in terms of lung disease, in very premature babies is absence of a substance called surfactant, which helps to hold the lungs open because the cells that produce surfactant are not present and not working at lower gestations.

Steroids, without going into too much detail, stimulate those cells in the lungs to mature and start producing surfactant. So it doesn't mean that the lungs are going to be fine, but it reduces the potential severity of respiratory distress syndrome, which is the condition caused by surfactant deficiency.

I also make the comment that although the membranes had been ruptured for around 48 hours, there hadn't been any reported temperatures in [Baby K]'s mum and that's relevant as well because maternal temperature also increases the potential risk of infection in a newborn.

ASTBURY: Right. Is that "short labour"?

JAYARAM: Spontaneous labour. "Spont" is short for spontaneous.

ASTBURY: And footling, as we have heard, a breech delivery?

JAYARAM: Footling breech means --

MR JUSTICE GOSS: We have heard. We've been told, thank you, by Dr Smith.

MR ASTBURY: You then noted she was born at 02.12. Is that her weight at 692 grams?

JAYARAM: Yes.

ASTBURY: Resuscitated by Dr James Smith?

JAYARAM: Yes.

ASTBURY: Is that --

JAYARAM: He was the registrar on call that night.

ASTBURY: Just the next entry on the line, please?

JAYARAM: Initially, when [Baby K] came out, she looked quite dusky.

That's a reference to her colour. Dusky means she looked generally bluish.

ASTBURY: After the word James Smith --

JAYARAM: "Paed reg", sorry.

MR JUSTICE GOSS: Paediatric registrar.

MR ASTBURY: Sorry, I imagined something different.

Is that "no respiratory effort"?

JAYARAM: Yes.

ASTBURY: Is that a reading underneath?

JAYARAM: A heart rate around 60 beats a minute. The initial assessments we do with any newborn are essentially to give us an idea of what we need to do to help assist the transition from being in utero to being outside. With breech deliveries, particularly footling breech, and she was premature, it can take a little bit longer for babies to be delivered and in that period of time the baby can have less blood flowing through the umbilical cord and can potentially have problems.

So the absence of gasping or respiratory effort is significant. The heart rate being 60 at birth is also significant because we want the heart rate to be above 100. And the fact that she was floppy without great tone and quite pale and dusky coloured is also significant.

So in this situation, we have a pathway that we follow and after initially stimulating and drying the baby, we give what are called inflation breaths.

Inflation breaths essentially simulate what a baby would normally do when they're born. When babies are very first born they take a very big gasp and they have to take a very big gasp because their lungs are full of fluid so the first breath is very difficult. It's analogous to blowing up a balloon: when you first blow up a balloon it's very difficult, you have to put a lot of effort in, but once the balloon is inflated it becomes easier. So a baby take a big gasp.

In this situation, if a baby hasn't gasped, essentially by giving inflation breaths we simulate that. So we give a breath

that goes on rather than for a second, for 2 or 3 seconds and we give five breaths.

We do that either with a bag and mask or with a T-piece and mask. What we do when we do inflation breaths is look to see that the chest is moving. When you give one set of inflation breaths, you then reassess. If the chest has moved you know that gas is getting into the lungs. But if the heart rate hasn't picked up we give another round of inflation breaths.

ASTBURY: And we see here there were two rounds?

JAYARAM: We did two cycles of inflation breaths and then I have said IPPV, which stands for intermittent positive pressure ventilation. And that means, as opposed to inflation breaths, we are giving breaths at a normal rate using the T-piece. And we observe to see that the chest is moving up and down.

If the chest is moving we know that gas is going in and out of the lungs, we know air is going in and out of the lungs. And if that's the case and the heart is beating then what should happen is that as we are oxygenating the lungs, and the heart is pumping blood to the lungs, that blood is getting oxygenated. Oxygenated blood is then coming back to the heart, which then perfuses the heart muscle, which then makes the heart rate pick up. And indeed after 2.5 minutes, [Baby K]'s heart was above 100 beats a minute.

ASTBURY: If we can scroll down, Mr Murphy. You mentioned the gasps from 3 minutes. Are they gasps that you're looking for?

JAYARAM: Yeah, those are a good sign. Babies should gasp when they come out. The fact that she had a difficult delivery suggests she was a bit stunned. We'd got her heart rate above, we were oxygenating her and she starting gasping at 3 minutes and then breathing spontaneously for herself from 4 minutes.

ASTBURY: That's the next entry?

JAYARAM: Yes.

ASTBURY: Then you have recorded the oxygen saturations at 85% --

JAYARAM: (Overspeaking) were above (overspeaking) greater than 85% at 6 minutes --

ASTBURY: Which --

JAYARAM: -- (overspeaking) you don't expect oxygen saturations in the first few minutes of life to sit at normal saturations. So that's a good sign -- and in this situation we would have

anticipated that she would have had a degree of surfactant deficiency. So sats above 85% at 6 minutes are satisfactory.

ASTBURY: She's been intubated; is that right?

JAYARAM: Yes.

ASTBURY: Successfully?

JAYARAM: Yes.

ASTBURY: What's the relevance of the 20 minutes?

JAYARAM: So intubation is a way of getting a more secure airway.

The important thing with management of the airway and breathing at birth is to make sure that we can get air/oxygen in and out of the lungs. Intubation means we have a more secure airway and it enables us to give artificial surfactant.

Intubation is a tricky technique and in smaller babies it can be more difficult. The risk of intubation is that if you spend too long trying to intubate, the baby can have a period where they're not actually breathing or having their breathing done for them. So in the process of intubation in this situation, we make sure that their saturations are as good as they can be, with our hand ventilation, with the mask. We then intubate using a device called a laryngoscope and an endotracheal tube, and we give ourselves 30 seconds to successfully intubate. Somebody independently times 30 seconds and if you don't intubate within 30 seconds we stop the procedure and put the baby back on to the bag and mask or the T-piece and mask and ventilate again.

It took three attempts to intubate [Baby K] and we put -- on the third attempt by Dr Smith we took a decision to put a slightly narrower bore tube in because sometimes in small babies the difficulty can be that you can see the vocal cords and just not pass a tube through.

Now, the trouble with a smaller tube -- and we're talking fractions in terms of sizes. This is referring to the internal diameter of the tube of 2 millimetres, ideally at this gestation a 2.5-millimetre tube would have been a better fit but in the circumstances, given intubation was trickier than anticipated, a decision was made to put a size 2 tube in.

This was secured at 6.5 centimetres at the lips.

That means -- if you look at an endotracheal tube, there are markings every centimetre. We intubate through the mouth and the point that the tube emerged from the mouth was 6.5 centimetres.

ASTBURY: So the tube is marked in advance with --

JAYARAM: It is a pre-marked tube, so the tubes actually have markings on.

ASTBURY: We can see that [Baby K] was moved to the NNU?

JAYARAM: Yes. And while she was being transferred, she would have been being ventilated by hand through the endotracheal tube.

ASTBURY: We've heard she would have completed that journey on the Resuscitaire?

JAYARAM: That's correct.

ASTBURY: And then been transferred to an incubator on arrival in, as it turned out, nursery 1?

JAYARAM: That's correct.

ASTBURY: If we can scroll down, please. So is this -- it's headed "on arrival". Is this on arrival at nursery 1?

JAYARAM: On arrival at nursery 1.

ASTBURY: So you have recorded the ventilation settings; is that right?

JAYARAM: Yes. Talking through the ventilation settings, I've put 21/5. That means that she had a background pressure, what we call the PEEP, positive end expiratory pressure, of 5 centimetres of water, which is fairly standard in the situation, and a peak pressure of 21, which is the pressure that each breath was being given at. We judge the pressures, really, on what is needed to make sure that we can see the chest moving. So a pressure of 21/5 in a 25-week gestation baby isn't a huge amount of pressure to inflate the lungs. The "T in" of 0.4 is the inspiratory time. So that means each breath we gave was 0.4, and normally 0.4 to 0.5 seconds is what we would do.

And she was needing around 60% oxygen through the ventilator circuit. I've commented there that on these settings her chest was moving well and when I listened she had good air entry. That means with a stethoscope I could hear gas going in and out of lungs, I could hear air moving in and out of her lungs.

She had an initial gas, which is a venous gas -- so venous gases always have a slightly lower pH than an arterial or capillary gas. Her pH was 7.23. Her PCO₂, which is the amount of carbon

dioxide in her blood, the waste product of breathing, was 7. In babies we often accept slightly higher CO₂s and slightly lower pHs at this stage, particularly with a venous gas, because we know that trying to ventilate to normality can potentially cause harm to the lungs. So we call it permissive hypercapnia and we are happy to let them have a little bit of leeway with their carbon dioxide.

Her bicarbonate was 23, which is a reflection of the metabolic side of things, which is normal. Her lactate was a little bit high at 4, which was not a surprise given that she'd had a little bit of a difficult birth.

She was given surfactant down the endotracheal tube at 2.45. And following this, her oxygen requirement came down slightly to 50%.

ASTBURY: For fluids, we can see "IV access obtained"?

JAYARAM: She'd have had a cannula placed.

ASTBURY: Is that BM?

JAYARAM: BM is a term for blood glucose. It's a bit like calling a vacuum cleaner a Hoover. BM was the original machine that did it. So a blood glucose of 4, which again is acceptable and perfectly good for this age.

We commenced her, as we would have done standardly, on a 10% dextrose infusion at 60ml per kilogram of body weight per day, which is the standard formula for fluids in newborns.

I've commented that we sent a blood culture off.

The reason for this is because there were risk factors for infection. So spontaneous premature delivery in itself can happen because of infection and there was a history of a prolonged rupture of membranes and she had significant respiratory symptoms. Even though that was likely to be due to surfactant deficiency, we can't exclude infection, so it was important to make the assumption until proven otherwise that infection was present and we do this routinely. So we sent a blood culture off. A blood culture is a blood test to see down the line if any bacteria are growing in the bloodstream. But rather than waiting for that result we assume it is there until we know it is not and she was commenced on two intravenous antibiotics, penicillin and gentamicin.

ASTBURY: If we scroll down we can see the meds she was administered. Is that vitamin K?

JAYARAM: Yes, she received intramuscular vitamin K. Again, newborn babies get this as matter of routine to reduce the risk of a condition called haemorrhagic disease of the newborn, which can happen because babies' clotting factors are not entirely mature.

As I mentioned she was started on penicillin and gentamicin -- and with ventilated babies we usually start them on medication as (sic) analgesia and sedation. And that's why she was started on morphine because it's not pleasant to have a plastic tube going down into your airway. So as a matter of routine we want to keep these babies as comfortable as possible and 20 micrograms per kilogram per hour is a fairly standard starting dose for a morphine infusion in a newborn baby -- or indeed an older child as well.

ASTBURY: Do you recall at what stage of [Baby K]'s introduction to the nursery the morphine was commenced?

JAYARAM: I don't recall exactly when. I don't recall. It's not usually straightaway because it takes time to (inaudible: coughing) it up and draw it up as well.

ASTBURY: I'm sorry, I can't read the --

JAYARAM: The rest are just examination findings. I commented on initial assessment at that time that her -- she was pink in colour, having been dusky. She had good tone, having been floppy previously. Her pulses were of good volume and easy to feel. Her capillary refill -- that's when we push over the sternum for 5 seconds and take our finger away and the colour should come back in less than 2 seconds. That's a sign that, from a circulation point of view, we are in a good place.

And that line with (inaudible) is a way of documenting that her heart sounds were normal. So I could hear her two heartbeats, I couldn't hear any extra sounds such as murmurs. I have written there that her chest was moving equally on both sides and when I listened to her lung fields I could hear air going or gas going in and out of her lungs.

ASTBURY: I'm going to ask you to pause there. [Baby K] is being moved from the delivery suite to nursery 1. You told us about the ventilation settings. And we've heard from her designated nurse how she would be connected to the ventilator.

JAYARAM: Yes.

ASTBURY: At this stage, bearing in mind the note you just told us, do you have any observations about the efficiency of ventilation or otherwise?

JAYARAM: Well, the fact that the chest was moving and I could hear air going in and out of the lungs and the oxygen saturations, which I haven't documented there, were acceptable in the amount of oxygen she was in. For a 25-week gestation baby I was happy with where she was.

Obviously, we are always aware that over time surfactant deficiency can cause worsening symptoms. So she would need to be watched closely in terms of her chest movement, in terms of her oxygen requirement, in terms of her blood gases.

ASTBURY: Were you satisfied at that stage that the ventilation was working properly?

JAYARAM: Yes, I was. The reason I say that is, as I say, I could see her chest moving and air was going in and out of her lungs. Remember, the purpose of what we're trying to do with the ventilator is to get gas in and out of the lungs and if the chest is moving and we can hear gas going in and out of the lungs, then we know -- we are working out: is it enough, is it too much? We have to look at what her oxygen saturations are doing, we have to have a look at blood gases as well.

ASTBURY: Erm --

JAYARAM: But I certainly wasn't concerned at this stage that we needed to change a huge amount acutely because, as I say, her chest was moving and she was a good colour.

ASTBURY: And you've noted her -- is that "abdo soft"?

JAYARAM: Her tummy was soft, so she didn't have an obviously distended tummy. Sometimes, when we've been ventilating with a mask, gas, as well as going into the lungs, can go into the abdomen and sometimes the tummy can get distended. But her tummy was very soft and I commented that she had good tone neurologically.

So at this point I spoke with the neonatal transport team. So we have a team who transfer babies between units and they're a very specialised, highly trained team and they have the equipment and the ambulance equipment to come to us, pick up babies, and transfer them to the tertiary centres. And as I said earlier, ideally it is better for these babies to be born in tertiary centres, but it doesn't happen uncommonly at all that babies can't be transferred or babies come in and are born in the secondary centres. And they advised there was a bed at Arrowe Park, a cot at Arrowe Park Hospital, and they asked us if we could, whilst we were waiting for them, try and place umbilical lines and get some X-rays done.

And I've commented at that point I updated [Baby K]'s parents. I don't remember what I said or doing that.

I would have gone back to the labour ward to update them, just really to tell them where we were and what the plan was.

ASTBURY: I'm going to ask, please, to put a note that you made -- did you prepare a plan for the police to show where [Baby K] was in the unit?

JAYARAM: I have a recollection I did, yes.

ASTBURY: Thank you. Could you put that up, please, Mr Murphy?

JAYARAM: The delivery suite is over to the right. [Baby K] was where the A is circled.

ASTBURY: Where we have neonatal unit, we know that the map is inaccurate to the extent there's a door above the O or the N here.

JAYARAM: Yes, that's correct.

ASTBURY: It's been missed off the plan.

JAYARAM: That's correct.

ASTBURY: That's nursery 1?

JAYARAM: Yes.

ASTBURY: And as far as you're concerned on the map, your A is where [Baby K] was placed in nursery 1?

JAYARAM: That's correct.

ASTBURY: We'll come back to that in a moment please. Were you aware, having seen [Baby K] in nursery 1, who her designated nurse was?

JAYARAM: It was Jo Williams.

ASTBURY: Thank you. Were you aware at any point that Joanne Williams left the unit?

JAYARAM: Yes. So we were happy that [Baby K] was stable. We didn't have to particularly change her ventilator settings a huge amount, her chest was moving, she was settled, she had her antibiotics, she was on a morphine infusion and she was very, very settled.

Jo Williams told me -- and I don't know if you want to go back to that picture because I can tell you where I was.

ASTBURY: I will ask you a question first.

JAYARAM: Yes, of course.

ASTBURY: You've given us a summary of [Baby K]'s condition at that point and you were content that she was settled. You mentioned that the morphine infusion had started?

JAYARAM: (Overspeaking).

ASTBURY: I want you to look, please, at tile 69.

This is the infusion chart, which reflects the morphine infusion that we understand [Baby K] received.

JAYARAM: That does state it started at 03.50.

ASTBURY: Yes. So we can see there, the date, the time, the rate; can you see your signature?

JAYARAM: I can see my signature, yes.

ASTBURY: Are those details in your hand?

JAYARAM: That's my writing, yes, absolutely.

ASTBURY: So that would have been the infusion, the time that you understand the infusion to have started?

JAYARAM: Looking at that, yes, absolutely.

ASTBURY: When Nurse Williams left -- do you recall her leaving?

JAYARAM: Yes. She came to me and she said she was going to go to the labour ward to update [Baby K]'s parents.

ASTBURY: Were you aware that she went?

JAYARAM: Yes.

ASTBURY: Where did you go?

JAYARAM: I was sitting at the desk, which is just round the corner from the other door on -- in nursery 1.

ASTBURY: Let's go back to the plan, please. The cursor should work, I hope. On the mouse to the left of the screen --

JAYARAM: So I was (indicating) there.

ASTBURY: Tell us what's there, please.

JAYARAM: There are some shelves there and there's a desk here with drawers underneath it and a chair.

ASTBURY: Do you recall what you were doing at the desk?

JAYARAM: I was either writing a note or waiting for the transfer team to come back, but I recall I was writing a note.

I don't know whether it was [Baby K]'s notes or other notes.

ASTBURY: What, if anything, happened at that point?

JAYARAM: So Jo had told me that she was going to the labour ward to update [Baby K]'s parents and she told me that Lucy Letby was -- we use the word babysitting -- was going to keep an eye on things.

I'll talk you through my thought processes. Now, at this point in the February, we were aware, as a team, of a number of unexpected, unusual events, and we were aware of the association with Lucy Letby being there.

That's all we were aware of. Nothing else had been -- no cause/effect had been ascribed. I will admit, it seems entirely illogical and irrational, but when Jo told me she was going and Lucy was there, I felt extremely uncomfortable.

Now, you can call me hysterical, you can call me irrational, but that's how I felt because of this association. And then the rational part of myself told me to stop being ridiculous and I carried on doing what I was doing. And this thought recurrently came into my head. So after about 2 or 2.5 minutes, I got up and went to walk up, just to check on [Baby K]. And the reason I did that was actually to prove to myself that I needed to stop being ridiculous and irrational and, of course, everything was going to be okay and then I could go back and just carry on with doing what I was doing. And I would say it was probably 2.5 to 3 minutes, I think, after Jo had told me that she was going to the labour ward from my recollection.

So I got up. I had not heard -- I'd not been called to come to review [Baby K] and I'd not got up because I'd heard alarms going off and -- an alarm going off in nursery 1 -- and I don't recall there were any other babies in nursery 1, although I may be wrong. I would have heard an alarm. So I got up and walked through to see [Baby K].

ASTBURY: Okay. Did you go into nursery 1?

JAYARAM: I went into nursery 1.

ASTBURY: Do you remember which door you used to go into nursery 1?

JAYARAM: I went in through the door that isn't on the drawing (overspeaking) --

ASTBURY: So the door nearest the desk?

JAYARAM: -- and I walked through and walked up.

ASTBURY: Okay. What, if anything, did you see when you went into nursery 1?

JAYARAM: So, as I walked up, I saw Lucy Letby standing by the ventilator by the incubator. She didn't have her hands in the incubator, and I saw her, and then I looked up at the monitor. And on the monitor [Baby K]'s saturations were dropping. So her saturations are a reflection of her oxygenation. And when I got there, they were in the 80s and they continued to drop.

The ventilator wasn't alarming and the monitor wasn't alarming. The monitors are set to alarm usually when the saturations drop below 90%. I recall saying, "What's happening?", and Lucy looked and said words along the lines of, "She's having a desaturation". And at that point, the important thing is to then assess the baby and try to work out why that desaturation is happening.

ASTBURY: Let's just pause there. We've got a map in front of us.

Is there any significance in the B that you have marked (overspeaking) --

JAYARAM: I recall that might have been -- if A is the incubator, that was where Lucy Letby was standing.

ASTBURY: And before we move on to your conversation, you told us she was standing near to the incubator?

JAYARAM: Yes, right at the top. So the incubator is obviously where A is. The ventilator machine is here (indicating), the monitor is above here (indicating), and there's various infusion pumps and she was standing at the top end of the incubator, as close -- the ventilator would have been sitting where the cursor is there, so she was standing there (indicating).

ASTBURY: Which way would [Baby K] have been lying in the --

JAYARAM: [Baby K]'s head was towards the wall and feet towards the other end.

ASTBURY: Right. So she was standing alongside the incubator?

JAYARAM: That's correct.

ASTBURY: What, if anything, was she doing?

JAYARAM: Nothing. She hadn't actually -- I wasn't aware that she was looking at the monitor. She was facing -- I can't remember, she wasn't facing away from me, she was facing more towards me but didn't actually say anything to me until I asked her what's happening.

ASTBURY: Do you remember where you were in the room when you first spoke to her?

JAYARAM: Probably as I was walking -- probably about halfway because I'd walked in and it was at this point that I had looked up and seen that the saturations were dropping.

ASTBURY: You told us the priority was the baby?

JAYARAM: Absolutely.

ASTBURY: What did you do?

JAYARAM: In this situation, if a baby is -- if a ventilated baby is desaturating again there's a number of things we have to think about as to why this baby is desaturating. So the first thing is to look at the baby because it might just be that the monitor is not picking up properly and the baby is fine. But when I looked at her, you could see that the chest, which had been moving with the breaths from the ventilator, was no longer moving. So immediately, if the chest isn't moving one has to think, why isn't the chest moving, is there a problem with ventilator tube, is there a problem with the lungs.

The first thing then is to look at the ventilator and the ventilator was still delivering breaths. When you look at the chest, it's not moving, you listen to the chest and can't hear air moving in and out, that suggests then there's some kind of issue with the tube but it could be an issue with the ventilator.

So I disconnected the ventilator from the endotracheal tube, and put a T-piece on with a thing called a CO2 monitor. A CO2 monitor is a device that -- if carbon dioxide, the waste product

of breathing, is coming out of the lungs, the CO2 monitor will change colour.

I gave breaths through the T-piece with the CO2 monitor on through the endotracheal tube. Two observations: the chest didn't move and the CO2 monitor didn't change. That suggests that the tube is not functioning as it should be. That will either be because it's not in the right place, it's become dislodged, or it's happening because it's blocked in some way.

It could also be happening because the lung disease, which -- we know surfactant-deficient lung disease/respiratory distress syndrome evolves over time and it could have deteriorated to the point where the lungs were so stiff that we couldn't give enough pressure to inflate the lungs. But I felt that was unlikely given that a few minutes before, on the ventilator settings we were on, we were stable.

ASTBURY: Pausing there, was there any more conversation between the two of you as you did this?

JAYARAM: We switch into professional mode and say, look, we have to deal with this situation. So I may have asked, "What's happened?", because it didn't really make sense to me why the tube should become dislodged because it was secured, it was in at 6.5 centimetres at the lips, and [Baby K] wasn't a vigorous baby, she had good tone.

It's very difficult to dislodge an ET tube without it being spotted. So it can happen if a baby is having cares and being handled. It can happen if a baby is very vigorous and their hand gets caught under the tube and they pull it. But [Baby K] wasn't really behaving like that.

So I then removed the tube, which wasn't blocked, and then put a face mask on the end of the T-piece to ventilate [Baby K]. And as soon as we ventilated through the face mask, [Baby K]'s chest began to move up and down, without a huge amount of difficulty and her saturations picked up.

ASTBURY: Did Lucy Letby say anything during the course of that procedure?

JAYARAM: Nothing that I remember. Nothing that I remember.

I was probably asking her to bring me things and help, but I don't remember any kind of conversation.

ASTBURY: Okay. So you managed to, through the Neopuff, provide air; is that right?

JAYARAM: That's correct, yes.

ASTBURY: What happened next?

JAYARAM: Through the Neopuff with a mask, [Baby K]'s chest moved, her saturations picked up, and that suggested to me that her lungs disease at that point hadn't significantly worsened. Then she was re-intubated.

ASTBURY: Did you remove the original tube?

JAYARAM: Yes, that was taken out before we -- the sequence was, having disconnected from the ventilator, we ventilated through the original tube with the CO2 monitor. It was clear the chest wasn't moving, it was clear the CO2 monitor wasn't changing colour, so we removed the tube, ventilated with the mask, and then electively re-intubated her, which I believe James Smith did under my supervision.

ASTBURY: Bearing in mind the alternatives that you ran through, did you check the tube that was (overspeaking) --

JAYARAM: Yes, it wasn't blocked -- and actually there would have been no reason at this stage for a tube to have been significantly blocked.

MR JUSTICE GOSS: He had actually said that. Dr Jayaram already said, "I removed the tube and it wasn't blocked".

MR ASTBURY: I just wanted to confirm. I missed that.

Okay, so just talk us through the next phase then, please.

JAYARAM: So James Smith re-intubated and because we were in a more controlled situation, we had more time and we put a size 2.5 tube down, which we would have liked to have done to start with, and she was reconnected to the ventilator. She was on pretty much similar ventilator settings to what she was before this event, which again suggested that whatever had caused that deterioration, it probably wasn't related to a significant worsening in that time of her underlying lung disease.

ASTBURY: Okay. How was [Baby K] behaving at that time?

JAYARAM: She was behaving as I would expect a 25-week gestation baby to behave. She was not really moving a huge amount, but she had normal tone, she wasn't floppy, the intubation was controlled, she stayed pink with good saturations throughout.

ASTBURY: So Dr Smith intubated for a second time?

JAYARAM: He intubated, yes. I can't remember whether he -- how many attempts he took this time.

ASTBURY: Perhaps if we go to your note, it will assist. If we can go to tile 65, please. It's towards the bottom of the page that we've already been through and continues on to the next.

JAYARAM: The other thing I did is check there wasn't a pneumothorax with a cold light and there wasn't a pneumothorax. Again, just thinking through causes for acute deterioration.

ASTBURY: So looking for causes eliminating those that you could at the time?

JAYARAM: Yes. It's important to look for important causes that can be -- that need to be found and treated immediately.

ASTBURY: So at 03.50 you described it as a sudden deterioration; is that correct?

JAYARAM: Yes, that's correct.

ASTBURY: And you have put that the O2 sats dropped to -- is that --

JAYARAM: Less than 40. So as I say, when I walked into the room they were dropping, they were in the 80s and they started going down.

ASTBURY: And at what stage did they reach 40%?

JAYARAM: That was before we took the tube out and bagged her back up with the mask.

ASTBURY: You then have entered:

"Bagged via ET tube with Neopuff."

JAYARAM: That's correct.

ASTBURY: "CO2 monitor not changing colour" --

JAYARAM: No (overspeaking) --

ASTBURY: -- "and poor chest movement?

JAYARAM: -- which again indicated to me that we needed to remove the tube.

ASTBURY: Thank you. The cold light, which we've heard about, was normal in appearance, so not determinative --

JAYARAM: Yes, which suggested there was (overspeaking) --

ASTBURY: -- (overspeaking) no sign of --

JAYARAM: No sign of a pneumothorax.

ASTBURY: Scroll down, please:

"Tube removed and bagged via face mask."

And you say the sats recovered quickly?

JAYARAM: Yes.

ASTBURY: "Re-intubated by Dr Smith after a bolus of morphine."

JAYARAM: Yes, we do that as a matter of routine when we're intubating electively, again more for sedation and comfort for the baby. It makes the intubation process a little easier as well.

ASTBURY: Okay.

JAYARAM: And the tube was placed, again, at 6.5 centimetres at the lips, so it was the same length in terms of how far in it was as the original tube. And then we listened to both sides and again could hear good air entry and she was put back on to the ventilator.

ASTBURY: And is that ventilation settings (overspeaking) --

JAYARAM: As previously, yes.

ASTBURY: Okay. We can see the change in size of the ET tube from 2 to 2.5. Might that have been a feature in what you saw?

JAYARAM: I don't think so. The reason I say that is that although it is -- we'd have liked to have got a 2.5 in and the fact that there was a size 2 in didn't have any impact on the ventilation. So don't forget the outcome of ventilating is to try to get our gas mixture in and out of the lungs and get oxygen in and carbon dioxide out. If we're in a situation where we were struggling -- so in the period leading up to this deterioration if we'd been having to put the ventilator settings higher and higher to get the chest moving and we were struggling to oxygenate, then it would have been entirely appropriate at that point to say, look, we probably need to try and change to a bigger tube.

As it was, with the narrower bore tube, we were ventilating effectively, and I don't think that having that narrower bore tube had an impact on her ventilation and I don't believe that had an impact on the event of her sudden deterioration at that time.

ASTBURY: Okay. I'll come to your plan in a moment. If we scroll up we can see you have timed the event at 03.50.

JAYARAM: I have written that there, yes.

ASTBURY: If we go up to that, please. Are you able to assist with how long Nurse Joanne Williams had been away at the time that you went into the nursery?

JAYARAM: I honestly can't remember. I can't remember whether Jo Williams was back at the time we re-intubated or not.

ASTBURY: Okay. The other question is we looked at an infusion prescription earlier suggesting --

JAYARAM: It was 03.50.

ASTBURY: Yes, it was 03.50. So can you explain that, please?

JAYARAM: I would imagine that that's probably when the morphine was prescribed and set up, which is -- it goes against my recollection. I thought it was earlier.

ASTBURY: Thank you. Let's go then to your plan, please. Your plan was to await line placement, then contact the transport team?

JAYARAM: So the transport team had already been contacted.

They'd said, call us back when you've got lines in.

[Baby K]'s parents came to visit [Baby K] on the unit and I updated them as to where we were up to.

ASTBURY: So in the aftermath of the incident at 03.50, you've noted that the transport team were already aware of what [Baby K]'s position was?

JAYARAM: Yes. I don't think... I don't think I had updated them at this point of this event that had happened.

ASTBURY: Are you able to say when you first contacted them; do you remember?

JAYARAM: Some time between... It would have been before I wrote this because it says:

"Await line placement and then contact transport team."

If we can go further back, I think I mentioned the transport team earlier on. So I think I'd discussed, before this deterioration at 3.50, looking at the sequence of things, and they'd suggested that we should do some lines and then call them back and they'd come down.

ASTBURY: Are they the UVC and UAC that we've heard about?

JAYARAM: Yes.

ASTBURY: And if I can conclude your plan at this stage. The parents have visited baby on unit and have been updated?

JAYARAM: Yes.

MR ASTBURY: All right. Thank you.

My Lord, is that a convenient moment?

MR JUSTICE GOSS: It is, yes.

Dr Jayaram, we break off for an hour for lunch, so could you please be ready to continue at 2 o'clock?

Thank you very much.

Members of the jury, 2 o'clock for you, please.

(In the absence of the jury)

MR JUSTICE GOSS: Just looking at the witness list for the rest of today, in particular Dr Babarao, I'm not anxious on having that doctor waiting here and not being called.

MR ASTBURY: He cannot come tomorrow, so we'll have to complete him this afternoon. So we were thinking of, at this stage, sending away [Nurse B].

MR JUSTICE GOSS: Certainly one of them, I think, should be.

I don't know how long Mr Myers is going to be.

MR MYERS: Maybe about 20 or 25 minutes.

MR JUSTICE GOSS: Oh right. Well, anyway. I'll leave it to you to discuss. If the witness can't be here tomorrow, that witness should be completed today.

MR ASTBURY: We'd reached that view.

MR JUSTICE GOSS: Thank you very much.

(1.02 pm)

(The short adjournment)

(2.00 pm)

(In the presence of the jury)

MR ASTBURY: Dr Jayaram, helpfully on the screen is the point we left off at, which was your plan for [Baby K], which speaks of, as you clarified for us, the UVC and the UAC that were planned.

JAYARAM: Yes.

ASTBURY: Could I ask Mr Murphy to go to tile 106 next, please.

Can we scroll down, please? We should scroll up maybe.

There are a number of pages on here. There we go, thank you.

Where we left off with your plan, an entry from somebody else, from the handwriting, about Curosurf.

Then is that your note continuing (overspeaking) --

JAYARAM: That's my handwriting, yes.

ASTBURY: Thank you. I think we can see -- what's the first line, please?

JAYARAM: I have documented that Dr Smith put an umbilical venous catheter in. "9 centimetres at the cord" means that it was inserted to a 9-centimetre length at the umbilical cord. But he was unable to pass a catheter for an umbilical arterial catheter. And we did a chest X-ray to look at the position of the UVC and also to look at the lungs.

ASTBURY: Okay. We've seen that the X-ray taken -- of course Dr Smith has given evidence already -- was at 6.07 am, so if we can continue with your note at 6.15, please.

JAYARAM: At 6.15 it was noted that [Baby K]'s saturations began to drop and that the tidal volume being measured by the

ventilator had dropped a little bit as well. So in this situation, that suggests again there's some kind of issue with the ventilation. This could be an issue with the lungs, it could be an issue with the tube, it could be an issue with the ventilator.

ASTBURY: If we scroll down, please.

JAYARAM: But the crucial thing here isn't so much what the ventilator is saying about the tidal volume, it's the fact that the clinical problem was that the saturations were dropping.

ASTBURY: Thank you.

JAYARAM: And the capillary gas there suggests a respiratory acidosis. So the pH of 7.07 is significantly low. The base excess of minus 3 suggests that the metabolic component of it, which is the part of the -- the contribution to the acidosis of the circulation potentially being compromised was probably okay. But the carbon dioxide was 12.8. So this suggests that at that moment, with that deterioration, we had a situation where saturations were dropping and the CO2 was increasing, suggesting we probably had an issue with ventilation.

The other thing that was noted was that [Baby K]'s mean blood pressure, so average blood pressure, was 20 millimetres of mercury. Generally, it's difficult to know exactly what a normal blood pressure is, but generally for a mean blood pressure around gestational age is about acceptable. So a mean blood pressure of 25 millimetres of mercury would probably have been okay, but that has to be put in the context of the clinical situation.

So there were two things here potentially happening.

There was clearly an issue with ventilation in terms of getting gas in and out of the lungs. But also with oxygenation because the saturations were low. That could have been related to ventilation, but with a low blood pressure, a low body systemic blood pressure, there is a situation that can arise where blood preferentially bypasses the lungs.

To explain this further, there are connections within the heart and outside the heart between the right side of the heart and the left side of the heart that are present when a baby is on the inside, but that usually close when a baby is on the outside. They serve a purpose when a baby's on the inside because the baby gets their oxygen from their mother not through their lungs.

In a situation where there is potential difficulty with the lungs being stiff or harder to ventilate, and a low body blood pressure, then actually fluid in pipes takes the path of least resistance and it is easier for blood coming back to the right side of the heart to go through the hole between the atria, the top pumping chambers of the heart, and a thing called the duct, which connects the pulmonary artery to the aorta. And that is the situation in neonatology we call persistent pulmonary hypertension of the newborn.

So the important thing if the blood pressure is low is try to do things to improve the blood pressure, hence the bolus of normal saline was given. This -- in spite of this, however, the saturations remained low.

We then wondered whether the tube, the endotracheal tube, could have been in the wrong position, could it potentially have slipped down. So we pulled it back, but the saturations dropped and so we extubated.

Again, [Baby K] responded to hand ventilation with a mask. And again, a new endotracheal tube was put in, and she went back on to the ventilator.

ASTBURY: We can see that that was again a 2.5 size ETT.

JAYARAM: The same size tube as had been put in when she was re-intubated.

ASTBURY: And to the same depth of 6.5 centimetres?

JAYARAM: Yes.

ASTBURY: And you have noted that she was settled for about the next 30 minutes.

Then you have another note at 07.25.

JAYARAM: Yes, then again her blood pressure dropped. So we gave a further bolus of fluid to try and improve her blood pressure and her saturations picked up and then her saturations and heart rate dropped. Her saturations dropped and her heart rate went below 100 --

ASTBURY: If we can scroll down. Again, just take your time as we go through the note, please, because it's being transcribed.

JAYARAM: Sure. So we took her off the ventilator and ventilated her with the T-piece through the Neopuff down the endotracheal tube. Cardiac compressions were started not because her heart had stopped but with a heart rate below 100, we can't be sure

that enough blood is being pumped around the body, so we assist by starting cardiac compressions. This helps also to bring oxygenated blood back to the heart as well. We noted at this point that the endotracheal tube that had been at 6.5 centimetres now appeared to be at 8 centimetres at the lips --

ASTBURY: I'm going to ask you to pause there. We've got the entry, previous entry, where it's been pulled out?

JAYARAM: Yes.

ASTBURY: Okay. Then is this the second time it has been pulled out during the course of that morning?

JAYARAM: So higher up -- we didn't -- sorry, can you scroll back up again --

ASTBURY: Of course.

JAYARAM: -- to the top of the page, just to talk through the sequence.

So when she had the deterioration prior to this one documented at 7.25, because she wasn't responding, I wondered was the tube too long. We pulled it back to 6 centimetres, but actually she deteriorated. It may be that it had become too short but it wasn't working so we took it out, bagged her, by which I mean ventilated her through the T-piece, and then re-intubated. And then she was settled again.

So this episode at 7.25 was with the tube that was put in at that episode and we noted during this episode that the tube, having been at 6.5 at the lips, was at 8 centimetres at the lips.

ASTBURY: Just allow me to correct myself. It's gone in (overspeaking) --

JAYARAM: It's gone in further rather than coming out. And when you see this, a tube should be sitting in the trachea, which is the main pipe, before the trachea divides into the two bronchi. If a tube slips and is too long it can go down into one of the bronchus -- bronchi, usually the right side, because the way the anatomy is, the right lung tube, the right bronchus, is more vertical and it tends to go down that way.

So we withdrew the tube back to 6.5 centimetres and she picked up quite quickly. So I think at that point part of the problem might have been the tube having slipped. And then she settled again.

ASTBURY: Thank you. Is that last entry "now stable"?

JAYARAM: Yes, "Now stable". And at the time I documented, these were her ventilator settings. Again, pressures of 23/5 --

ASTBURY: I'm going to interrupt you. We've got them there and if anyone wants to ask you about them in any more detail, I am sure they will. But they represent the settings post that second incident that morning, if I can put it that way -- of course, the earlier incident was in the morning --

JAYARAM: Yes.

ASTBURY: -- but the one you have just described? We can see the fluids, the meds, set out?

JAYARAM: Yes.

ASTBURY: If we go down to results, the CRP is less than 1.

JAYARAM: Yes.

ASTBURY: Lines -- can we go down a little more, please, Mr Murphy? We can see, is that a peripheral --

JAYARAM: A peripheral line in her right arm, so a short venous cannula, and the umbilical venous cannula.

ASTBURY: Thank you. The blood pressure mean has risen a little, you told us before --

JAYARAM: It has, to 25.

ASTBURY: -- to 25. It should be about the gestation period?

JAYARAM: That's about the minimum that we would be comfortable with.

ASTBURY: And the cap refill is satisfactory?

JAYARAM: Yes.

ASTBURY: What's the last --

JAYARAM: A heart rate of 130. And the other thing just to observe here when -- in the entry for medications, we commenced or planned to commence, I'm not sure what time it was started, a medication called dopamine. So dopamine is from a group of drugs called inotropes which help cardiac contractility, so this was in response to the persistently low blood pressure. And the aim of dopamine in this situation is to try to make the heart beat

more strongly, essentially to improve the cardiac output and help to maintain the blood pressure.

ASTBURY: Thank you. If we can scroll down a little further, please, Mr Murphy. Is that the end of that page? We need 123 then, I think, next.

JAYARAM: That's the end of that clinical entry. I looked at the chest X-ray which had been done before that deterioration and on the chest X-the tube was in a good position, a satisfactory position, and I commented that the left lung field appeared a bit hazier than the one on the right. And then the transport team arrived at 8.30, I have put Anand from the transport team from Arrowe Park and you can see there, after discussion, he added in another inotropic drug in addition to the dopamine to help with cardiac contractility. He suggested a second dose of surfactant and increased the fluid volume as well and suggested, because there was difficulty putting an umbilical arterial catheter in, we should put in a peripheral arterial line.

And really I think from that point, the transport team led on management. I can't remember whether that morning I was there subsequently or whether I handed over to somebody else and went elsewhere to do what I was doing during the day.

ASTBURY: Just scroll to the bottom of the page. We might be able to see who else makes an entry. It looks like -- well, we'll hear, or I think it's agreed, it's [Dr A].

JAYARAM: Yes, and he put that peripheral arterial line in.

At the time he put that in and it was measured through that, the blood pressure, the mean blood pressure was 27 millimetres of mercury.

ASTBURY: Thank you. Just some specific questions now, please, Dr Jayaram.

You were asked about the significance of the size 2 tube in comparison to the size 2.5 and the event at 3.50. What can you tell us about that, please?

JAYARAM: So coming back to that, so ideally, it would have been nice to have a 2.5 millimetre internal diameter tube in, but we've put the 2 in because of the difficulties and the time it was taking at the initial resuscitation after birth.

When we look at observations, the ventilator is quite a clever machine and it can measure lots of things. It can measure, obviously, how much gas goes in and how much gas goes out. Ultimately, what we're trying to do with ventilation, as I've

said before, is to get gas in and out of the lungs, to oxygenate the baby, and to be able for the baby to get rid of carbon dioxide.

So a size 2 tube in itself is not a problem. It's only a problem if we're really struggling to ventilate the baby through it. The ventilator will give us all sorts of measurements and one of the things it measures is what's called the leak. If you imagine the baby's top of the baby's windpipe, the larynx, and the tube sits in it, the ventilator can measure how much gas is leaking out around the edges. Now, we want to have some degree of leak, because if there's no leak, it's potentially that the tube is too tight and it can potentially cause damage.

The leak is a calculated value. The ventilator looks at how much gas is put in and how much --

ASTBURY: Take your time again, please.

JAYARAM: Sorry. The ventilator measures how much gas goes in down the tube and measures how much gas comes out of the tube and it calculates the leak by the difference between those volumes. Now, a leak in itself is not of any clinical significance because what's important is are we ventilating the baby. So if a leak is a high leak, it's noted, but actually if there's no difficulties with ventilation, we wouldn't act on just a leak.

If a leak was high and we were struggling to ventilate the baby, then it's important then to think, well, is this a problem because we are not able to get enough gas in and out through this narrower tube, we should put a bigger one in --

ASTBURY: I'm going to ask you to pause there. The high leak was noted at a time before Joanne Williams went to --

JAYARAM: Yes.

ASTBURY: -- notify the parents. Would the high leak have caused, if it's what happened, the intubation tube to dislodge?

JAYARAM: No.

ASTBURY: Would the size of the tube have caused the intubation tube to dislodge?

JAYARAM: No. I mean, we're talking half a millimetre difference.

ASTBURY: Thank you. We touched very briefly on the X-ray being at 6.07 and you have told us before that when a baby is intubated, it can be important to take an X-ray --

JAYARAM: Yes.

ASTBURY: -- to check the position. There's a reason why an X-ray wasn't taken straightaway with [Baby K]?

JAYARAM: We don't usually do X-rays in this situation until a baby's around 4 hours old because if we're trying to establish whether there's surfactant-deficient lung disease, we won't see the changes until around they are 4 hours old. If we were having difficulties with ventilation or when we looked at the chest, it wasn't moving as it should, or when we listen to the chest there was unequal air entry on both sides, we would consider getting an X-ray earlier. In this situation we were happy with the original intubation, that there was equal air entry when listening with a stethoscope and the chest movement was symmetrical and we were happy that we were adequately ventilating her. So there wasn't an indication to do an earlier chest X-ray.

We would also do an X-ray if we had put an umbilical venous catheter in or an umbilical arterial catheter in, again to check the position. So essentially with investigations we would do them if we think we're going to find something that might change management at that time.

ASTBURY: Okay. But not in this case?

JAYARAM: Not at that situation at that time.

ASTBURY: Again, just concentrating on that period between [Baby K] being intubated and Nurse Williams leaving the neonatal unit, were there any warning signs about the desaturation you were about to witness?

JAYARAM: No. No, and had there been at the time that Nurse Williams left and told me she was going to the labour ward, I believe absolutely she would have spotted this and told me. So at the time she left, there were no concerns that there was anything to suggest any deterioration.

ASTBURY: Bearing in mind the desaturation you witnessed, would [Baby K]'s lung disease explain what you saw?

JAYARAM: Not at that time because the way that surfactant-deficient lung disease/respiratory distress syndrome gets worse is it evolves. Over time you'll see an increase in ventilatory requirements, you will see an increase in oxygen requirements, you will see blood gases showing more of a respiratory acidosis. But certainly it would be -- one wouldn't expect [Baby K]'s lung disease to have deteriorated in that short period of time from

Nurse Williams going to the labour ward to talk to [Baby K]'s parents and me walking into the room.

ASTBURY: Did you form a view about how long [Baby K] would have been in the condition she was in when you entered the nursery?

JAYARAM: So when babies are reasonably well oxygenated, let's say a point comes where ventilation fails for whatever reason, usually babies will maintain saturations for 30 to 60 seconds before they start desaturating. So for her saturations to have been in the 80s and dropping, my inference is that this would have happened at least -- something would have happened at least 30 to 60 seconds before I walked in. She might have desaturated more quickly because she had RDS, but at the point that Jo Williams left, her saturations were stable.

ASTBURY: Were there any calls for assistance before you --

JAYARAM: I didn't hear anything. As I say, I explained my rationale and thought processes for going in really just to prove to myself that everything was okay so I could carry on doing what I was doing. I hadn't heard a ventilator alarm or monitor alarm going off and I hadn't been called to say that she was desaturating.

MR ASTBURY: Thank you, doctor. If you could wait there, please.

Cross-examination by MR MYERS

MR MYERS: You were worried, Dr Jayaram, given your suspicions you were being irrational, weren't you?

JAYARAM: I was certainly concerned because my logical mind would have said, she's stable, there's nothing to worry about.

However, having been party to and heard about a number of unusual events by this stage, I was concerned.

MYERS: So if what you say is correct, what you have told us all things were like when you walked into that nursery, it turns out you weren't being irrational at all?

JAYARAM: In the sense that I really didn't want to walk in and find her in anything other than the condition she'd been in when Jo had left. But my reasons for walking in were not based on any clinical suspicion of [Baby K], although she was a premature baby, being at risk of an acute deterioration due to her underlying medical issues.

MYERS: What you tell us you saw with Lucy Letby and what she was not doing goes to show, if you are right, that you were not being irrational in your concern?

JAYARAM: In retrospect no, which I guess is part of why we are here now.

MYERS: Because, according to you, the woman and you one or more of your colleagues had decided was linked to an increase in incidents since June 2015 was there in highly suspicious circumstances, wasn't she?

JAYARAM: You mean, can you elaborate what you mean by she was there in highly suspicious circumstances?

MYERS: You have described the scene to us; yes?

JAYARAM: But it wasn't suspicious that she was there. She was a nurse, she was asked to look after the baby.

MYERS: You told the police that you thought this might have been done on purpose.

JAYARAM: It's certainly one of the things that crossed my mind.

MYERS: That sounds pretty suspicious, doesn't it?

JAYARAM: That does, yes.

MYERS: Yes. So you're telling us the woman who had been identified by you and one or more of your colleagues as linked in some way to an increase in incidents was standing there in suspicious circumstances?

JAYARAM: In that context, yes.

MYERS: Yes. You'd got her then?

JAYARAM: No, because I didn't see her do anything, and actually, if I may say at this point, and you have made reference to this before about myself and my colleagues, we had noticed this association and more and more of these events were happening and we really wanted to be able to have this investigated objectively in an appropriate way. And we, at that time, were really unclear as to how we could get this investigated in an appropriate way.

MYERS: Right.

JAYARAM: Because there was absolutely no... no evidence that we could prove anything, because that's not our job as doctors. Our job is to notice patterns and raise concerns.

MYERS: You agree, you did tell the police that, confronted with what you saw, you wondered if the tube had been dislodged on purpose?

JAYARAM: I did wonder that.

MYERS: And you have said to us now how this would have gone on for a certain period of time for the desaturation to reach this point?

JAYARAM: That's correct.

MYERS: So did you confront her?

JAYARAM: Absolutely not. It's my job at the time to deal with the baby, it's not my job to say that.

MYERS: This is someone who you're saying by this time you have linked to incidents on this department; yes? That's what you're telling us?

JAYARAM: Absolutely.

MYERS: It's someone you're saying is standing there when you walked in because of your suspicions; yes?

JAYARAM: Absolutely.

MYERS: It is someone who is standing there having done something that you told the police could have been done on purpose?

JAYARAM: It's a possibility.

MYERS: If it happened the way you are describing it to us, you'd have asked her what was happening?

JAYARAM: No, I wouldn't.

MYERS: And the reason you didn't ask her is because it didn't happen in the way you're telling us or rather told the police later?

JAYARAM: No. Well, I'm interested in why you say that because what I have told you and what has been said is exactly my recollection of things.

MYERS: Do we see anywhere in your note, clinical note, anything relating to suspicious circumstances of a dislodged tube?

JAYARAM: Well, Mr Myers, that is not the sort of thing that one writes in clinical notes. It is, however, one of the things that we discussed as a team together, and added to the list of concerns that we already had, and escalated to senior management in the hospital.

MYERS: In fact, there's no reference to dislodgement of a tube at all in the note, is there?

JAYARAM: Well, it's implicit that the tube wasn't in. You can -- you can -- from the fact that the tube when we ventilated down it through (sic) hand, there was no change in the CO2, the chest wasn't moving, the tube -- and the tube wasn't blocked. The only reason that tube could not have been working was that it was not in.

MYERS: You don't make reference to any dislodgement because there was nothing suspicious at the time in your mind about a dislodgement, was there?

JAYARAM: There was a lot suspicious in mind because I still don't understand how a tube could have been dislodged.

MYERS: We don't in fact see a Datix report about this, do we?

JAYARAM: I didn't put a Datix in, no.

MYERS: A Datix is a standard form that's completed when something has happened that isn't right, isn't it?

JAYARAM: We often do them, yes.

MYERS: And this is more than just not right if you're telling us accurately, isn't it, Dr Jayaram?

JAYARAM: It's unusual.

MYERS: Unusual. You're saying it's suspicious and potentially deliberate?

JAYARAM: Potentially, yes.

MYERS: Deliberate harm by someone that you and your colleagues suspect of being associated with a series of events since June 2015, if you're right?

JAYARAM: Correct.

MYERS: And you don't even put a Datix report in, do you?

JAYARAM: I wasn't convinced that the Datix system was the correct way to investigate this because this event and any of these events in isolation would have been, hmm, not sure why that happened, and not thought about it. But in the context of the pattern they were more significant and we, as a group of consultants -- and this isn't just me or one or two colleagues, we as a group of consultants by this stage, most of us had had experience of an unusual and unexpected event and had noticed this association with one particular nurse. Now that is by no means us ascribing any kind of guilt, but we were very concerned because not only was there the association with Nurse Letby, but all of these events were unusual.

And yes, if we'd put Datix forms in for all of these things perhaps patterns would have been recognised more quickly and perhaps we'd have been here sooner. But we didn't. However, we had a list of things that we were trying to raise with the senior management of the hospital, really to seek their advice as to how we could possibly go about investigating this. All we wanted was to know how to investigate these events properly.

Unfortunately, this is something that we are not taught at medical school or through our postgraduate training.

MYERS: If someone does something to harm a baby, you just do nothing?

JAYARAM: We didn't do nothing, Mr Myers. We tried our best to escalate our concerns to the senior management of the hospital.

MYERS: First of all, you didn't escalate any concern with Ms Letby on this occasion, did you? You didn't say a word to her?

JAYARAM: No.

MYERS: You didn't raise anything with the shift leader?

JAYARAM: No.

MYERS: You didn't put a Datix complaint in?

JAYARAM: No.

MYERS: At any point, as it happens?

JAYARAM: No.

MYERS: You don't make a note anywhere of what you're telling us happened, do you, in any record?

JAYARAM: I think the notes are very detailed. I mean --

MYERS: You don't put a note in these records of what you're saying is a person of interest, standing there, acting suspiciously and potentially dislodging an ETT?

JAYARAM: Because that's not the one of thing one writes in medical notes -- and at the time I wasn't anticipating that several years later I'd be sitting here talking to you.

MYERS: You have a duty to look after the children on your unit, don't you?

JAYARAM: Yes, absolutely.

MYERS: If you think someone is deliberately harming them, you act to protect them, don't you?

JAYARAM: We did our best to act to protect them, as I say, by raising our concerns to the senior executive level medical management.

MYERS: At this point?

JAYARAM: Concerns were very first raised before this by my colleague Dr Brearey -- and in February, I can't remember whether it was before or after this, we raised them again.

MYERS: I make it plain, I don't accept the accuracy or truth of any allegation against the defendant on her behalf, but I'm just going through this from what you're saying at the moment, Dr Jayaram, so we're not in any misunderstanding.

Lucy Letby continued to work on this department for another 4 months or so, didn't she?

JAYARAM: That's correct.

MYERS: You were telling us last week about a discolouration that you claim you saw with [Baby M]; do you remember that?

JAYARAM: Yes.

MYERS: Another thing that you didn't make a note about at the time.

JAYARAM: I explained that last time about not understanding the clinical significance.

MYERS: You -- had you thought someone was actively involved in harming children on your unit, you would have not failed to raise it with the police.

JAYARAM: If I may take a step back -- and I've already said this, Mr Myers. We had significant concerns, really probably certainly from the autumn of 2015. We escalated these concerns, they were on the radar of someone as senior as the executive director of nursing as far back as October 2015. As clinicians, we put our faith in the system, in our senior management, to guide us as to how to escalate these concerns and investigate them. The initial response was: it's very unlikely there's anything going on, see what happens. We said, okay, against our better judgement in retrospect.

We flagged it up again in the February to the medical director and the director of nursing that we had concerns and my colleague Dr Brearey, who was the neonatal lead, requested to have a meeting with them.

They didn't respond to that for another 3 months. And we were stuck because we had concerns and we didn't know what to do.

In retrospect, we wish we had bypassed them and asked the police. All we wanted was to be advised as to the correct way forwards in terms of investigating this association. We by no means had played judge and jury at any point, but the association was becoming clearer and clearer and we needed to find the right way to do this.

This is an unprecedented situation for us. Nobody trains us to deal with this. And as I have mentioned before, we work within a certain rulebook and a certain playing field. We are not thinking "Could this be deliberate harm" initially. And these thoughts come into your head after a while and you put them away because it seems utterly preposterous. Then more and more happens, and then it is very easy sometimes then to start seeing things that aren't there.

We are all aware of the concept of confirmation bias: if you buy a red car, you suddenly start noticing lots of red cars. But even taking into account that there was a risk of confirmation bias and we were seeing things that actually weren't there, these episodes were becoming more and more and more frequent with this association.

And yes, you know, in retrospect, it's easy, we should have put Datix forms in, we should have written these specific concerns maybe in the notes but we didn't. But eventually, it reached a point in June 2016 where we did say something has got to change, but that's not for me to talk about now.

MYERS: Dealing with this specific incident you're describing to us, you raised no complaint with anyone at the time, did you?

JAYARAM: Not to anybody on the neonatal unit, but I discussed this because I knew that we had a list of concerns already.

MYERS: You made no formal record at the time, did you?

JAYARAM: I didn't make a formal record at the time.

MYERS: And you and which other consultants are talking about are all grown adults who don't need to be trained to call the police if someone is hurting babies, do you?

JAYARAM: The trouble is at that time it was one of a list of possibilities and all we could see was the association.

MYERS: And the significance --

JAYARAM: And we also, as I've alluded to before, were under -- were beginning to get a reasonable amount of pressure from the senior management of the hospital not to make a fuss. And in retrospect, yes, absolutely, we're grown-ups and we should have stood up and not listened.

MYERS: And the significance of this event, if it happened in the way you said to the police some years later, is that this would have given you what you needed to make that complaint if you're telling the truth about it, Dr Jayaram, wouldn't it?

JAYARAM: Are you suggesting that I'm not telling the truth?

MYERS: First of all, do you agree, once this happened, if it happened the way you say, you were in a position to go and make something of this, weren't you?

JAYARAM: In this isolated incident, absolutely not, because it was an association, I didn't see her do anything.

I didn't see her do anything, but I still find it very difficult to understand why in that short period of time, when [Baby K] had been stable, poorly but stable, and Jo Williams left, she had this deterioration.

I also don't understand why an alarm didn't go off. And even if an alarm didn't go off, I don't understand, when it was clear she was desaturating, I wasn't called or someone hadn't raised an alarm.

MYERS: You did nothing at the time, Dr Jayaram --

JAYARAM: I resuscitated [Baby K].

MYERS: Nothing in terms of a complaint --

JAYARAM: No.

MYERS: -- because there was no suspicion that Ms Letby had interfered with anything or failed to act.

JAYARAM: I think there's an element --

MYERS: That's the truth of it, isn't it?

JAYARAM: The truth of it is that we're thinking the unthinkable and, as with anyone, when one first hears about these things, you don't want to believe it, just as I had this instinct. And in retrospect, I wish we had. But actually, we did add it to the list of concerns that we wanted to discuss with senior hospital executive medical and nursing management for advice as to how to proceed.

And in retrospect, were I ever in such a situation again -- and I sincerely hope I never, ever am -- I would have no hesitation in bypassing the apparent correct lines of communication.

MYERS: Because raising an issue, if things had happened the way you're telling us, is the obvious thing to do, isn't it?

JAYARAM: It is.

MYERS: And you didn't, did you?

JAYARAM: We did. We raised it, as I say, with senior hospital management.

MYERS: And in fact the suggestion that Ms Letby did the sort of things, or rather didn't do them in the way you're saying now, is something that you said to the police years later when they interviewed you, isn't it?

JAYARAM: We'd been saying it or wondering about that association from that time and it took a long time for the police to be involved.

MYERS: Could we look at tile 103, please, in the prosecution schedule of events? Can we just go behind that?

This is in the sequence of events. This is the record of what takes place. It's a record from the network service the morning that we're dealing with.

I want to go down, it's in our sequence, can we go down, please, scroll down. 05.55. It says:

"Call received from Dr Jayaram. Baby dislodged the tube and had to be re-intubated."

Do you see that?

JAYARAM: Yes, I would probably have said that the tube was dislodged, I don't think I'd have said the baby dislodged it. In the normal scheme of things, if a tube is going to be dislodged, it's most likely dislodged by the baby. But in a 25-weeker who's not vigorous and not moving around, with a tube that's in to a good length and secured, it's a very unlikely thing to happen and I don't know, if it did happen, it happened in that window.

MYERS: This is in the material that we have, Dr Jayaram. Do you agree if it says that -- do you agree you said that?

JAYARAM: I can't remember what words I used. That's what's been recorded there.

MYERS: Yes.

JAYARAM: And actually, it's more likely in the general scheme of things that a baby would, but it's also very unlikely that a small 25-week gestation baby would have dislodged a tube. It can happen when babies are being handled; there was no reason for [Baby K] to have been handled. It can happen during cares. It can happen if a baby is very vigorous; that's usually with bigger, heavier, more robust, stronger babies. And in that situation, with somebody watching the baby, it would have been witnessed and it's likely to have been seen by the nurse looking after the baby.

MYERS: First of all, a baby like [Baby K], as she was at that point, is capable of dislodging a tube by her own movement, isn't she?

JAYARAM: Except she wasn't really moving very much and I think that's still very unlikely. It's possible, as is anything possible, but I don't think in my time looking after small premature babies that I have seen a baby at this stage who's not vigorous, with a tube that's secured, dislodge a tube.

MYERS: Do you recall ever telling the police that tubes can get dislodged by very active babies?

JAYARAM: It can happen but she wasn't a very active baby.

MYERS: I'm going to come to that. Let's deal first of all in principle.

JAYARAM: In principle, yes.

MYERS: An active premature baby can dislodge a tube, can't she or he?

JAYARAM: If they're very active but a baby of this weight and this size at this stage...

MYERS: And actually, that's what you thought had happened at the time, isn't it?

JAYARAM: I thought the tube -- well, the tube had been dislodged because there's nothing else that could have been going on at that point.

MYERS: And if you had seen Ms Letby doing or not doing what you say, you wouldn't be suggesting it was the baby that had dislodged the tube, would you?

JAYARAM: I think when -- again, the thought in my head was, has this been done deliberately. I'm not going to say this to the receiving consultant at the other end. And I would probably have said that the tube was dislodged -- the interpretation would be that the baby had dislodged the tube because obviously the receiving consultant isn't going to assume that it has been done by anybody else.

MYERS: We can take that down, thank you. You told the jury earlier on that the ventilator was not alarming.

JAYARAM: That's correct -- certainly that wasn't what prompted me. I would -- I didn't hear an alarm as I walked in.

MYERS: You've just given evidence this morning, the ventilator -- you were asked about it, you were asked about the alarm, you said the ventilator was not alarming. That was your evidence, wasn't it?

JAYARAM: It wasn't alarming and the monitor was not alarming either.

MYERS: And a ventilator not alarming, you have -- that makes it sound more suspicious, doesn't it?

JAYARAM: Potentially.

MYERS: Yes. In fact, and you can look at this if it helps, isn't your actual recollection you can't recall whether it was sounding?

JAYARAM: It wasn't sounding -- well, the reason I got up from where I was sitting wasn't because I heard an alarm going off. And in the anatomy of the neonatal unit, the alarms are loud and I would have gone in had I heard an alarm.

MYERS: Do you dispute that the alarm sounded, Dr Jayaram?

JAYARAM: I don't recall it going off and that's not why I went in. And certainly when I went in and I walked in, I don't remember the alarm going off because if the alarm had been going off, that's what would have prompted me to stand up and go through.

MYERS: Do you remember having a conversation with Nurse Williams when you went over at some point after the desaturation?

JAYARAM: I... I will have had a conversation to sort of say, you know, her tube's out and we've had to -- and she desaturated and we've had to re-intubate her, but I can't remember when Nurse Williams came back, at what point in the proceedings she came back.

MYERS: You asked her, "Who was in the room when the alarm went off?" That's something you said to her, wasn't it?

JAYARAM: I can't remember.

MYERS: You asked her what had happened; do you recall that?

JAYARAM: I asked Ms Williams?

MYERS: Do you recall asking --

JAYARAM: She wasn't in the room when I went in -- was this for the first incident?

MYERS: No. After the first incident, do you recall asking Joanne Williams what had happened?

JAYARAM: No, because she wasn't in the room.

MYERS: Yes.

JAYARAM: She might have asked me what happened.

MYERS: Because if things happened in the way you're saying, you wouldn't need to ask Joanne Williams, who came back later, what had happened, would you?

JAYARAM: I didn't ask. I didn't -- well, why would I have asked her what happened? Because she wasn't in the room when it happened.

MYERS: I'm going to suggest you did ask her who was there when the alarm went off because you heard an alarm go, you could hear an alarm ringing.

JAYARAM: No. I don't recall that at all. That's not my recollection in the slightest because had I heard an alarm going, that would have been the prompt for me to go in.

MYERS: You're able to give quite a precise timing for how long Joanne Williams had been gone for by the time you went to the room, aren't you?

JAYARAM: Roughly, yes.

MYERS: You said 2 to 2.5 minutes --

JAYARAM: I think so.

MYERS: -- this morning, didn't you?

JAYARAM: Yes.

MYERS: If we look at tile 63, it shows us the swipe data. If we go behind that, we can see the swipe data for Joanne Williams is that she left the neonatal unit to go to the labour ward at 3.47. So she had left 3 minutes before the desaturation. So your timing of about 2 to 2.5 minutes after she went is pretty spot on, isn't it?

I mean, do you always have a memory that's that precise, Dr Jayaram?

JAYARAM: In this event I did because I just remember that, as I described, what I felt was this irrational discomfort and I kept telling myself, don't be ridiculous, and looking at my watch. But you know, it was a feeling -- and actually I'm saying 2 to 2.5 minutes, I didn't have a stopwatch on it. So it's, you know, guesswork that it was around that, but I think it was.

MYERS: It seems to dovetail with the swipe data very neatly, doesn't it?

JAYARAM: I have never seen the swipe data in my life. I don't have any reason to look at swipe data and I don't have -- I wouldn't have access to swipe data were I even wanting to look at it. I'm trying to work out why you think this is important. I know you don't like me asking you questions.

MYERS: It's not that I don't like it, but his Lordship will tell you, the general way of business here is that we have to ask the questions and the jury are helped by you answering them, so would you do that?

JAYARAM: But it would help me to answer your questions if I understood the kind of things that you are getting at because it would help me frame how I answer your questions.

MYERS: Yes. You'd like to know where we're going before I ask the question?

JAYARAM: Not really. It just really helps me to understand how you're thinking -- in my professional practice we have two-way adult discussions and we actually treat each other as equals. Now, I appreciate in this situation this is different and it is quite difficult for me. And I appreciate I'm probably speaking out of turn, but it would help me to answer your questions.

MYERS: Let me get back to the questions. I have asked you about this timing. You made statements to the police dealing with this incident -- I've got them in front of me -- on 17 April 2018, Dr Jayaram --

JAYARAM: That's correct.

MYERS: -- 12 June 2018, 4 June 2021, and 15 February 2022.

Right? In none of them do you suggest it's 2.5 or -- sorry, 2 to 2.5 minutes that Joanne Williams had been away for. Do you accept that?

JAYARAM: Um... Do I give a time at all in those statements?

MYERS: No.

JAYARAM: I accept that it's not mentioned in those statements then.

MYERS: We can check. If I'm wrong, I'll be corrected, you can be sure of that.

When you were interviewed by the police before this in April 2018, before those statements, and perhaps you -- you said this

and you can be shown it if you want to see it. It's at page K9662.

If we scroll down on this particular topic. Can you see that?
You say:

"I can't remember how long Jo Williams had been out of the room before this happened. It was the middle of the night, over 2 years ago."

Do you see that?

JAYARAM: Yes.

MYERS: Now, just a couple of years after this event you were able to tell the police how long Jo Williams had been out of the room for; yes?

JAYARAM: It was an estimate, and it's probably about right --

MYERS: You said --

JAYARAM: -- because at the time I subsequently thought about it.

But I think regardless, you're focusing again on minutiae. The point is that this event happened in that window that she was out.

MYERS: One of the things that I'm going to suggest you have done, Dr Jayaram, is to take certain details and add them to what you say as you've gone along; is that clear?

JAYARAM: That's clear and I would disagree with that.

MYERS: On this occasion I'm suggesting one thing you have done is, wherever you've got it from, you have picked up the time Joanne Williams is away and worked that into your account later on. Do you agree or disagree?

JAYARAM: I absolutely disagree with that because I would not have seen any data, unless I'd been asked a leading question by the police, which would be documented in this transcript. Absolutely not. I find it preposterous, really, that you're suggesting such a thing.

MYERS: Can you help us how it was that in April of 2018, when talking about this, you have told the police you couldn't remember how long she'd been out of the room, it's in the middle of the night 2 years ago, and now, about 7 years later, you're telling us it's about 2.5 minutes that she was out of the room? How's that happened?

JAYARAM: Because I've had more time to reflect on it.

MYERS: And your memory's improved in the period in between, has it?

JAYARAM: The events of this night are emblazoned and I don't know why I specifically didn't say that. This was in the context of a very long conversation about a lot of things.

MYERS: You change things as you go along, Dr Jayaram, don't you?

JAYARAM: No.

MYERS: [Baby K] was a poorly baby because of her prematurity, wasn't she?

JAYARAM: That's correct.

MYERS: And her management and care at the Countess of Chester on your watch, I'm going to suggest, agree or disagree as you wish, fell below the standard that she required?

JAYARAM: I disagree. There were things, absolutely, that we could have done better in terms of intubation, et cetera, but I disagree entirely that the care she received was detrimental. She was a poorly baby. She was a premature baby with a history of prolonged ruptured membranes, possible risk factors for infection, and she behaved in a way that one would expect a 25-week gestation baby to behave. The only thing to me that doesn't compute is that first deterioration.

The other events are events that can be seen with babies that are premature and I think they were managed as well as we could have done in the circumstances. As I said, this is why ideally babies that are born very prematurely should be born in a tertiary centre.

Unfortunately, sometimes, that can't happen, and I don't -- I refute the allegation that the care that we provided influenced the ultimate outcome. Others may disagree.

MYERS: Have you sought to distract from what I'm suggesting to you are shortcomings in her care at least in part by creating this issue about Lucy Letby?

JAYARAM: I'm sorry, can I just frame what you're suggesting? So what you're suggesting is that I, and possibly my colleagues -- are you talking just with reference to this case or other cases?

MYERS: I'm asking about this incident at this point, Dr Jayaram.

JAYARAM: What you're suggesting is that I am trying to distract everybody from what you perceive as the extremely poor care provided by myself and my team by focusing on this one incident. Is that what you're suggesting?

MYERS: You've added the word "extremely". But what I'm asking you is have you sought to distract from what I'm suggesting is a poor level of care by creating this issue?

JAYARAM: That's an easy question to answer: absolutely not.

MYERS: And are you seeking to bolster suspicion against Lucy Letby by adding details after the event?

JAYARAM: Absolutely not.

MYERS: You agree, [Baby K] should have been at a tertiary centre, shouldn't she?

JAYARAM: In an ideal world, in different circumstances, if this had been anticipated, she'd have been born in a tertiary centre, but we know that can't happen every time.

MYERS: Well, there was some warning when [Baby K] was going to be born, wasn't there?

JAYARAM: It's a decision made by the obstetricians and the midwives who decide whether a mother is transferred with the baby in utero.

MYERS: We've seen that there was a spontaneous rupture of membranes 48 hours before the delivery, wasn't there; yes?

JAYARAM: Yes.

MYERS: Now, when you contacted the tertiary centre in the early hours that morning, you were told there was a bed ready, a bed available, weren't you?

JAYARAM: I was told that for the baby, yes.

MYERS: And Arrowe Park is a 20-minute drive from the Countess of Chester?

JAYARAM: It's not my decision or a paediatrician's decision around whether a mother is transferred before the baby is born. We will always try our best to get the obstetricians to transfer, but it's not my decision or a paediatric decision as

to whether a mother is safe enough to transport or not. We have no say in that matter.

MYERS: Do you agree that the hospital should have ensured that [Baby K] could be born in a tertiary if there was a bed available?

JAYARAM: I don't know the circumstances of the discussions with the obstetricians. I'm not an obstetrician, I'm not a midwife, I don't understand what the issues were with [Baby K]'s mother's clinical decision that led them to make the decision that, on balance, she was too unstable to transfer. I can't answer that. It's not within my field of expertise.

MYERS: And let me then ask: as a consultant of many years' experience, who has worked at that hospital for a long time, do you agree that on the face of it there appeared to time and opportunity to make that arrangement?

JAYARAM: Given that there was 48 hours, but I don't know at what stage [Baby K]'s mother presented to the obstetricians and again I can't comment on the clinical decision-making of that specialty, it's not my expertise.

MYERS: The chances of survival for a baby like [Baby K] are improved if she is at a tertiary centre, aren't they?

JAYARAM: They are improved, absolutely, which is why ideally they are born at tertiary centres. But unfortunately sometimes that isn't possible.

MYERS: And there is no time to waste in terms of getting them there if that can be effected, is there?

JAYARAM: That's correct.

MYERS: [Baby K] didn't arrive until about quarter past 3 on the 17th that afternoon?

JAYARAM: To the tertiary centre?

MYERS: Yes.

JAYARAM: Some of that -- again, you will have to talk to the transport team and the team at Arrowe Park -- is about how stable babies are to transport as well. By this stage she was having issues with her blood pressure, she was needing inotropic medication to maintain her blood pressure, and it is far safer to optimise ventilation, to optimise blood pressure before transport, as best as is possible. Sometimes it's not possible and the transport teams just have to pick up and run. But it's

standard practice for transport teams -- although I'm saying this, I don't work on a transport team and I haven't for a very, very long time -- to get a baby as stable as possible before transfer, so the fact that she didn't leave the unit until later that day is neither here nor there. The team that were down, the transport team, are the tertiary team so she was receiving care from people with that expertise.

MYERS: The standard of care that she received in the first few hours of her life is capable of having an impact upon her chances of survival going forwards, isn't it?

JAYARAM: That's correct.

MYERS: Intubation, let me ask you about that.

JAYARAM: Yes.

MYERS: If I suggest to you intubation should be achieved within about a 15-minute period of birth where it's an emergency intubation, do you agree or disagree?

JAYARAM: I would agree ideally, but the important thing in this situation was that in the periods where she wasn't intubated, she was adequately ventilated, as evidenced by the fact that her chest was moving and her saturations picked up.

MYERS: The guidance that it should be achieved within 15 minutes takes into account the fact that a baby will be intubated -- it will be given oxygen as that process goes along, doesn't it?

JAYARAM: Yes, but they can receive that through a T-piece and mask as well. The only advantage of earlier intubation is you'll get your surfactant slightly earlier and actually the recommendation is if you can't intubate or intubation is difficult, then don't just keep trying if you've got a secure airway.

MYERS: One of the reasons intubation took the time that it did was that it was undertaken by a relatively junior registrar, wasn't it?

JAYARAM: By James Smith.

MYERS: Yes. He was a relatively junior registrar, an ST5, wasn't he.

JAYARAM: As an ST5 he will have done at least a year of tertiary neonatal practice where he will have developed intubation skills. And if any of our junior trainees, our registrars -- and I don't like the term junior because it implies they're quite

green but they are experienced. We make an assessment together with them of their competence. If Dr Smith had said, "I don't feel comfortable doing this, please will you do it", I would have done it, but we also have to take these opportunities to train. This isn't experimenting on babies, this is standard practice. And it's important for him to have these skills -- and actually even experienced intubators sometimes will struggle occasionally to get a tube down.

MYERS: You told us this morning this was a tricky technique and more difficult in smaller babies?

JAYARAM: It is.

MYERS: You also told us, as you proceeded, it was trickier than anticipated.

JAYARAM: It was.

MYERS: You should have taken over, shouldn't you?

JAYARAM: I would have taken over at the point where Dr Smith was struggling. I could see that actually he could do this and he did it safely. He never went more than 30 seconds, because we follow standard practice, and he maintained [Baby K]'s airway absolutely impeccably and ventilated her there through the T-piece impeccably as well.

MYERS: Do you agree it would have been preferable for you to take over when he was struggling to achieve this when it was trickier than anticipated?

JAYARAM: It's something that I could have done but I also -- it's important not to undermine his confidence as well. And all of these things are a judgement call at the time.

If [Baby K] at that point -- and we'd been in a situation where we were actually struggling to ventilate her with the T-piece, so for example when we'd put the mask over her face and ventilate her through the T-piece and we weren't getting gas in and out of her lungs and we weren't maintaining her heart rate and we weren't keeping her saturations up then absolutely at that point I would have taken over.

MYERS: Because this is trickier than anticipated, you used a 2 millimetre rather than a 2.5, didn't you?

JAYARAM: That's correct.

MYERS: And we know, we've seen it, there was quite a high air leak after intubation, wasn't there?

JAYARAM: That's correct, yes.

MYERS: 94%?

JAYARAM: Yes.

MYERS: Is that insignificant?

JAYARAM: As I've explained, the point -- the leak is a measured value, it's looking at how much gas goes through the tube, through the hole in the tube and how much comes out, and it calculates the difference between the two.

So 94% leak is significant in the context that if we're struggling to ventilate a baby then actually she would benefit from a bigger tube. But we had a secure airway with relatively minimal pressures on the ventilator, we were moving the chest, and had reasonable blood gases and reasonable saturations. So actually the leak in itself is there but it's not of clinical significance in terms of the baby.

If, with that leak, we'd seen that [Baby K] was needing increasing amounts of oxygen, we were having to put increased -- higher and higher pressures through the ventilator to ventilate her then, yes, absolutely. But actually the number itself has to be put in the context of the bigger picture.

MYERS: Surfactant should be delivered within certainly, at the latest, 5 minutes of intubation, shouldn't it?

JAYARAM: Ideally, yes.

MYERS: Now, we can look at the timings, but we have seen a prescription for surfactant at 3 o'clock, but I will go to an earlier timing that we have, the earliest timing that we've got, which is at tile 31, please, Mr Murphy.

Just as we find that, the reason it has to be done quickly is surfactant is to assist the lungs in the elasticity they need for respiration to take place, isn't it?

JAYARAM: What surfactant does is it lines the alveoli, the air sacs, and if you don't have surfactant, they have a tendency at the end of every breath to collapse down completely, so rather like my analogy of the balloon earlier on, so each time a baby breathes, it's like the beginning of a balloon. So surfactant is normally produced by cells in the lung in the alveolar lining.

The surfactant we give from the outside is to support the baby -- and we try to give it as early as possible.

MYERS: And it's to ensure that respiration happens effectively, isn't it?

JAYARAM: It improves gas exchange --

MYERS: And that --

JAYARAM: -- and ventilation.

MYERS: That's the reason why, in a small baby like this, it's got to be quick that it's delivered --

JAYARAM: The sooner the better, absolutely.

MYERS: Because minutes without having the lungs working as effectively as they can be damaging in the long run, can't it?

JAYARAM: Well, what's damaging in the long run is having prolonged periods with low oxygen saturations and not being able to ventilate. So if surfactant is given slightly later than anticipated in the situation where a baby is oxygenating adequately I would contend it doesn't make that much difference in the long run. What makes a difference in the long run is a prolonged period of having low oxygen saturations.

MYERS: We're going to go behind this tile just to look at the timing we have here. If we just scroll down, further down the page, keep scrolling down, thank you. On to the next page. Is this your handwriting on this page, Dr Jayaram?

JAYARAM: Yes.

MYERS: All right. We can see surfactant given. It's got a dose of 120 milligrams. And the date, 17 February, time 02.45. Do you see that?

JAYARAM: Yes.

MYERS: If the intubation took 20 minutes it would have been complete at 2.32. If the intubation took 12 minutes, which is what it says in the nursing notes, it would have been completed by 2.24. It may seem to be a matter of minutes but as it happens, it comes late, doesn't it?

JAYARAM: It's later than it could have been, yes, but I would contend it made no difference because subsequently, if we look at [Baby K]'s ventilator settings and what she was on, she was on a relatively low pressures -- and 50% oxygen sounds like a lot of oxygen, but for a 25-week gestation baby that's not a

huge amount and actually her oxygen requirement came down slightly after she had surfactant. So I think really focusing on whether she had surfactant earlier or later, absolutely it could have been given earlier, but with reference to the episode that happened when the tube was dislodged, it is not relevant to it whatsoever.

MYERS: So we can keep track of what is or isn't relevant -- the jury will decide that, Dr Jayaram -- we are looking at two matters here. One of them is any potential cumulative effect of any shortcomings, so we can keep track. And the second matter is what the quality of care was in the unit and gauging it by the way that help is given. Do you understand that?

JAYARAM: Okay, yes.

MYERS: So putting to one side, for the time being, what the consequences may be, the surfactant has come late, hasn't it?

JAYARAM: It's later than we would have liked, yes.

MYERS: The intubation has taken longer than would have been ideal?

JAYARAM: It has, yes.

MYERS: And where we began, ideally, [Baby K] should have been born in a tertiary unit if that could have been done?

JAYARAM: Ideally.

MYERS: Let's carry on. You're familiar with the concept of the golden hour, aren't you?

JAYARAM: Absolutely.

MYERS: They are the steps that should be taken early in a neonate's life, within the first hour of life, aren't they --

JAYARAM: Yes.

MYERS: -- to improve the outcomes. That's right, isn't it?

JAYARAM: Yes.

MYERS: And again it's because the accumulation of small shortcomings may lead to a large shortcoming in the long run, mightn't it?

JAYARAM: It's -- potentially, yes.

MYERS: Also, a unit that is acting effectively and delivering the right level of care should be aiming to meet the requirements of the golden hour, shouldn't it?

JAYARAM: Yes.

MYERS: I would like to look at the notes, just some of the entries on the notes that you made, Dr Jayaram. So if we go, please, to -- I'll check which tile. Tile 65, please, Mr Murphy. You, we know, wrote these notes?

JAYARAM: That's correct.

MYERS: Dr Smith had been giving the treatment, hadn't he?

JAYARAM: That's correct.

MYERS: Is there any particular reason why you wrote the notes when it was Dr Smith who had given the treatment?

JAYARAM: I don't know, I can't remember. Quite often in this situation we would both write records. I don't know whether Dr Smith wrote anything or not.

MYERS: In fact, could we go to the top of this tile. We went through these, I'm not going to go through all the entries here, but just a couple of them. These are set out -- the note was written at 04.50 retrospectively.

We've seen the first page deals with happened on delivery and on the way to the -- prior to the neonatal unit. This page says "on arrival"; yes?

JAYARAM: Yes, so once we had got [Baby K] established on the neonatal unit.

MYERS: All right. And on arrival it's got a series of steps that are taken set out, hasn't it?

JAYARAM: It has.

MYERS: And reading through it, it would appear these are steps that are taken sequentially on arrival in the unit; is that what it conveys?

JAYARAM: It conveys that.

MYERS: It does? And if we just scroll down to the bottom of this page, we can see this page ends with the desaturation at 03.50, doesn't it?

JAYARAM: That's correct.

MYERS: So what you are conveying with this page is what was done prior to 03.50 in [Baby K]'s care on this unit?

JAYARAM: That's what it conveys, yes.

MYERS: All right.

JAYARAM: However, I will say, having seen the morphine prescription chart, I would say that it does look like the morphine infusion was not commenced until later.

MYERS: We'll come to morphine in a little bit, Dr Jayaram. Can we just look at the antibiotics. First, if we scroll up -- sorry, about the up and down, Mr Murphy.

If we just look up, antibiotics. Under the principles of good and effective care, Dr Jayaram, antibiotics should be delivered within that first hour, shouldn't they?

JAYARAM: That's correct, yes.

MYERS: And certainly, looking at the way this note is set out, we can see where the reference to antibiotics is (overspeaking) the line says sepsis.

JAYARAM: Yes.

MYERS: It says:

"Commenced IV penicillin and gentamicin."

Do you see that?

JAYARAM: Yes.

MYERS: So that plainly conveys the message that, as expected, antibiotics have been delivered at the right time, doesn't it? Now we can see when this takes place if we look at tiles 79 and 80, please. We have the electronic prescriptions behind these. Gentamicin at 04.40 and we can see next to it penicillin at 04.40.

JAYARAM: Yes. Do you have the prescription chart to say when they were written up? I accept if they were given then they were given later than they should have been, absolutely.

MYERS: If we can to help you.

(Pause)

If we could go, please, to -- I'm afraid I'll have to give you the J number, Mr Murphy, 17069. We have the tile number, it's 82. It seems to be the first one that we come to for gentamicin, Dr Jayaram. It's a little bit difficult, but we need to enlarge the top half of this form if we could, please. We can see:

"Patient details: [Baby K], baby girl. Date of birth, 17 February."

Can you see it says gentamicin?

JAYARAM: Yes. So that wasn't my signature, so it wasn't me that wrote it up. I'm guessing that was James Smith, I'm not sure, but I can't see on there what time it was prescribed. I can see what time it was given and I'll accept they were given later than they should have been.

MYERS: "Time given: 04.45" that says, doesn't it?

JAYARAM: Mm.

MYERS: If that's right, that's come late, hasn't it?

JAYARAM: That's late. That's later than they should have been.

MYERS: Although your note would appear to indicate it arrived in the right time frame, didn't it?

JAYARAM: And I think when I wrote my note it was on the assumption, wrongly, that they would have been certainly written up and delivered. I don't know why they were given later. Obviously there were -- there was the event that happened but that happened sort of after that first hour, so I accept that those antibiotics could have been given earlier.

MYERS: And should have been given earlier; do you agree?

JAYARAM: Yes.

MYERS: Vitamin K is something that should be dealt with within the first hour, shouldn't it?

JAYARAM: Ideally. It's not as crucial. We give it as soon as possible.

MYERS: I am just looking at the notes that you provide and the care that we have and the vitamin K appears to have been given, from your note, in advance of the desaturation, doesn't it, in that one-hour period?

JAYARAM: I think so. Again, it would have been written up -- I don't know time it was physically given. But the antibiotics being given late is important. I don't think the vitamin K being given late would have had any bearing on events.

MYERS: The vitamin K, we have it -- on the tile we have the record it was given at 04.20 in the morning. That's tile 72, which is outside the time frame for giving it, isn't it?

JAYARAM: It is.

MR MYERS: I do want to turn to the morphine. I won't spend long with those. My Lord, I don't know whether you'd wish me to deal with that now or take our break now and carry on. I'm in the court's hands.

MR JUSTICE GOSS: Are you likely to be more than about 5 minutes?

MR MYERS: Yes, I think I am likely to be more than 5 minutes.

MR JUSTICE GOSS: We'll have the break now then.

(3.10 pm)

(A short break)

(3.20 pm)

(In the absence of the jury)

MR ASTBURY: My Lord, I know the witness is still in the box, but could we raise a housekeeping matter, please?

MR JUSTICE GOSS: Yes.

MR ASTBURY: My Lord was told earlier that we need to deal with Dr Babarao today. It may well be that we need to sit a little later than 4.30 if that's the case.

MR JUSTICE GOSS: Yes, we will sit late until it's finished.

MR ASTBURY: Thank you.

(In the presence of the jury)

MR MYERS: Dr Jayaram, I'd be grateful if you could look with us at tile 65, which is from the clinical notes.

It deals with what was done and when in that first section.

If we just scroll down a little bit to where it says meds, please, can you see, Dr Jayaram, it says morphine at 20 milligrams (overspeaking) --

JAYARAM: Yes, I can.

MYERS: -- micrograms, is it, per kilogram per hour?

JAYARAM: Micrograms per kilogram per hour.

MYERS: Micrograms per kilogram per hour. That certainly conveys the impression that morphine had been given prior to the desaturation, doesn't it?

JAYARAM: It does. And having seen the prescription chart, I would say that that actually didn't happen at that time.

MYERS: No. Now, I asked you a little earlier about the possibility of babies being able to dislodge the tubes.

You agree that is possible?

JAYARAM: It is possible.

MYERS: What you were anxious to explain to the police when you made the statement I've referred to in 17 April 2018 was in [Baby K]'s case, she had been sedated.

JAYARAM: That's absolutely correct.

MYERS: Therefore she couldn't have dislodged it?

JAYARAM: Yes. I will absolutely agree that the timing of things, having seen that prescription chart, was different, and again from the way things are recorded there, that's correct, she wasn't on a morphine infusion. However, she was not a baby that had been very vigorous and trying to pull tubes out. Babies don't, at this gestation, consciously go for their tubes. And even though she wasn't on a morphine infusion at that time, I still contend that the probability of that tube doing what it did at the time that it did was unlikely.

MYERS: You were at pains to convey to the police that it was unlikely because she was sedated; that's what you were saying, wasn't it?

JAYARAM: That's what I thought at the time.

MYERS: And let's be absolutely clear: you told them morphine stops the baby from being active and reduces the risk of tubes being dislodged?

JAYARAM: It reduces the risk. The risk is small anyway.

MYERS: You were explaining morphine would reduce it?

JAYARAM: Yes.

MYERS: And makes it less likely she could have knocked it herself?

JAYARAM: And I accept now, looking at the timings of things, the morphine infusion was not running at that time.

MYERS: And you also said [Baby K] was a baby on sedation and was not moving around?

JAYARAM: And I admit that at that time she wasn't but she wasn't vigorous. So generally, had -- in retrospect, and you can accuse me of changing things, but having seen that, I will absolutely accept that the morphine infusion, from what has been written, was not running at the time of the dislodgement. Had she been very vigorous, we almost certainly would have started that sooner. Again, I'm surprised it hadn't been started, but it hadn't been.

MYERS: You added that detail -- first of all, you agree she wasn't actually sedated at all, was she?

JAYARAM: From what I can see from those notes, yes.

MYERS: She wasn't. You agree you told the police and emphasised that she was sedated?

JAYARAM: That's correct.

MYERS: You did that to support the impression you wanted to create that somebody else had interfered with that tube, didn't you?

JAYARAM: No, that's not why I did it. In good faith I thought at the time that the baby was on a morphine infusion at that time. And -- but even if she wasn't, there was nothing to suggest in the way she was behaving, up until the point that Jo Williams went to the labour ward, that she was vigorous or fighting or at risk of dislodging the tube. And if she had been, this certainly would have been started earlier.

MYERS: It also follows, as it happens, morphine was not given at the point your notes appear to convey, was it?

JAYARAM: That's correct.

MYERS: I'm going to suggest what you have done is try to shift your evidence to try to take account of the fact that you didn't give morphine in the way you first said.

Have you tried to shift your evidence to take account of that?

JAYARAM: Can you describe what you mean by shift evidence?

MYERS: Change it, try and account for the fact that you can't blame this on morphine now.

JAYARAM: I'm still --

MYERS: I'll be clearer. I suggest you sought to convey to the police that [Baby K] couldn't move because she was sedated.

JAYARAM: I think at the time I gave that statement that was one of the things, but even accounting for the fact that she wasn't on a morphine infusion at that time, she was a 25-week gestation who had been born and needed resuscitation and she was not behaving in a way where we were worried she might pull a tube out, as had been reported. And until that moment that Jo Williams left she'd been absolutely stable, poorly but stable.

MYERS: In your evidence, at a relatively early stage, the prosecution showed you that prescription for the infusion with your handwriting --

JAYARAM: That's correct (overspeaking) --

MYERS: -- and your signature at 03.50, didn't they?

JAYARAM: That's correct, yes.

MYERS: Yes. You appreciate that trying to say that [Baby K] can't move because she was on morphine simply can't be sustained now?

JAYARAM: That's not correct, I agree.

MYERS: What you have said now is, well, it wasn't -- [Baby K] was not a vigorous baby is what you have said now; yes?

JAYARAM: Yes.

MYERS: As it happens, that's not an observation you included, certainly in your statement, is it, that she wasn't a vigorous baby?

JAYARAM: No.

MYERS: What you said to them was because she was on morphine she couldn't move?

JAYARAM: That's one of the things, yes, I acknowledge that.

MYERS: And as it happens, before she was sedated, [Baby K] was actually quite an active little baby, wasn't she?

JAYARAM: Define active. She could move but she wasn't making any purposeful movements and certainly she was not making any movements to actually dislodge a tube. To dislodge a tube you need to be able to either grab on to it and hook it out or be able to roll around enough. So babies can move their arms and legs but she wasn't in a situation where we were concerned and the tube was secured.

MYERS: You deliberately misstated what happened with the morphine, Dr Jayaram, to make it sound as if it was less likely that [Baby K] (overspeaking) --

JAYARAM: No, I didn't deliberately misstate -- it was a genuine misunderstanding because I went from my notes, which obviously were written retrospectively. I wasn't aware, because I hadn't seen that prescription chart, that the morphine was not given until 3.50. And I accept that.

I don't accept that I deliberately made an error or deliberately did that.

MYERS: As it happens, not being sedated, [Baby K] was perfectly capable of moving in some way that could dislodge a tube?

JAYARAM: There's a possibility, but in a 25-week gestation baby who's 600 grams, the likelihood is very, very small.

And the fact that it happened in that small window of time is also of concern.

MYERS: Your suggestion she was inactive is a detail that you have put in once you realised you can no longer stick with saying that she was sedated by means of morphine? That's what you have done?

JAYARAM: She was not a baby that was jumping around, that we were concerned that she would dislodge a tube.

MYERS: Just pausing, if we move on, on the question of blockage, are you aware the nursing notes make reference to there being secretions of blood and oral secretions?

JAYARAM: I'm not aware of that. I'm not aware of that.

MYERS: So you're not at any disadvantage, let's have a look at tile 66 please, Mr Murphy. Go behind that. We can see what I'm referring to. If we go into the actual note itself. Scroll up, thank you.

This is what we're looking at. Just in the centre of that large body of the note by Joanne Williams there's a line:

"Large amount of bloodstained oral secretions."

JAYARAM: Yes.

MYERS: As best as we can understand, that appears to be when the tubes were first changed after the desaturation.

JAYARAM: But that secretion is in the back of the mouth, not within the tube.

MYERS: As it happens, there's no reference to that in the note that you made is there?

JAYARAM: It's not really relevant in that situation. Quite often there can be bloodstained secretions orally. Babies swallow a lot of maternal blood. This can come up.

Sometimes trauma can be caused when you intubate. But it wasn't a significant finding in terms of what was going on clinically. And it certainly doesn't imply that the endotracheal tube was blocked.

MYERS: Well, you didn't actually check the tube, did you?

JAYARAM: No, I told you, I looked at it, I didn't document it but I would have noticed -- if it had been blocked I would have written it down.

MYERS: One of your interviews with the police was on 26 May 2021. I'd like you to have a look at something on page K12612. We've got a large paragraph there.

That's the paragraph for you to look at, please, in which you're talking about going through in your mind what could have led to this desaturation. You go through the various possibilities. I want to focus on what we're talking about. If you go about seven or eight lines from the bottom, please. Read the whole thing first if you wish. Sorry.

JAYARAM: I said I don't recall looking at the tube.

MYERS: Mm. You say:

"Now obviously we did look down to see whether it was obviously blocked or whether it was in the wrong place. I didn't -- we don't -- I don't recall looking at the tube to see if it was a blockage in it."

But you go on to say it clearly wasn't working.

That's what you said back in 2021 about this.

JAYARAM: Yes. I don't recall but I would have done. The other thing to say about a tube blockage is they tend not to happen acutely. You will again see, as secretions in the tube accumulate, that ventilatory requirements will go up and the baby will deteriorate gradually. It can be quite quickly gradually. So the pattern didn't really fit with a tube blockage.

MYERS: What I would like to be clear about is this, Dr Jayaram: you have said in your evidence there was no blockage and you checked the tube; yes? That's what you said in your evidence today.

JAYARAM: And I have said there I don't recall.

MYERS: What you say back in 2021 was:

"Obviously we don't look to see whether it was obviously blocked or whether it was in the wrong place. I didn't -- we don't -- I don't recall looking at the tube to see if there was a blockage in it."

That's what you said?

JAYARAM: I have to admit I've said that, yes.

MYERS: We can take that down, please.

I suggest to you, Dr Jayaram, that the level of care for [Baby K] on your unit fell below the optimal standard when you look across the board at what was done with her; do you agree or disagree?

JAYARAM: There are things that could have been done better and quicker, I wouldn't disagree with that.

MYERS: I suggest that what you have said about Lucy Letby and the suspicion you say is generated against her incorporates details that simply did not take place at that time.

JAYARAM: I would disagree with that. I would disagree with that because, as I said, I had an irrational bad feeling and I walked in and found [Baby K] deteriorating at that moment in time when minutes before, seconds before, there had not been anything to suggest that she was -- her clinical condition was changing.

MYERS: I suggest that months, if not years later, you added details to what took place with Lucy Letby to support the things that were then being said about her.

JAYARAM: I would disagree with that as well because the implication is you're questioning my probity and honesty and in good faith I would disagree with that.

MR MYERS: I'm not going to go over any further ground.

Those are my questions, thank you, Dr Jayaram.

Re-examination by MR ASTBURY

MR ASTBURY: Could I ask Mr Murphy to put up tile 45, please. You were asked, Dr Jayaram, about some of the notes that had been completed by the transport team.

JAYARAM: Yes.

ASTBURY: I'd like you to look at those, please. In particular, if we read down, it's just above the C on the left, 05.55:

"Call received from Dr Jayaram. Baby dislodged her tube and had to be re-intubated."

It's clear that's not a note that you have made?

JAYARAM: No.

ASTBURY: Have you ever had the opportunity to see this note before?

JAYARAM: I have not seen this note before.

ASTBURY: And you have not had the opportunity to correct it at any point since?

JAYARAM: No. This is -- the first time I've seen this note has been today.

ASTBURY: Thank you.

If we just scroll to the top of that page again, please. That tells us that it was at 3.15 that the transport team

called -- received a call from Chester regarding [Baby K] and that was made by yourself; is that right?

JAYARAM: That's correct.

ASTBURY: Take that down now, thank you, Mr Murphy.

In a similar vein it was suggested to you, and I think the phrase was "wherever you got it from", that you had tailored the period that you thought Joanne Williams was out of the room in comparison to the swipe data.

Now, can I ask this: have you ever, before you gave evidence today, seen the sequence of events chart that you were shown during the course of your evidence?

JAYARAM: Which was the sequence of events chart?

ASTBURY: The coloured tiles in the chronological order. Have you ever seen that before?

JAYARAM: No.

ASTBURY: And have you ever seen any of the electronic swipe data stored by the hospital --

JAYARAM: No.

ASTBURY: -- that underlies that particular entry?

JAYARAM: No. In my 18-plus years working there, I've never had any reason to look at swipe data and I have never seen any swipe data.

ASTBURY: Thank you. Tile 52, please, Mr Murphy. This is a blood sample, Dr Jayaram, taken at 3.31, and during the course of your cross-examination you accepted that the antibiotic could have been given sooner.

JAYARAM: Yes.

ASTBURY: Can we look at the blood sample that was taken before those antibiotic were administered. That's a pathology sample, would you agree, timed at 3.31?

JAYARAM: It says the specimen was collected at 3.31.

ASTBURY: So about an hour before those antibiotics were administered?

JAYARAM: Yes.

ASTBURY: And if we look at a venous sample, can we look at the last line please:

"No bacterial growth after 5 days of incubation."

JAYARAM: That's correct.

ASTBURY: So what does that tell us about [Baby K]'s status at 3.31 before those antibiotics were administered?

JAYARAM: So as I said earlier on, there are risk factors for infection. We assume it's there until proven otherwise and screen for infection and treat. The antibiotics, as has been discussed, could have been given earlier. If there's no bacterial growth after 5 days that would suggest that, in reality, there was no evidence of any bacterial infection in [Baby K]'s bloodstream. Now, other markers need to be looked at, like CRPs and white cell counts as well, but that would suggest that there was no bacteria growing in [Baby K]'s bloodstream. So although antibiotics were given later than they could have been and should have been, it almost certainly didn't make a huge amount of difference, if at all, to the outcome.

ASTBURY: Would the delay in administering antibiotics make any difference to the means by which the ET tube dislodged at 3.50?

JAYARAM: No, none whatsoever.

ASTBURY: Would any of those features that you've accepted could have been done quicker and better, such as surfactant and intubation, have affected whether that tube would have dislodged at 3.50 that morning?

JAYARAM: No. I think the only thing that might have made a difference would be the morphine. I don't think any of the other things that have been highlighted would have made any difference whatsoever.

MR ASTBURY: Thank you. I have no more questions. Does my Lord have any questions?

Questions from THE JUDGE

MR JUSTICE GOSS: Just this, and it relates to morphine.

Tile 69, please, Mr Murphy. Thank you.

Can we look at the chart behind there, please?

This, as I understand it -- and correct me if I'm wrong, Dr Jayaram, about this -- is the prescription and administration chart for the continuous infusion that was being set up.

JAYARAM: That's correct.

MR JUSTICE GOSS: We can see what appear to be different handwriting at various points. I'm not going to ask you to identify anyone else's, but I'm just going to ask you if you would tell us where your handwriting is on this document.

JAYARAM: The bits that are my handwriting are where it says "Consultant Gibbs", because Dr Gibbs would have been the admitting consultant for the week.

MR JUSTICE GOSS: So that's against the NNU?

JAYARAM: Yes. Shall I move the cursor, does that help?

MR JUSTICE GOSS: That would be helpful, thank you.

JAYARAM: I have written here (indicating):

"Starting rate 0.34ml an hour, 20 micrograms per kilogram per hour."

That is my signature and my printed name in my writing.

MR JUSTICE GOSS: Yes, and the date?

JAYARAM: The 17/2/16, that doesn't look like my writing. I can't say it isn't, but that's not my writing.

MR JUSTICE GOSS: Just going back to the doctor's signature box, we can see what you say is your signature underneath and we can see a squiggle through.

JAYARAM: That one there is my signature (indicating). That's my printed name. I'm not sure what that is (indicating).

MR JUSTICE GOSS: What is that that's --

JAYARAM: I genuinely don't know. I don't know whether it's another signature or... I do have fairly appalling handwriting but I don't know what that is at all.

MR JUSTICE GOSS: Well, the jury can look at it and see what they can see or can't see.

JAYARAM: I don't know if it's somebody else's signature --

MR JUSTICE GOSS: All right.

JAYARAM: -- or why they would have signed it. Generally, when we do a signature, we are taught to print our name underneath entirely to avoid a situation where there's just a squiggle and nobody knows whose signature it is.

All the writing here, under where it says "first dose", down to the doctor's signature, is my writing.

MR JUSTICE GOSS: So everything there (indicating)?

JAYARAM: Not where it's --

MR JUSTICE GOSS: Not there but from the date, the time?

JAYARAM: Everything in that (indicating) column is my writing.

MR JUSTICE GOSS: That is you and that's setting the rate and the dosage?

JAYARAM: Yes.

MR JUSTICE GOSS: Who will have administered it?

JAYARAM: It's usually the nursing staff. You can see there's two signatures there. We prescribe it as doctors and then the nurses draw it up, prepare it, double-check it, and administer the infusion.

MR JUSTICE GOSS: Right.

JAYARAM: When [Baby K] was intubated the second time -- the first time she was intubated on the unit, you'll notice I put a comment that she was given a bolus of morphine as well. That should have been written up somewhere.

Sometimes we start the infusion and bolus through the infusion or we may have given a single dose in a syringe. But we wouldn't really give a controlled drug without it being written up and double-checked.

MR JUSTICE GOSS: It appears from the documents we've gone through that it was at the same time, bolus and the --

JAYARAM: Okay, which may have been the case if the infusion was ready to roll, the bolus could have been given just as a -- so the infusion is put on a pump and then you can bolus through the infusion, so you can press a button so that you can give a higher amount, you can define the amount you want to give, how

long you want to give it over, and then go back to the infusion, if that makes sense.

MR JUSTICE GOSS: All right. They could have been at the same time then?

JAYARAM: They could well have been at the same time.

MR ASTBURY: Nothing from me, thank you.

MR JUSTICE GOSS: Thank you, Dr Jayaram. That completes your evidence at this stage, but you will be coming back to give further evidence. Thank you very much. What I have said to you several times before applies: please don't talk to anyone about anything to do with this case. Thank you.

JAYARAM: Thank you, my Lord.

(The witness withdrew)

Witness statement of MS ELIZABETH MORGAN (read)

MR ASTBURY: Just before we call Dr Babarao, there's a statement of agreed evidence we would wish to read in light of what we've just heard. It's page 31 of my Lord's bundle. It's a statement from an Elizabeth Morgan, who describes herself as a nursing advisory consultant. Her statement is dated 22 October 2021.

She says as follows:

"I, Elizabeth Morgan [and she gives her professional qualifications and PIN number, albeit in abbreviated form], have been asked to provide my professional opinion on the following statements by LL [it's Lucy Letby] and the appropriateness of the suggested approach in relation to the deterioration in [Baby K]'s oxygen saturation levels, taking into account all of the circumstances, including the infant's gestational age."

She then quotes the statement she has been asked to consider, which is this:

"Possibly waiting to see if she self-corrected. We don't normally intervene straightaway if they weren't dangerously low."

Elizabeth Morgan continues:

"In preparing my statement, I have read the medical and nursing notes for [Baby K] and the related interview transcript. In addition, I have read a number of external sources of literature.

"In my professional experience it is possible for an endotracheal tube to become dislodged in an unsedated or active baby or where securing ties have become loose. Where a baby is sedated or paralysed, this is less likely to occur accidentally.

"In my experience, it is very unlikely that a nurse would leave the bedside of an intubated neonate unless they were very confident the endotracheal tube was correctly positioned and secure, the baby was inactive, and they would only be away briefly.

"I would expect a nurse to inform a colleague, who would remain in the vicinity, they were leaving to alert them the baby was unattended at the time and to ensure they would attend the baby if an alarm should sound.

"In response to the specific question, given the gestational age of the baby, in my professional experience when observing a falling oxygen saturation level in a baby of this age and gestation, it would be standard good nursing practice to immediately attend the bedside to actively observe the baby, ascertain any cause for changes in oxygen levels, and to take any corrective action, calling for help to alert other staff members of the situation if necessary.

"A series of checks would be carried out immediately to ascertain why the oxygen levels had dropped, for example has the tube become blocked or dislodged, has the baby developed a pneumothorax, or has there been an equipment failure. I do not believe that it would be normal nursing practice to wait and see if the baby self-corrected at this gestational age given the lungs are so immature and the risks associated with unplanned extubation.

"The incident should also be reported verbally to the designated nurse on her return and recorded in the nursing records or charts."

That's the statement of Elizabeth Morgan.

MR JUSTICE GOSS: Thank you.

MR ASTBURY: My Lord, I call Dr Babarao, please.

DR SRINVASARO BABARAO (affirmed)

Examination-in-chief by MR ASTBURY

MR ASTBURY: Could we start with your full name, please?

BABARAO: Srinvasaro Babarao.

ASTBURY: Thank you. Are you a consultant neonatologist at the Wirral University Teaching Hospital?

BABARAO: I used to be. I no longer work at Wirral.

ASTBURY: Where do you work now?

BABARAO: I work at Liverpool Women's Hospital.

ASTBURY: In the same capacity?

BABARAO: Yes.

ASTBURY: Were you also employed as a consultant in neonatal transport with the Connect North-west team?

BABARAO: Yes, at that time. No longer.

ASTBURY: No longer, all right. You've come along to assist today with your involvement with baby by the name of [Baby K], is that right --

BABARAO: Yes.

ASTBURY: -- and events that took place back in February of 2016?

BABARAO: Yes.

ASTBURY: You've been a consultant neonatologist since 2013; is that right?

BABARAO: Yes.

ASTBURY: And amongst your qualifications, you're a fellow of the Royal College of Paediatrics and Child Health?

BABARAO: Yes.

ASTBURY: And you were, I think, the consultant with responsibility for [Baby K] upon her arrival at Arrowe Park back in February 2016?

BABARAO: Yes, you're right.

ASTBURY: Thank you. She arrived at 1.15 on that particular day on 17 February; is that right?

BABARAO: As per the notes, yes.

ASTBURY: Okay. Given your experience on the transport team, I'm also going to ask you to look at some tiles on the screen to your right, just dealing with the chronology of the transport team's activity, please, doctor, in addition to what you knew of [Baby K] when she arrived; okay?

BABARAO: Yes.

ASTBURY: I'm going to ask you to look first, please, at tile 44.

If we look behind it, it tells us -- if we scroll down, please. That's a referral form for the transport team.

Do you recognise that form?

BABARAO: Yes.

ASTBURY: If we look to the top right, we can see time of call underneath the black box at 3.15 on the morning of the 17th?

BABARAO: Yes, you're right.

ASTBURY: Would that indicate that was the first time that contact was made by Chester to the transport team?

BABARAO: I believe so, yes.

ASTBURY: Thank you. We've heard that [Baby K] had been born at a gestation of 25 weeks, which is preferably suitable (sic) for a tertiary centre as opposed to a secondary centre; is that right?

BABARAO: Yes, ideally.

ASTBURY: Ideally. Are you aware, have the notes told you, why it was not possible for [Baby K] to be born at a tertiary centre?

BABARAO: Yes. As per my statement, I think I'd written there was a possibility of an in utero transfer. That did not happen before the birth of [Baby K].

ASTBURY: So it was discussed but couldn't happen?

BABARAO: Yes.

ASTBURY: All right. Just then returning, please, to the chronology through the early hours of 17 February. Can we go, please, to tile 101, Mr Murphy? Look at that document. This is an unplanned time-critical transfer form; is that right?

BABARAO: Yes, you're right.

ASTBURY: It records the date of transfer. If we scroll down, please. It has details of the birth. You may be asked some more details about this, doctor, in due course, but just so we can go through the chronology. We can see various readings and a list of issues that [Baby K] was suffering in the bottom left-hand box.

BABARAO: Yes.

ASTBURY: And additional comments in the right. We've heard that it had not been possible to fit an umbilical arterial catheter.

BABARAO: That's correct.

ASTBURY: Thank you. The next tile, please, 103. This is a form we've seen. This is a log of events that happened following the call at 3.15; is that right?

BABARAO: Yes. Just looking at the notes, yes.

ASTBURY: I'm not going to take you to any specific note. If we can go next to tile 114. This is a typed document which is described, I think, as a referral form.

Is that something you're familiar with?

BABARAO: Yes.

ASTBURY: Again, all paper generated in the period before [Baby K] is transported, after the request has been made by the treating doctor?

BABARAO: Yes, that's correct.

ASTBURY: Thank you. If we scroll down and familiarise ourselves with that, please. That's got a date and time of referral at 06.47. Is there anything significant in that time?

BABARAO: I think that's probably the time they took the referral or they started documenting.

ASTBURY: Okay. We have some times on the next document, please, tile 122. This is the ambulance booking form, so we can see that the ambulance was contacted at 7.37, which is our first time on the left. Then we can see a log of times further down. "Arrived for transfer", would that be arrived at Arrowe Park to take the staff?

BABARAO: No, the transport service was based at Liverpool Women's Hospital.

ASTBURY: Right.

BABARAO: So the ambulance would have been called to the base at 7.37, would have come to Liverpool Women's Hospital at 8.05, and then left the Women's and then -- I don't know when the transport consultant joined the team, but they arrived at Chester at 8.50. That's what I could understand.

ASTBURY: So we understand it, Chester are asking for a transfer.

There's a bed available at Arrowe Park?

BABARAO: Yes.

ASTBURY: But the transport team are based at Liverpool?

BABARAO: Yes.

ASTBURY: So there's those three locations to liaise with one another; is that right?

BABARAO: Yes.

ASTBURY: After that initial call that we saw at 3.15, when it would appear Dr Jayaram notified the transport team that he required assistance, who then takes over with directions as to who does what?

BABARAO: The transport team. I believe at that time the call, it looks like, reading through the notes, I was not involved in any of the decision-making, but it looks like the call went to the transport team and the transport registrar was initially involved, who was based at Liverpool Women's. And then it was escalated to the transport consultant. At that time, consultants from Arrowe Park were covering for logistic advice for the transport team, but based at Arrowe Park at the time. So it looks like one of the other consultants from Arrowe Park took the call or the transport team contacted him at around 6 o'clock, it looks like, or 7 o'clock, I'm not sure, I need to look at the timings.

And then it was discussed between these people and the decision for transfer timings were made.

ASTBURY: Just in the context of this case, Dr Jayaram rings the service at 3.15 in the morning. We know that's about an hour after [Baby K] was born. Who then has control of, for example, when the ambulance comes out, when the baby is collected, and what the baby is transferred? Is that taken out of Dr Jayaram's control? Is that then in the hands of others?

BABARAO: It's difficult to say. Reading through the notes again, when the call was made I think the advice which was given was to stabilise the baby and then contact the transport team again because the transport team at that point of time, and even now, is not a stabilisation service. It is a service which transfers the babies when the babies are ready and stable to be moved out to our level 3 unit.

ASTBURY: Okay. So it is the responsibility of the treating clinicians to stabilise the baby?

BABARAO: Yes.

ASTBURY: Once the baby is stable, that's when the transport team may be in a position to --

BABARAO: To come and retrieve the baby and move them to a level 3 unit.

ASTBURY: Tile 138 next, please, Mr Murphy. These are a slightly different sets of notes. Do they suggest that the transport team arrived around 9 o'clock and would have taken responsibility for [Baby K]?

BABARAO: Yes, you're right.

ASTBURY: It describes a handover from Dr Jayaram?

BABARAO: Yes.

ASTBURY: And does that effectively mean that the transport team take over the care of the baby with the assistance of clinicians at that particular hospital?

BABARAO: They get involved with the care, but it's sort of a joint responsibility of the treating clinician and the transport team, because the transport team is still in that unit where the baby was born.

ASTBURY: Okay.

BABARAO: The transport team, being specialised services, like tertiary neonatologists.

ASTBURY: Is the focus then on preparing the baby for transport?

BABARAO: Yes, to make the baby as stable and safe as possible to move to a level 3 unit.

ASTBURY: Of course, the transport team are the experts in that particular aspect of care?

BABARAO: Yes.

ASTBURY: So are they likely to take over, as it were, supervision of the baby and control?

BABARAO: Yes, to manage the baby, to prepare the baby for transfer.

ASTBURY: Thank you. If we can scroll down the notes, please, we can see that they were told, in summary, that which we've -- you needn't worry about this -- heard in other evidence. You note in your statement that there was a problem with the endotracheal tube from looking at the notes.

BABARAO: Yes.

ASTBURY: And also that there had been multiple doses of surfactant?

BABARAO: Yes, you're right.

ASTBURY: If we can go to tile 140, please. It's a more detailed note, but it's clear that at 9.15 certainly the parents were involved in what was unfolding; is that right?

BABARAO: Yes, you're correct.

ASTBURY: There is -- an issue you observe in your witness statement is [Baby K]'s blood pressure?

BABARAO: Yes.

ASTBURY: Was there advice from the transport team to take further steps in that regard?

BABARAO: Yes, it looks like the baby, or [Baby K], needed multiple medications to get the blood pressure up.

ASTBURY: From the respiratory perspective, do you observe that [Baby K] was not saturating, meaning her oxygen levels couldn't be maintained within normal limits?

BABARAO: Yes, you're correct.

ASTBURY: And she was introduced, I think, at that stage, to inhaled nitric oxide; is that right?

BABARAO: Yes, you're right.

ASTBURY: That's not something we've heard about before. In a very short form, could you tell us what that adds to the ventilation regime?

BABARAO: It's like an additional gas in a cylinder which gets attached to the ventilator circuit. The nitric oxide works in trying to make the blood vessels in the lungs dilate or enlarge, so that helps with more blood flow and oxygenated -- ability for the lungs to get oxygen.

ASTBURY: So it's fed into the existing ventilation system?

BABARAO: Yes.

ASTBURY: You assess [Baby K] at this stage as "quite sick", is the quote from your witness statement.

BABARAO: Yes. From reading the notes, yes.

ASTBURY: All right. If we go next, please, to tile 157. At 10 o'clock, there's a list of those further medications that the transport team felt were necessary at that time; is that right?

BABARAO: Yes, you're right.

ASTBURY: I don't think we need to go through the rest of the tiles, but if we can go to 161 next, please, Mr Murphy.

At 10.30, I think there were -- if we go back to the front piece, please, Mr Murphy. Thank you. Those lines that were mentioned in the last note, there's a reference to pumps and charts. Could you just explain to us what that would have meant?

BABARAO: These pumps are infusion pumps to deliver medications and the charts are where they document the various medications.

ASTBURY: So those medications at 10 o'clock which the transport team considered appropriate would be entered on this pump form, which is what they're called, with the transport team?

BABARAO: Yes. Would have been delivered to the baby using the pumps, and they would have been documented or recorded in the charts.

ASTBURY: We were going through these tiles, and it may not be necessary, we have further references initially to nitric oxide and then an increase in nitric oxide; is that right?

BABARAO: Yes.

ASTBURY: Okay. And then references to mum and dad being involved in the treatment and being told what was going on and what the plan was. Would that always be the case?

BABARAO: Are you still --

ASTBURY: Tile 173, please. At 11 o'clock, still at Chester?

BABARAO: Yes.

ASTBURY: "Updated mum and dad."

BABARAO: Yes. That's by the transport consultant.

ASTBURY: Explaining about oxygenation and blood pressure issues; is that right?

BABARAO: Yes.

ASTBURY: And the monitoring process?

BABARAO: Yes.

ASTBURY: Tile 176 next, please -- sorry, just the page before, Mr Murphy, the summary of the relevant part. At 11.10, is that dobutamine and dopamine?

BABARAO: Yes.

ASTBURY: Are they blood pressure medications?

BABARAO: Yes. They are medications routinely used in preterm babies to increase blood pressure.

ASTBURY: And we can see that the dosage is being increased at 11.10?

BABARAO: Yes.

ASTBURY: [Baby K] continuing to suffer with her low blood pressure?

BABARAO: Yes.

ASTBURY: And continuing to be a sick baby as you described earlier?

BABARAO: Yes.

ASTBURY: There's a reference we won't go to to hydrocortisone.

The significance of that, please?

BABARAO: Again, it is one of the medications used in extreme preterm babies and also in bigger babies when there is difficulty in maintaining blood pressure, so the belief is that hydrocortisone, as a steroid, would help the baby's receptors to work better with these medications and also try to kick start the adrenal gland and help with blood pressure.

ASTBURY: If we go to tile 219, please. Go behind the first page please. We can see that [Baby K] left Chester having been stabilised by the transport team at 12.50.

BABARAO: Yes.

ASTBURY: And if we go to tile 225, please, we have the arrival at Arrowe Park at 13.15 hours; is that right?

BABARAO: Yes, correct.

ASTBURY: "ETT and all lines remained in situ during transfer."

That's in the middle of that particular entry. So no difficulties with [Baby K]'s ETT en route to the hospital?

BABARAO: I wouldn't say difficulty. They didn't get dislodged, so they were in situ.

ASTBURY: They were secure?

BABARAO: They were secure.

ASTBURY: No dislodgement?

BABARAO: That's what it means.

ASTBURY: Thank you. A much better way of putting it.

This, really, is where you come in with your first-hand knowledge, doctor, because in your statement you explain that upon her arrival at Arrowe Park, did you continue to struggle to oxygenate [Baby K]?

BABARAO: Yes.

ASTBURY: Would that mean her oxygen levels remained very low?

BABARAO: Yes.

ASTBURY: And did you have to increase again the levels of nitric oxide she was receiving?

BABARAO: Yes.

ASTBURY: Did you resort to what's called rescue ventilation by way of high frequency oscillatory ventilation?

BABARAO: Yes, I believe so. I don't recall that being done by me because I would have handed over the care to another colleague of mine at around 5 o'clock that evening.

ASTBURY: That would explain it because in your statement, I'm sure there's no dispute with this, that was commenced at 10 o'clock that night.

BABARAO: Yes.

ASTBURY: In know the statement is based in part on your notes as well as your own --

BABARAO: Yes.

ASTBURY: Did her chest X-rays show significantly premature lungs with pulmonary interstitial emphysema?

BABARAO: Yes.

ASTBURY: Which you described as "severe lung disease"?

BABARAO: Yes.

ASTBURY: And that was noted the following day from her arrival; is that right?

BABARAO: From my memory, yes.

ASTBURY: Did [Baby K] continue to deteriorate in the following 24 to 48 hours?

BABARAO: Yes.

ASTBURY: Okay. You continued to try to manage that with high frequency oscillation?

BABARAO: Yes.

ASTBURY: At times she was taken off that because not all babies respond well?

BABARAO: Yes.

ASTBURY: But nothing improved the situation?

BABARAO: Yes.

ASTBURY: All right. From a cardiovascular perspective, was [Baby K] on a variety of medications?

BABARAO: Yes.

ASTBURY: We've discussed dopamine, dobutamine and hydrocortisone; did they continue?

BABARAO: Yes, they did and I think more medications were commenced. If I'm right, I think an adrenaline infusion was commenced.

ASTBURY: Okay. Well, you have got those three for blood pressure on maximum doses; is that right?

BABARAO: Yes.

ASTBURY: Were her acid levels continuing to be high?

BABARAO: Yes.

ASTBURY: And that's I think when you included as medication support adrenaline and noradrenaline. You make the point they are there uncommon medications in a preterm baby. Just explain it that to us, please.

BABARAO: The number of medications that are put for blood pressures. The more we use, it's very unconventional, so that clearly indicates that the baby is very sick and we generally don't such a number of medications in an extreme preterm baby. Clearly it is moving into a stage of futility and treading into territories of whether it is going to increase the suffering because we're not seeing a response.

ASTBURY: Did the doses of adrenaline and noradrenaline reach their maximum threshold levels?

BABARAO: Yes.

ASTBURY: Was infection an issue with [Baby K]?

BABARAO: As far as I believe from the notes, no. The cultures were negative and the infection markers were within normal limits.

ASTBURY: Did she require treatment with insulin for high blood sugar levels?

BABARAO: Yes.

ASTBURY: Did she also have a deteriorating renal function --

BABARAO: Yes.

ASTBURY: -- which needed fluid management?

BABARAO: Yes.

ASTBURY: Did those acid levels referred to earlier indicate just how severe her clinical condition had become?

BABARAO: Yes. It indicates poor perfusion to the body organs.

Clearly, acid levels indicate that many of the body organs are not getting enough oxygen and blood supply.

ASTBURY: At 10 o'clock on 19 February 2016, did you have a discussion with [Baby K]'s parents, explaining just how sick she was?

BABARAO: Yes.

ASTBURY: And that she wasn't responding to the maximum level of intensive care that you were able to provide?

BABARAO: Yes. And any other neonatal unit would have provided.

ASTBURY: Okay. Her blood pressure had deteriorated, mean blood pressure, to 16 to 18; is that right?

BABARAO: Yes.

ASTBURY: She was already on the maximum blood pressure medication?

BABARAO: Yes.

ASTBURY: And did you tell the parents that she was not responding?

BABARAO: Yes.

ASTBURY: And that there was a point when she would die following a period of deterioration over the next few hours?

BABARAO: Yes.

ASTBURY: All right. Did you agree with the parents that if she continued to worsen, they were asking for no further escalation of intensive care?

BABARAO: Yes.

ASTBURY: They didn't want cardiac compressions or medications to restart her heart if it stopped and they felt that she had suffered enough?

BABARAO: Yes.

ASTBURY: And they, in your view, understood the gravity of the situation?

BABARAO: Yes.

ASTBURY: Did your colleague, Dr Gardener, who was the senior registrar on the unit, continue to discuss the situation with you overnight?

BABARAO: Yes.

ASTBURY: And did [Baby K], in fact, continue to deteriorate?

BABARAO: Yes.

ASTBURY: At 3 am was there a conversation with the senior registrar?

BABARAO: It's one of the documented conversations. So there might have been more than that. I don't recall.

ASTBURY: Was it explained that [Baby K] was not responding to intensive care and that her oxygen levels were now down to the 50s?

BABARAO: Yes.

ASTBURY: All right. And at 5 am, a discussion with the parents and they felt it was now time to stop intensive care?

BABARAO: Yes.

ASTBURY: And you agreed that that was an appropriate and sensible decision?

BABARAO: Yes.

ASTBURY: Did you then electively stop all intensive care and simply allow the parents to spend some quality time with their baby?

BABARAO: Yes. Not me personally, that is what happened.

ASTBURY: Her endotracheal tube was removed with the parents' consent at about 05.10?

BABARAO: Yes, as per the notes.

ASTBURY: And then [Baby K] spent some time with her parents in the parents' room?

BABARAO: Yes.

ASTBURY: And her death was declared at 05.28 that morning, now on 20 February?

BABARAO: Yes.

ASTBURY: You had an input with all of those decisions and those events?

BABARAO: Yes.

ASTBURY: Was there, during [Baby K]'s stay at your hospital, at Arrowe Park, any incidents involving the dislodgement of her endotracheal tube?

BABARAO: I don't believe so. It's not recorded or documented in the notes.

ASTBURY: Okay. And finally, we heard a little yesterday about something called the golden hour that you cover in your statement.

BABARAO: Yes.

ASTBURY: You may be asked some more questions about this. But just in general terms, what's the golden hour, please?

BABARAO: The golden hour is the initial hour after birth of a preterm baby, which is crucial in stabilisation, to give them the best possible next few hours and the outcomes.

ASTBURY: Who has formulated the golden hour process or procedures?

BABARAO: It's just good practice, there's nothing like strict guidelines to say that these have to be implemented within the

hour. So at the time that used to be a belief and we increasingly are now moving away from things like putting central lines into the baby within the hour because that is not the key. The key now is to mess less and less with the baby.

ASTBURY: All right.

MR JUSTICE GOSS: To mess less and less?

BABARAO: In the sense not do a lot of invasive procedures to the baby, do the most essential things in the first few hours, let the baby settle and take some time, and then we increase support as the baby needs.

MR JUSTICE GOSS: Sorry, I was just checking that I'd heard correctly what you said.

BABARAO: Sorry.

MR JUSTICE GOSS: In other words, only do anything when it was necessary to do it?

BABARAO: Yes, to try and keep the baby stable, quiet and resting and do only the things which the baby needs.

MR ASTBURY: Okay. So that was an approach back in 2016?

BABARAO: Yes.

ASTBURY: But less prescriptive now, would be that fair?

BABARAO: Yes.

ASTBURY: And to be judged on the clinical situation as it stands?

BABARAO: Yes. Absolutely.

MR ASTBURY: Thank you. I have no more questions. If you could wait there, please.

Cross-examination by MR MYERS

MR MYERS: Dr Babarao, I see it's late but we're going to try and deal with your evidence today. My Lord, I'll probably be 20 or 25 minutes to deal with this.

Again, we've just been dealing with the very sad situation here. I make it plain, as I have done before, the questions I ask are not meant to be insensitive in any way.

BABARAO: I appreciate that.

MYERS: We all appreciate what we're dealing with, but I need to deal with a number of topics.

The first thing is this, please, Dr Babarao. You are a consultant neonatologist, aren't you?

BABARAO: Yes.

MYERS: We've heard from consultant paediatricians in this case.

Is a consultant neonatologist the same thing as a consultant paediatrician or is it a different type of specialty, could you explain to us?

BABARAO: Neonatology is a sub-specialty in paediatrics. So we train specifically to become a neonatologist. That's part of a three-year training programme in neonatology and other relevant sub-specialties to get that sub-specialty recognition as a neonatologist.

MYERS: Why is it -- what's the benefit of having that training, what difference does it make? This is so we can all understand.

BABARAO: In simplistic terms, when I become a neonatologist I care for the most extreme and complex newborn babies, including surgical and cardiac preterm and term babies.

And I no longer care for children, so I specialise only in treating babies.

MYERS: Is there a particular period of life that a neonatologist covers? A paediatrician might be everything up to the age of 16 years, but is there a particular period that a neonatologist focuses on and is dedicated to in their training and experience?

BABARAO: As a neonatologist, we cater to babies born from about 22 weeks' gestation until the point the baby gets home from the neonatal unit.

MYERS: Right. When you say "gets home from the neonatal unit", that means whatever gestation they were born at?

BABARAO: Yes.

MYERS: After they leave the neonatal unit, you care for them up until that point?

BABARAO: Yes, in terms of care perspective. But we do follow them up until a period of 2 years to look at how they get on with weight, neurodevelopment, et cetera.

MYERS: So you will have specialist experience in training in babies in the earliest years of life?

BABARAO: Yes.

MYERS: And paediatricians who are employed more generally across maternity units or paediatric units may not have that focused level of expertise?

BABARAO: Yes.

MYERS: Do you agree that the outcome for [Baby K] may have been better if she'd been born at a tertiary centre?

BABARAO: Yes. That's the evidence.

MYERS: It makes a difference, doesn't it?

BABARAO: Yes.

MYERS: Your understanding of the notes that you've seen is that there should have been what's called an in utero transfer, shouldn't there?

BABARAO: That's the intention.

MYERS: Yes, the intention.

BABARAO: Yes.

MYERS: Because it was important that [Baby K] should be at a tertiary centre, wasn't it?

BABARAO: Yes.

MYERS: And in utero, of course, means before she had been born?

BABARAO: Yes.

MYERS: In fact, did you find any clear explanation why that didn't happen?

BABARAO: I can only refer to the notes, what I had documented there. There was an opportunity for an in utero transfer. I extrapolated what I believe is -- because [Baby K] was able to come to the neonatal unit, so the reason for declining an in utero transfer could have been maternity beds at the time at

Arrowe Park Hospital and that could be related to staffing or there was no physical space, I don't know.

MYERS: Right. Is that to say it's not quite clear why she wasn't transferred?

BABARAO: Yes.

MYERS: But the bottom line is she should have been if there was any way of doing that; do you agree?

BABARAO: Yes. The other reason could have been that [Baby K]'s mother may not have been stable enough for a transfer.

Again, I can't comment on that because I have not documented that information.

MYERS: Once she'd been born at the Countess of Chester, clinically was it important for her to be transferred to the tertiary unit as quickly as possible?

BABARAO: Realistically, yes.

MYERS: Realistically. We know that she arrived at 13.15. With a baby like [Baby K], the sooner she gets there, the better. The sooner she gets to the tertiary unit, the better, isn't it?

BABARAO: Yes, but safely.

MYERS: And safely. The difference in the hours of care she spends at a tertiary can improve her chances if she gets there hours earlier; do you agree?

BABARAO: That's very difficult to comment on because there is nothing to say that the first few hours in a level 2 unit changes the outcomes.

MYERS: All right. I just want to ask you about one of the entries in the notes that we looked at. It was at tile 140, please. Could we go behind this? Pausing there, I want to be clear about something you just said, that as a matter of principle, Dr Babarao, the outcomes for a baby are invariably better if born at a tertiary unit; is that correct?

BABARAO: Yes.

MYERS: I don't want there to be any misunderstanding from your last answer.

This is the note that deals with the arrival of the transport team at Chester and I would like to go behind this to the

document that lies behind it. We looked at this briefly. There's just one entry I would like to look at five lines down:

"Arrived at Chester. Parents arrived from labour ward at the same time. I updated them as to what our procedure..."

Is that "equipment consisted of"?

BABARAO: Yes.

MYERS: "Very anxious. Dr Kamalanathan is examining baby. Notes three toes on left foot and first and second toes on right foot very bruised."

We heard about that:

"Left hand: second bruised, third pale. Right hand: middle and ring finger very bruised."

I'm not too sure what the next word is.

"Discoloured", thank you.

BABARAO: Yes.

MYERS: "Small amount of bruising on trunk."

Then this:

"Baby is ventilated."

MR JUSTICE GOSS: Is it trunk or is this thumb?

MR MYERS: It is thumb, actually, that fits:

"Small amount of bruising on thumb."

MR JUSTICE GOSS: You can see the TH clearly.

MR MYERS: "Baby is ventilated, not very secure."

Pausing there, this is the situation when the transport team arrived at the Countess of Chester, isn't it?

BABARAO: Yes.

MYERS: So this is the way the baby was presented when handed over by the clinicians or rather when presented by the clinicians at the Countess of Chester?

BABARAO: Yes.

MYERS: So that indicates that the -- by ventilation, the system used there wasn't very secure in terms of the way it had been set up; is that correct?

BABARAO: I think I believe what they mean, what the transport nurse means is, because following that "not very secure", she has written "tightened" or something.

MYERS: "Tightened with effect."

BABARAO: "With effect." I think that means the endotracheal tube fixation device was not secure, fully tight.

MYERS: So the transport personnel tightened the tube --

BABARAO: Yes.

MYERS: -- after it had been presented by the Countess of Chester staff. And it was pointed out to you that the tube didn't dislodge on the way to hospital in the journey to hospital -- do you remember you saw that?

BABARAO: Yes.

MYERS: But we can see the staff responsible for the transport tightened the tube to make sure it was all right?

BABARAO: Yes.

MYERS: They had to do that?

BABARAO: Yes.

MYERS: We've heard about how [Baby K] was when she went to Arrowe Park, how poorly she was. Do you agree, she was a very sick little girl?

BABARAO: She was very sick, yes.

MYERS: There were multiple systems in her body that were not working properly; do you agree?

BABARAO: Yes.

MYERS: Her respiration wasn't. There were cardiovascular problems. Problems with her blood.

BABARAO: Yes.

MYERS: Problems with her kidneys.

BABARAO: Yes.

MYERS: Renal problems.

BABARAO: Yes.

MYERS: Sadly, these are problems that are associated with her condition at birth, aren't they?

BABARAO: A condition associated with being born extremely preterm.

MYERS: Extremely preterm. Yes, that's what I meant. Yes, extremely preterm. Which again comes back to why it's desirable, if it had been at all possible, that she be born in a tertiary centre?

BABARAO: Yes.

MYERS: You were asked about whether or not the ET tube was dislodged or moved at any point when she was at Arrowe Park. Do you remember being asked that?

BABARAO: Yes.

MYERS: Of course at Arrowe Park you are experienced in dealing with babies of this gestation and the equipment that is used with them, aren't you?

BABARAO: Yes.

MYERS: And you do that all the time?

BABARAO: Yes.

MYERS: As we've seen on that transport note it was the Arrowe Park operatives -- transport, rather, the transport team from Liverpool Women's Hospital who had to tighten the ventilation to make sure that was secure, didn't they?

BABARAO: Yes, I believe so from the notes. But the transport consultant is a neonatologist working at Arrowe Park.

MYERS: And also at Arrowe Park, as a result of her condition sadly, [Baby K] was -- was she sedated throughout her time there?

BABARAO: Yes.

MYERS: A very sick little girl?

BABARAO: Yes.

MYERS: There's one document I would like you to look at before we turn to the question of the golden hour and the care given in that period. It's something that we looked at already and we were asked if there was someone with expert knowledge to take a look at it. So if you can help us with it I'm going to ask you to. It's an intensive care chart that we have behind tile 68. It's just for you to explain some of the figures we see there if you're able to, Dr Babarao.

BABARAO: Sure.

MYERS: If we go into this, it would help us to understand something we've seen. I'm going to ask Mr Murphy to enlarge what we see on the left-hand side of the chart where we have an entry for VTE, leak and resistance.

It's the 03.30 entry.

I'm just asking you to look, first of all, in that left-hand column with the numbers in it; do you see that?

BABARAO: Yes.

MYERS: Starting first of all with leak, it says 94. Could you explain what that -- the significance of 94, if there is any significance?

BABARAO: The leak is a measurement from the ventilator, so the leak around the endotracheal tube. 94 pretty much means that the endotracheal tube is not in the right place because there is a huge leak around the tube. It could be either too far in or too high.

MYERS: But it's --

BABARAO: One of the possible reasons.

MYERS: Possibilities. That is unhelpful in trying to ventilate a baby, isn't it?

BABARAO: Yes.

MYERS: Where it says resistance, just below that, again for 3.30, we can see the first column says 624 and that's the reading at 3.30 when we have leak 94. As we go from left to right, you can see the numbers a bit lower from 624?

BABARAO: Yes.

MYERS: Is 624 too high really for a machine like this?

BABARAO: To be really honest, we do not use resistance as a conventional parameter when we monitor ventilated babies. I'd be more interested in looking at the tidal volume, which is VTE.

MYERS: We will move from resistance then. I have only asked you to comment on what you can. What does the tidal volume tell us, bearing in mind it's 0.4 in that first column and then it seems to change as we go to the right.

BABARAO: Yes. Again, I think I picked up the documented numbers from the monitor or the ventilator. The tidal volume is the amount of gas which flows in and out of the baby with every breath.

MYERS: What does 0.4 tell us?

BABARAO: It's too low.

MYERS: Too low?

BABARAO: Yes.

MYERS: So if you see a leak of 94% and a tidal volume of 0.4, that is something that should raise some concern to the clinicians?

BABARAO: Yes.

MYERS: Thank you. We can take that down, please.

I am just going to ask a little more about your assessment of things that were done at the early stage of [Baby K]'s care, the very beginning of it. To help you, you made a statement to the police on 4 June 2019.

Just to assist you, I have a copy for you and for your Lordship if you wish.

MR JUSTICE GOSS: All right, thank you, if it's there.

(Handed)

MR MYERS: Dr Babarao, you were asked about the idea of what was called the golden hour. This is a general point. I'm going to ask you to -- start you at the front of this statement. The fundamental principle is there are things to be done in that first hour or so of life that do improve the possibility of a positive outcome if they're done. Do you agree with that?

BABARAO: Yes.

MYERS: What they are may change in medical practice over time, but that first hour is fairly crucial, isn't it, for a baby like this?

BABARAO: Yes.

MYERS: I'm looking at the first page of this statement. Just by way of introduction, one of the things you did with your team was to conduct what's called a mortality review after a death; is that correct?

BABARAO: Yes.

MYERS: And did you do that in the case of [Baby K]?

BABARAO: Yes.

MYERS: I'm going to move forwards, if I could, then just to page 3 of your statement. By all means feel free to comment on this as you need to as I ask you questions, but I want to go through some items that I am going to suggest you and the panel took a critical view of.

BABARAO: Yes.

MYERS: The mortality review is conducted by a panel of practitioners, isn't it?

BABARAO: Yes.

MYERS: There's not just you, there's other practitioners?

BABARAO: Yes.

MYERS: As part of that you look at the various steps that can be taken with a baby who was in [Baby K]'s condition, don't you?

BABARAO: Yes.

MYERS: I'm looking -- if we look at that first, page 3 of 6.

You deal, first of all, with intubation, don't you?

BABARAO: Yes.

MYERS: As a principle, is it regarded that 15 minutes -- within 15 minutes is the ideal time to achieve intubation, or rather the maximum, for it to be the best?

BABARAO: Again, at that time.

MYERS: At that time.

BABARAO: Yes. There is no science to these numbers, 15 minutes and 20 minutes. To be honest, we are moving away from intubating preterm babies at delivery now. So that is not the key.

MYERS: All right. What about surfactant, does that remain important?

BABARAO: Again, yes. As soon as the breathing tube is put in, surfactant should be given as soon as possible. Again to emphasise, we no longer consider surfactant to be given as urgently. If you're not intubating, we don't give surfactant.

MYERS: But if you are intubating, you should have surfactant?

BABARAO: Yes.

MYERS: Because the intubation creates pressure in the lungs, doesn't it, with the air going in; is that correct?

BABARAO: No, intubation -- given the severity of the extreme preterm baby, if we are ending up intubating a baby then very well the recommendation is to give surfactant as soon as, yes.

MYERS: So if the baby is being intubated, she or he should get surfactant and they should get that as soon as possible after the intubation, shouldn't they?

BABARAO: Yes.

MYERS: Your assessment here, if we go across to page 4, was that there was some delay in the giving of surfactant, wasn't there?

BABARAO: Yes.

MYERS: Antibiotics and vitamin K should be given within the first hour, if at all possible, shouldn't they?

BABARAO: Specifically antibiotics.

MYERS: Specifically antibiotics.

Umbilical lines. Again, you have said that there's a balance to be struck between how invasive treatment is and what a baby needs.

BABARAO: Yes.

MYERS: But if a baby needs them, it should be done relatively swiftly, shouldn't it?

BABARAO: Yes.

MYERS: And there appeared to be some delay in inserting an umbilical line in this case, didn't there?

BABARAO: Yes.

MYERS: It fell outside what you and your team regarded as the ideal period, didn't it?

BABARAO: Yes, that 1 hour.

MYERS: The ideal period is 1 hour?

BABARAO: Yes, that's the golden hour.

MYERS: This actually happened it seemed about 3 hours later after birth, didn't it?

BABARAO: Based on the review, I'm not sure. Three hours is too long. I'm sure that it would have been something else or the documentation was 3 hours.

MYERS: There would be a peripheral line?

BABARAO: Yes.

MYERS: But in terms of umbilical lines, it should still be sooner than 3 hours, shouldn't it?

BABARAO: At that time that was the golden hour practice. Again, neonatologists have moved away from that. So peripheral cannula is equally enough.

MYERS: Right. In terms of how you concluded the position with regard to the early care and the steps taken in that first period after [Baby K] had been born, did you and your team reach a conclusion as to whether death was inevitable or not? I'm asking you to look at the final page of your report, please. Let's just take time to read through to yourself --

BABARAO: The final page?

MYERS: Perhaps the last paragraph of page 5 through to the final part of page 6.

(Pause)

BABARAO: Yes.

MYERS: What was your view as to whether or not death was avoidable?

BABARAO: Her death wasn't avoidable because she was extremely sick right from the beginning.

MYERS: And in terms of where you've put, if I just look at the bottom of page 5, when you look at the overall neonatal care of [Baby K]:

"Including in utero transfer, stabilisation at Chester, transport and inpatient care here, we consider the death was potentially avoidable."

BABARAO: Yes, looking at the entire picture.

MYERS: Right.

BABARAO: Yes.

MYERS: Looking at the entire picture including in utero transfer?

BABARAO: Yes.

MYERS: Stabilisation at Chester?

BABARAO: Yes.

MYERS: And transport?

BABARAO: Yes.

MYERS: Including that, you considered that -- and inpatient care here?

BABARAO: Yes.

MYERS: "We considered that death was potentially avoidable"?

BABARAO: Yes.

MYERS: And you go on to say, looking at the final paragraph -- I'll read the whole of it:

"In relation to [something] was the death expected? In the 24 hours [Baby K] was very sick and continued to decline after her

arrival and within 24 hours it was expected she would die, sadly."

BABARAO: Yes.

MYERS: That means arrival at Arrowe Park?

BABARAO: Yes.

MYERS: But you go on to say:

"This was then graded as grade 2, sub-optimal care. Different care may have made a difference (possible avoidable death). This was in reference to her overall perinatal care, as previously mentioned."

BABARAO: Yes.

MYERS: Just unravelling that, what you're saying is from her condition when she attended at Arrowe Park, sadly it would be expected she would die?

BABARAO: Yes.

MYERS: But the care and the way it was dealt with in that first period after birth was sub-optimal?

BABARAO: Yes.

MYERS: Had that been done better, that may have made death avoidable?

BABARAO: Yes, potentially avoidable. As I said, the major factor was also in utero transfer.

MYERS: In utero transfer from the Countess of Chester Hospital?

BABARAO: Yes, to a level 3 perinatal or neonatal centre, level 3/tertiary neonatal unit. As we all know, as I have mentioned earlier, that is shown to improve outcomes for extreme preterm babies, being born in a level 3 unit.

MYERS: So the factors were: in utero transfer, stabilisation at Chester, transport, and inpatient care at Arrowe Park?

BABARAO: Yes.

MR MYERS: All right. Thank you, Dr Babarao.

Re-examination by MR ASTBURY

MR ASTBURY: Just dealing with that last point, you described the major feature as the in utero transfer; is that right?

BABARAO: Yes.

ASTBURY: You said this a little earlier --

MR JUSTICE GOSS: In other words, the fact that she wasn't born in a tertiary centre, that was the major factor?

BABARAO: Yes. A better way of looking at it is that, yes, not being born in a level 3 centre.

MR ASTBURY: Thank you. When you talk about outcomes being better, is it survival?

BABARAO: Survival outcomes, yes.

ASTBURY: That's what you mean by outcome?

BABARAO: Yes.

ASTBURY: Okay. You said a little earlier in your cross-examination this:

"There's nothing to say that the first few hours changes the outcome."

BABARAO: There's nothing specifically done in research to say the first few hours makes a significant isolated difference.

I'm not aware of anything like that.

ASTBURY: All right, thank you.

BABARAO: It's the overall care.

ASTBURY: Can we just go to tile 50, please, Mr Murphy? The entry you were shown on the chart. I'm talking about the right-hand side. If we just look at the right-hand side of the form, please. Sorry, the left.

You were shown the tidal volume and the leak.

BABARAO: Yes.

ASTBURY: If I can ask Mr Murphy just to expand downwards, please, to the SaO2 level. We can see that the high percentage of leak and the low tidal volume, but what does the saturation level at the same time inform you, please?

BABARAO: That means that the baby was oxygenating well in about 49% oxygen, which doesn't really tally up with the numbers above.

ASTBURY: So despite those figures, the outcome, the result, was a satisfactory one, 94%?

BABARAO: Yes, that's an optimal saturation level for a preterm baby.

MR ASTBURY: Thank you. I have no more questions.

Does my Lord have any?

Questions from THE JUDGE

MR JUSTICE GOSS: Just by way of clarification, and the fault will probably be mine, doctor. This statement to which you've been referred was made in June 2019.

BABARAO: Yes.

MR JUSTICE GOSS: And we're now at the end of February 2023.

BABARAO: Yes.

MR JUSTICE GOSS: From your earlier evidence, you said things have changed slightly in relation to the view of golden hour since this report was prepared and the conclusions that were reached at that time.

BABARAO: Yes.

MR JUSTICE GOSS: In what way? Is there any difference in the conclusions now to the conclusions you reached in 2019 in relation to this particular case or not?

BABARAO: It's only the parameters of the golden hour. So what's being done to a preterm baby just after birth -- things have changed in the last few years. If a preterm baby at that gestation is able to breathe spontaneously or on his or her own, we don't go on to intubate the baby at birth, so we stabilise them. What's mainly necessary is temperature control and we give what is called CPAP support. So the babies only need to keep their lungs open, they do not need a breathing tube to do that.

Only if the baby's oxygen levels are very poor or if the baby is really working hard or the baby stops breathing or is not breathing, we put the breathing tube down soon after birth. So things have changed on that, just to give you an example.

If we end up putting a breathing tube down, the guidance is to give the surfactant because you have intubated or put the tube down the baby's lungs, so just optimise it, make it better, give surfactant --

MR JUSTICE GOSS: As soon as possible?

BABARAO: As soon as possible, yes.

MR JUSTICE GOSS: Thank you.

MR ASTBURY: We don't expect Dr Babarao back.

MR JUSTICE GOSS: No. Thank you very much for coming and giving your evidence. I think you were inconvenienced yesterday.

BABARAO: No worries.

MR JUSTICE GOSS: You weren't here yesterday?

BABARAO: I wasn't here yesterday.

MR JUSTICE GOSS: You don't have to be here tomorrow either.

Thank you very much for coming and giving your evidence.

It's highly unlikely that you will, but I know that the medical community can be a small community, so don't speak to anyone about anything to do with this case, please, until it's all over.

BABARAO: Sure.

MR JUSTICE GOSS: Thank you very much indeed.

(The witness withdrew)

MR JUSTICE GOSS: Sorry it's a bit later than normal, but obviously it was important for the witness to finish.

10.30 tomorrow morning, please. Thank you very much.

(In the absence of the jury)

MR JUSTICE GOSS: Do you want to go down, is it going to be possible or...?

MR MYERS: I think we're a little bit tight for that today, my Lord.

MR JUSTICE GOSS: All right.

MR MYERS: Thank you anyway.

MR JUSTICE GOSS: You may go then in other words.

(Pause)

MR MYERS: My Lord, is it possible, if the court is cleared, that we could have a very brief word with the defendant before she leaves the dock? Is that possible, literally through the vents of the --

MR JUSTICE GOSS: You'll have to ask the senior officer who's in charge. Yes?

MR MYERS: We're grateful for that. It'll only take a moment. Thank you.

MR JUSTICE GOSS: The important thing then is I shall make sure the court is cleared first before anything else happens. Thank you very much.

(Pause)

MR JUSTICE GOSS: When I rise, everyone apart from those representing Ms Letby will leave this courtroom. All the recording equipment and the links will be switched off. They will be switched off when I've finished speaking so that then this is a secure private environment. All right? May I thank you, officer, very much, for facilitating this.

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

MR JUSTICE GOSS: I'll rise and then everything goes off.

(4.46 pm)

(The court adjourned until 10.30 am on Wednesday, 1 March 2023)