Thursday, 6 April 2023

(10.30 am)

(In the absence of the jury)

Housekeeping

MR JUSTICE GOSS: Mr Johnson, Mr Myers, before the jury come in, I've received some notes about sitting difficulties. Of course one of the issues is that when the jury were empanelled the anticipated finish date was a little bit closer than it's likely to be.

MR JOHNSON: Yes.

MR JUSTICE GOSS: Taking them in order, there is a request to have Friday, 21 April off. That's our first week back where we're starting with half a day on Monday, not sitting Tuesday, then Wednesday, Thursday, and then Friday would be off. That actually might not be an inconvenient day for the jury not to be here in fact.

MR MYERS: Yes, there may be things to be dealt with.

MR JUSTICE GOSS: So I will say yes to that particular request.

Then we get to May. The 22nd, 23rd and 26th, which are Monday, Tuesday and Friday of that week. It is for a very good reason in fact because the juror in question put everything off to then, but that's the last possible date that can be accommodated, anticipating that the trial would have finished by then. So I'm minded to set

his mind at rest and say that we will not be sitting on those days.

MR JOHNSON: Yes. I'm pretty sure that almost -- however things pan out, we will be able to make some use of at least some of that.

MR JUSTICE GOSS: Exactly. So I'll deal with that now because we're going to have this break now, then they won't have it hanging over them, the anxiety.

MR MYERS: My Lord, yes.

MR JUSTICE GOSS: Thank you very much indeed.

Is that all right, Mr Johnson?

MR JOHNSON: Yes. We timetabled Professor Arthurs for the 21st, but he had offered, I think, the day before if necessary and he said he could re-arrange things to accommodate that so I'm just trying to give him as much notice as possible.

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

(In the presence of the jury)

MR JUSTICE GOSS: Good morning, members of the jury. I've received some notes about requests not to sit on certain days, which I have just been discussing with counsel. To put the minds of those who are asking for the days off at rest, I agree to not sitting on the days requested, so we will not be sitting on 21 April, we will not be sitting on the 22nd, the 23rd and 26 May

either.

What I'm going to do is put all these dates on a list for you and give it to you before we part company this afternoon so you have an up-to-date list of days when we will not be sitting. I just wanted those of you who made the requests to know that they will be accommodated. All right? Thank you very much.

Yes, Mr Johnson.

DR SANDIE BOHIN (recalled)

Examination-in-chief by MR JOHNSON

MR JOHNSON: My Lord, I recall Dr Bohin, please, who is already in the witness box.

Just for the sake of the record, please, would you confirm your identity?

A. I'm Dr Sandie Bohin.

Q. Thank you. Dr Bohin, concerning the case of [Baby Q], have you signed four separate reports/statements?

A. Yes.

Q. Is the first and compendious report 16 April 2019?

A. Yes.

Q. Subsequently, have you signed statements dated 10 June 2021, 5 October 2021 and 15 October 2021?

A. Yes.

Q. Albeit those of June and 15 October 2021 deal

essentially with pagination issues rather than the essence of your evidence?

A. The 15 October one is not a pagination one, the previous two are. 15 October was a statement in relation to direct questions asked of me.

Q. Sorry, yes. I'm reversing the 5th and 15 October, I think. Thank you for correcting me.

Can we just start, as always, by confirming the material that you received. It's paragraph 4.3 of your report of 16 April. Did you receive the notes from the Countess of Chester Hospital together with X-rays?

A. Yes.

Q. Material from Alder Hey, being medical and pathological records?

A. Yes.

Q. Probably most of that material was in a binder of material which consisted of 816 pages?

A. That's correct.

Q. And did you also receive two witness statements made by Dr Evans, dated 3 June 2018 and 25 January 2019?

A. Yes.

Q. Was your approach to [Baby Q]'s case essentially the same as your approach to the other 16 cases that you have already given evidence about?

A. Yes, it was.

Q. Just dealing with the chronology and taking it up from your section 6 of your report, did you record the time and circumstances and date of [Baby Q]'s birth on 22 June?
A. Yes.
Q. Did you address in general terms the issues of his ventilation and how that was managed?
A. Yes.
Q. The fact that he was taken off CPAP on 23 June 2016 at 11.30 hours?
A. Yes.
Q. Did you, at your paragraph 6.7, record the fact that he remained well, his abdomen was not distended, he was passing meconium, a fact that we have noted at 18.00 hours on 23 June in the hard copy documents at page 24311?
A. Yes.
Q. Which is page 3B in section 22 of the hard copy documents that the jury have.

Moving on to 24 June, which of course is the day before the event with which we are primarily concerned, did you record the fact that [Baby Q] was started on milk feeds of a half of one millilitre every 2 hours?
A. Yes.
Q. Did you note the aspirations that had been recorded

in the records?

A. Yes.

Q. At your paragraph 6.9, which is our tile 70, did you summarise the essence of the nursing note that [Baby Q]'s abdomen was full but soft?

A. Yes.

Q. And that his blood gases were "not as good"?

A. Yes.

Q. Did you note in particular that prior to 09.10 hours -- so I'm now looking at your paragraph 6.10 -- on 25 June the records suggest that [Baby Q]'s abdomen was not distended?

A. That's correct.

Q. And in this respect can we just go to, with Mr Murphy's assistance, tile 102, please. It's the top left-hand corner of the page, please, Mr Murphy.

This is Lucy Letby's note for the day shift. If you could expand that section.

This is a note written between 12.53 and 13.04:

"Written for care given from 08.00 to present. Emergency equipment checked, fluids calculated, [Baby Q] nursed in an incubator."

Et cetera, et cetera. Then we see just at the end of that first section it says:

"Abdomen soft and non-distended."

And the note then moves on to the events of 09.10 hours. Is that what you were referring to at your paragraph 6.10?

A. Yes.

Q. Thank you. Keeping that on the screen if we may, please, Mr Murphy. At your paragraph 6.11, did you summarise the essence of Lucy Letby's note that appears in the bottom half of the screen as we are now looking at it?

A. Yes.

Q. Did you refer to the fact that there had been suction of the oro- and nasopharynx, that that had been said to yield "clear fluid +++", which is probably a reference to Minna Lappalainen's note at the previous tile, 102?

A. Yes.

Q. That [Baby Q] had been bagged with the Neopuff, given oxygen, the NGT had been aspirated and that that had yielded "air ++", as we see recorded there by --

A. Yes.

Q. -- Lucy Letby? Did you then refer to observation charts?

A. Yes, I did.

Q. It may be easier in this respect to go to divider 22 of the hard copy documents that we have. It's difficult to read the pagination that's been put on the top

right-hand corner because it's partly obliterated by the NHS logo, but it's the second page, page 2, bottom right-hand corner, page J24307.

A. Yes.

Q. We see that this is an observation chart which begins at 08.30 hours on 24 June; is that right?

A. Yes.

Q. So by a necessary inference, the events of the 25th, albeit not marked with a date, begin about eight columns in from the right-hand side of the page at 03.00 hours?

A. Yes.

Q. Actually, 24.30 would have been 25/06, so nine columns in.

And you refer there to [Baby Q]'s heart rate and respiratory rate; is that right?

A. Yes. In my statement I'd written that the heart rate gradually increased to around 200. Actually, that's a mistake on my part. At that time the heart rate was around 165, but the heart rate had increased.

Q. Yes. I think the increase up to about 200 is on the next page.

A. Yes.

Q. That's about 20.00 hours, the same day, on the 25th --

A. Yes.

Q. -- where they're marked in manuscript at 198.

A. Yes.
Q. Did you refer also to the venous blood gas taken after [Baby Q]'s desaturation at 09.10?
A. Yes.
Q. That's at tile 118, but it's also in the hard copy documents on page 8 or 24326 of section 22 in that file.
Dealing with events concerning what happened at about 09.10 hours, at your paragraph 6.13 did you record the fact that medical staff were called urgently to [Baby Q]?
A. Yes.
Q. That by the time they arrived, he'd been bagged and his saturations were 100%?
A. Yes.
Q. His partial septic screen was carried out and his antibiotics changed to teicoplanin and cefotaxime?
A. Yes.
Q. That he was given a bolus of intravenous saline and his nasogastric tube was put on to free drainage and that series of events subsequently improved his perfusion?
A. Yes.
Q. Again, the notes describe [Baby Q]'s abdomen as not distended?
A. Yes.
Q. At a later stage, 3ml of milk/mucus were aspirated from

the nasogastric tube, and [Baby Q] was put back on to CPAP; is that right?

A. Yes.

Q. Actually, the gas chart that we have on the screen there is quite a good ready reckoner, isn't it, for when [Baby Q] was or wasn't on CPAP?

A. Yes.

Q. So just summarising that position, we see that from his birth, at the top of the gas chart there -- he'd been born a couple of hours earlier -- SIMV; what does that mean, please?

A. Synchronous intermittent mandatory ventilation. So that's -- he was put on to invasive ventilation using a breathing tube. That's a form of ventilation.

Q. Yes. Then on to CPAP at 16.57, which continued --

A. Yes.

Q. -- until some time between 00.55 and 13.27 on the 23rd, when he was self-ventilating in air; is that right?

A. Yes.

Q. Then we see that position continued past the time at which he desaturated at 09.10?

A. Yes.

Q. Then back on to CPAP?

A. Yes.

Q. Over the page on to page 9, we see the ventilator again,

SIMV, at the top there?
A. That's correct.
Q. That's the position that continued so far as that chart is concerned?
A. Yes, until he got transferred.
Q. Thank you. You refer to the fact that, following [Baby Q]'s collapse at 09.10, the results of the septic screen, when they came back, were unremarkable; is that right?
A. Yes. The omission there is the platelet count had fallen to 95 from 196 but the rest of the septic screen was unremarkable.
Q. You refer to, albeit he had a good blood gas at 11.12 hours -- and that's the third line up from the bottom of page 8 in the hard copy, J24326 -- he was later described as being tired with a falling respiratory rate and increasing heart rate, which we saw on the second page of the observation charts?
A. Yes, that's correct.
Q. That, of course, was referred to yesterday by [Dr A].
A. Yes.
Q. There were minimal aspirates following that, but as the day progressed into the evening, he developed an oxygen requirement and was therefore electively intubated and ventilated. As we heard yesterday from [Dr A], that

was at 19.20 hours on the 25th, which is our tile 197.
A. Yes.
Q. Following that, overnight, the 25th into the 26th, you recount the medical attention that he received and I think part of that was referred to by Dr Gibbs yesterday.
A. Yes.
Q. You move on at your paragraph 6.17 to refer to the examination of [Baby Q] on the morning of Sunday, 26 June at 08.56?
A. Yes.
Q. And the fact that [Dr A] was able to feel a loop in the right upper quadrant, about which he told us yesterday?
A. That's correct.
Q. That an abdominal X-ray was then taken?
A. Yes.
Q. And that also is the X-ray that was shown to us yesterday, taken shortly before midday?
A. That's right, although in my note I've written that the dilated loop is in the upper right upper quadrant and in fact the X-ray shows the dilated loop is in the left upper quadrant.
Q. Yes, thank you. That precipitated the suspicion of NEC and that the antibiotic metronidazole was added to his

drug regime?

A. That's correct.

Q. Following that, at your paragraph 6.18, do you record the fact that a referral was made to the surgical team at Alder Hey and he was subsequently transferred?

A. Yes.

Q. How did you summarise the position once [Baby Q] had been transferred?

A. He settled very quickly once he'd been transferred to Alder Hey. There was no further vomiting. The aspirates from his nasogastric tube were not excessive. There was no further bile that I could see from the aspirates. And he was eventually extubated fairly shortly, a day or so after arriving -- the next day in fact, after arriving at Alder Hey. The abdominal X-rays that they took were reported as showing no evidence of necrotising enterocolitis.

The other condition that had been questioned was whether [Baby Q] had what a volvulus. That's a condition where the bowel sort of twists on itself because that can cause that sort of X-ray appearance, but it was clear to the team at Alder Hey that he didn't have that either. And there was no sign of any perforation. So they, I think, were very cautious in that they felt that he should continue to be treated for possible

necrotising enterocolitis, although that wasn't confirmed. But he was repatriated to the Countess of Chester on the 28th.

Q. Yes. So Dr Bohin, can we move on to section 7, please, and deal with your observations and opinion. Can you talk us through your review, please?

A. Well, yes, initially [Baby Q] was obviously a baby who was premature and needed some respiratory support very soon after birth, but within a short space of time he was taken off the ventilator and on to CPAP and remained well.

The team at Chester decided that they would feed him and normally when a baby's at this gestation, when you feed, you give very small volumes of feed; I think it's been referred to already as trophic feeds. And that's a way of getting the gut used to accepting more substantial volumes of feed. So it's a way of priming the gut.

Babies don't always absorb those feeds but it's a way of giving small amounts and to try and get the gut working. The team in Chester decided they would do that for [Baby Q], but actually rather than giving small amounts, the first two feeds that he had were 2ml an hour rather than 0.5ml on alternate hours. And he -- when the nurses aspirated the tube, they actually found

some bile -- it says "light bile aspirates".

Now, bile can be very light, very light green or can be very dark green, and there is a kind of grading of this. So "light bile aspirate" I think I would note and I would watch, but I wouldn't pay too much attention to it.

Later on, at 21.30 that day, early on, the nurse looking after him has recorded that she'd aspirated 2ml of -- in the notes it says blood and bile, but when she gave evidence she said it was coffee grounds. Now, coffee grounds are altered blood and they are like you would see coffee grounds, they are dark brown. So if bile is mixed in with dark brown, I'm not quite sure how you would see that.

Clearly, blood, if it's red mixed with bile, would be very obvious to see, but in her evidence she said it was coffee grounds. So I'm not sure whether this was fresh or old blood that she aspirated. But regardless, the staff took that seriously and stopped any further feeds that day and they were not restarted until a day or so later, when they were started at half a millilitre alternate hours. And the staff were continuing to aspirate that tube and there was no more blood for the duration of [Baby Q]'s stay at the Countess of Chester, so no more blood was aspirated up that tube.

From there on, [Baby Q], on the 24th, was fed alternate hours. There were some aspirates, but I think they were not excessive in the scheme of things. It's not uncommon for babies to have some feed intolerance and I think that's probably what [Baby Q] had.

On the 24th there was no bile seen at all on that day and the feeds were returned -- the aspirates that they got were returned with the feed. But throughout this time, the abdomen was either described as being normal or full but soft.

Up until the time [Baby Q] deteriorated, the day prior to that he was given feeds at 3 o'clock, 5 o'clock and 7 o'clock in the morning. And then no other recording is made of milk administration that day.

Q. I'm sorry --

A. Have I gone on too far?

Q. I'm going to ask, just so we can follow what you're describing, Mr Murphy to put up tile 62, please.

A. It does make it easier.

Q. That's at page 11 in the hard copy because we're at the critical time in effect. So just so we can assimilate what you're describing with what is recorded.

This is the fluid balance chart which, as we can see from the left-hand -- under where it says "date", it says "25 June". Somebody has written in manuscript,

underneath the time 01.00, "01.30".

A. Yes.

Q. We see that Babiven was being given via the UVC as the main source of nutrition.

A. Yes.

Q. There were lipids as well in the second block of rows. And further down, under two more fluid blocks, we have:

"Feeds. NGT/OGT. Bottle/breast. Please circle."

Which nobody has.

We see then that the reference to half of 1ml of expressed breast milk being given to [Baby Q] -- I think you said 3.00, 5.00 and 7.00 hours; is that right?

A. Yes.

Q. We see the corresponding aspirates under the output rows right at the bottom of the page, as Mr Murphy has now --

A. Yes.

Q. -- highlighted. So with that data in mind, can you just run through that part of your explanation again, please?

A. Yes. So feeds were given, as they had been before, at 0.5ml and at 3 o'clock 3ml of nasogastric aspirate had been obtained; the R denotes that that was returned.

At 5 o'clock, ordinarily there would have been a feed but there wasn't and I'm not sure of the reason for that.

Q. I think there is at 5 in the feeds --

A. I beg your pardon. I mean there's no aspirates, sorry. The feed is given but there's no mention of any aspirate, that's left blank. So I don't know if it wasn't aspirated or whether nothing was obtained. But at 7 o'clock, a further 1.5ml of aspirate was obtained and that was returned.

The next feed would be due at 9 o'clock and obviously there's nothing in that column.

Q. Yes. If Mr Murphy wouldn't mind zooming out so we can see the full -- it's not brilliantly clear on the screen because of the size. Thank you.

So we see just by where there's a black --

A. Yes.

Q. -- round object, which is clearly or might be thought to be a photocopy artefact from where there would be a hole in the page where somebody's put it into a file, we see what may be the initials LL under the 8 o'clock column.

A. Yes.

Q. We see that LL has recorded the fluids going in as Babiven --

A. Yes.

Q. -- and the lipids.

A. Yes.

Q. There's then some ticks in the third block. Can you decipher what's written there or what that means for us?

A. (Pause). At the far left, it says "zeroed later". So that relates to something at 1 o'clock. Then I can't see what...

Q. No.

A. I can't -- oh.

Q. Something warm?

A. Something warm.

Q. Pink and warm, is it?

A. Yes, pink and warm. But that's in the fluid column. That doesn't actually make any sense. I think it's, "Pink [tick], warm [tick]".

Q. Yes.

A. Yes.

Q. All right.

A. I don't think that helps with regard to the fluids.

Q. No, it's just in case anyone asked what it was, I thought we might as well deal with it with you if you could help. The words appear in the 7 o'clock column, the ticks appear in the 8 o'clock column.

A. Yes.

Q. Anyway. It's clear that LL, who we are assuming for these purposes is Lucy Letby, at 8 o'clock and 9 o'clock -- there are initials in the 8 o'clock column but not in the 9 o'clock column -- has recorded, at the very least, progress of the administration of Babiven

and of the lipid.

A. Yes.

Q. Is that right?

A. Yes. Then after that, at 9.10, as I've recorded it, it was when [Baby Q] deteriorated, shortly after that, and the record shows his heart rate went up shortly before that, but the abdomen was still said to be soft and non-distended.

Thereafter, a variety of people have written about this event and it has been suggested that [Baby Q] vomited nasally and from the mouth, which I think is in the nursing record, he desaturated and became bradycardic. As we know, he then needed to be resuscitated.

Nurse Lappalainen said that she needed to bag intermittently for 3 minutes and that the bradycardia lasted on and off for around 3 minutes, and she found him to be mucousy. So I think she aspirated what she said was mucus, but prior to that there was a history of vomit. So those two things for me were different, a vomit and mucus are not the same thing.

Q. No. We have a number of sources of information, don't we?

A. Yes.

Q. We have the oral evidence of Nurse Lappalainen. We have

the note made by Nurse Lappalainen at tile 101. If Mr Murphy would just help us with that, please, where there is reference to mucus, clear mucus, and then "clear fluid +++".

A. Yes.

Q. We have Lucy Letby's note at tile 102, which mentions vomit.

A. Yes.

Q. And we have [Dr A]'s discharge letter at tile 310, if we could go to that, please. Just scroll down. Keep going, please.

A. There it is, profuse vomit.

Q. Profuse vomit with desaturation on the morning of 25/6/16.

So it's a matter for the jury to determine of what they can be sure, but that's the evidence. Is there on the face of it, if the jury were to conclude that there was a lot of clear fluid, is there any obvious explanation from that in the context of [Baby Q]'s clinical condition as you assess it to have been?

A. No. I don't know where the +++ of clear fluid comes from given that at that time he had not had any feed since 7 o'clock, 2 hours previously, and then that was only a very tiny amount of milk and what was aspirated here was clear fluid, not milk. Therefore, I can't

explain where the +++ of fluid would have come from. In the scale of pluses, I think three is the maximum I've ever seen written down. So to me, although it's very subjective, that would indicate a lot of fluid, not just the odd millilitre or two. That would indicate a lot of fluid, +++.

Q. What about the air?

A. Well, there's no doubt that if you bag a baby with Neopuff, you will push some air into the gut as well as into the airway, which is what you're intending to do. But Nurse Lappalainen bagged intermittently for 3 minutes and yet the air coming out was, again, ++. So a lot of air, and I don't think intermittent bagging for 3 minutes is likely to have caused sufficient air in the gut to cause [Baby Q] to collapse and become very mottled.

Q. Of course, the collapse had happened before the bagging in any event.

A. The collapse had happened before the bagging in any event, but I think not all of the air aspirated from the nasogastric tube was due to the Neopuff bagging. So the collapse occurred before the bagging, something had caused him to collapse and become mottled. It's not uncommon, obviously, for babies to vomit. But what is uncommon is for babies to vomit, desaturate, become

mottled and need resuscitation.

Q. Yes. Just going to the observation chart, so back to divider 22, please, and the record made at 09.00 hours, which of course, if it's accurate, is 10 minutes before the collapse.

A. Which page?

Q. It's page 24307 or the second page behind --

A. Yes, yes, yes.

Q. -- divider 22. Is there anything worth noting in the observation charts at just before this collapse?

A. Well, yes. At 8 o'clock the heart rate is within the normal range. At 9 o'clock it is 170, which is the upper limit of normal. Then the time it's recorded, at 10 o'clock, it's higher still. Then there's a commensurate rise in respiratory rate. To me those indicate that clearly something had changed and had distressed [Baby Q] such that he was having to increase his respiratory rate and there was a commensurate rise in heart rate. Something had gone on then because prior to that -- because as you can see the heart rate and the respiratory rate were completely stable and within the normal range.

Q. Yes.

A. This is an acute thing.

Q. In this context what do you mean by acute?

A. It's not something that's happened over the previous hours or days or many hours. It's something that has happened over -- well, minutes and up to an hour, but minutes to cause that change.

Q. So in seeking, from your perspective, to explain the clinical picture, and looking at your paragraph 7.16, what conclusion did you draw, Dr Bohin?

A. My conclusion was that [Baby Q] had been given air down his nasogastric tube, which had caused him to become distressed and caused the increase in heart rate and respiratory rate and distended his abdomen so much that effectively the diaphragm squashed his lungs, which caused him then to decompensate and become mottled and require -- desaturate and require the resuscitation.

Q. Was this acute event consistent with anything that you think can reasonably be explained by some naturally occurring illness or condition?

A. No. The team had considered necrotising enterocolitis, they'd considered infection prior to that, but he didn't have any of those things, so no, I can't think of anything naturally occurring that would account for that.

Q. Some time later, some time before 5 -- or it may be the 15th because I got them the wrong way round -- October 2021, you were asked specifically to

address an issue that had been raised by Lucy Letby in interview, in which she had told the police that vomiting could cause babies to swallow air. What is your response to that suggestion?

A. Babies don't swallow air when they vomit. If you vomit, stuff is coming out, not going in.

MR JOHNSON: Thank you. Would you wait there, please, for some further questions?

Cross-examination by MR MYERS

MR MYERS: Dr Bohin, I would like to deal first with the question of the fluid. If I just briefly summarise the sources of evidence that have gone to describe the fluid and the vomit, we've heard there's the account of Mary Griffith orally, what she says she saw; she used the word vomit.

A. Yes.

Q. We've seen the notes on the apnoea chart by Minna Lappalainen and we've had her evidence. I'm not going to rehearse all of that now. The jury will consider that.

We've seen the note from Lucy Letby in the nursing notes and we've also seen what [Dr A] said in his discharge letter.

So far as that fluid is concerned, the amount of fluid a baby can produce isn't limited solely to what he

or she has received by way of a trophic feed, is it?
A. No.
Q. We know that throughout this period, [Baby Q] was also on TPN, is that right, so there's fluid coming in that way?
A. Intravenously. TPN is intravenous.
Q. Yes, into the baby that way. Mucus production, for example, isn't dependent upon the amount of trophic feed a baby has had, is it, it's not going to be?
A. No.
Q. And if it's right that [Baby Q] did produce a lot of mucus, which is one of the explanations we've had, I think by Minna Lappalainen, the fact there was a very limited number of feeds doesn't mean he can't have produced a lot of mucus, if that's what she saw?
A. No, but babies that produce mucus, (a) it's not usually in large quantities, and mucus is produced quite frequently if babies are on a ventilator. This baby wasn't on a ventilator. So it would be unusual for them to produce large amounts of mucus, but in any case even if they did, which I think would be most unusual, it doesn't cause them to desaturate to the point where they become mottled and need resuscitation because they swallow it.
Q. Again, you question the mucus, we've got the evidence on that, Minna Lappalainen's evidence. If there's so much

mucus in a baby's mouth or throat that he needs to have it removed or sucked out, that could actually interfere with breathing, couldn't it?

A. Yes, it could but I don't think that would be described as +++ then. Nurses will suction the oropharynx or nasopharynx if they think babies are becoming snuffly or it is obvious to them when they do their hourly observations that babies are developing mucus. He'd never had a problem with mucus up until that point, so I don't know why he would suddenly then produce +++ of mucus that caused him to become mottled and desaturate in the way he did.

Q. But you agree, whatever lies behind it, if it is mucus +++, and if it had to be removed by suction or by pulling it out, that could actually interfere with breathing, couldn't it?

A. If it was, yes, it could.

Q. On the subject of vomiting and swallowing air, a baby can actually swallow some air in a vomit or after a vomit or inhaling and swallowing air in that process; isn't that possible?

A. You can swallow air by breathing but you don't swallow air when you are vomiting because by the very nature of vomiting, stuff is coming out not going in.

Q. No --

A. But you have to breathe in between vomiting, yes.
Q. I'm not suggesting in the act of vomiting a baby's breathing in air at the same time, that's two different directions.
A. Exactly.
Q. But in the process of vomiting, or maybe immediately afterwards, a baby may suck in a lot of air and that could introduce more air into the baby; do you agree?
A. No.
Q. You say absolutely not, the vomiting --
A. I say that's breathing. I don't think you'd ingest any more air through normal respiration than you would -- after a vomit you carry on breathing normally, so I don't think you would ingest more air by breathing normally, no.
Q. Now when it comes to the air that was aspirated from [Baby Q], we know that that only happened after he'd been knee puffed. That's something we know, isn't it?
A. Yes.
Q. Up until that point, nowhere, in fact, have we seen any description of a distended abdomen anywhere, have we?
A. No.
Q. Not in the notes, not in the eyewitnesses?
A. No.
Q. Neopuffing can introduce air into the baby's abdomen,

can't it?

A. Yes.

Q. You've listened to what Minna Lappalainen said about how it was done over a period of 3 minutes. You question whether -- you dispute -- you say that couldn't cause the air that was aspirated.

A. Well, from what Minna Lappalainen wrote, she said that Neopuff was given intermittently for 3 minutes, and in her evidence she said that bagging was stopped, the baby's heart rate fell, so bagging was continued. So from her own oral evidence she said that bagging was intermittent and the whole episode was only 3 minutes, so that's not a huge amount of time, if he was bagged intermittently, for enough air to be accumulated within the abdomen to require +++. But in any case, he'd already collapsed by then.

Q. I'm just looking at whether there are separate -- sorry. (Pause). That's not me.

MR JUSTICE GOSS: I think it's coming out of a speaker over there.

MR MYERS: I'll keep going and if the chimes strike, I'll pause at those points, Dr Bohin.

The amount of air -- what I was going to say is there's possibly two separate things: one is the vomit and what lies behind that, and the other -- this is what

I'm exploring with you -- is the amount of air that was produced after the NGT was aspirated.

I have asked you about the vomit and now I am dealing with the air. So far as the Neopuffing is concerned, there's no way of knowing just how much air could have gone into [Baby Q] at that point is there?

A. No, it wasn't measured.

Q. No, and there's no way of knowing exactly how much air came out after the Neopuffing, is there?

A. No.

Q. So --

A. But he had collapsed by then, so something caused him to collapse.

Q. Yes, something may have caused him to collapse, then he was given the Neopuff, which is capable of putting in the air that was then taken from him, isn't it?

A. I don't think it accounts for all of the air. That was my opinion.

Q. I'll move on from that but that's the point I wanted to ask you about.

With regard to that event at 9.10, we've followed the clinical picture from the doctors who dealt with [Baby Q] and the nurses. He was stabilised after that took place, wasn't he?

A. Yes.

Q. And then moved to nursery 1?
A. Well, he was stabilised in that his saturations returned, but he required CPAP afterwards. So he certainly wasn't back to where he was before.
Q. No, but he required CPAP and was then stable on CPAP?
A. Yes.
Q. And largely during the day, until the early evening, his improvement was either stable or even improved slightly -- his position, sorry, was either stable or he improved.
A. I think he was stable.
Q. I'm not going to dispute with what you we say we see from the blood gas and what we have heard. We have had the evidence on that.

As we go into the evening of the 25th and then into the 26th, do you agree that, certainly by that point, we see features emerging which may be consistent with early stage NEC?
A. The parameters seen at that stage were completely non-specific, so it would fit with NEC but it would fit with infection and it would fit with feed intolerance, so it's certainly not diagnostic of NEC.
Q. No, but you know that many of the factors of NEC may be non-specific in themselves.
A. Yes.

Q. The bile -- to explain, I'm going back to 23 June for a moment, just following this through. We saw that there were 2ml of bile on 23 June.
A. Yes.
Q. That's described as bile -- I think the word blood is used on the notes, isn't it?
A. There were two episodes on the 23rd. There was one at 9 o'clock where there was 2ml of what was described as "light bile", and then at 21.30, there was another 2ml that was described -- that was written in the notes as "bile/blood".
Q. If we have -- if it's possible to put up page 24311, we can see it there. I know we've seen it before but it helps to see it as I'm asking the questions.
As you've said, Dr Bohin, earlier on this day, 9 o'clock, there's 2ml of "light bile", it says.
A. Mm.
Q. If we just remind ourselves, that's the 09.00 reading on the right-hand side.
A. Yes.
Q. There we are, thank you, Mr Murphy.
That's on the 23rd. If we scroll down, we'll see the reference at 21.30 that evening and the note made at the time by Nurse Downes was that this is "2ml bile/blood".

A. Yes.
Q. It is right that when she gave evidence here, she elaborated and said coffee grounds, but certainly at the time it's "bile/blood", isn't it?
A. Yes.
Q. As a general point, do you agree that the staff would be correct to take that seriously because a bilious aspirate might indicate a serious gastrointestinal pathology?
A. Yes, but I also note she put a new nasogastric tube in at 22.30 and didn't note any bile or blood when she put that new tube in. But yes, it's right that you should note that and see how things develop. It may come to nothing but it may go on to suggest ongoing pathology.
Q. If further bile aspirates are produced, dark bile for example, running on from that, might that be a continuing matter of concern? That isn't what happened to [Baby Q], but out of interest would that be a continuing matter of concern?
A. It would depend over -- the time frame over which that occurred. So if you had sequential aspirates with bile in it then it's something that you would take more seriously than if you had intermittent very small quantities of bile. Half a millilitre here or there you would note but not necessarily act upon. But if

you were having 2ml or 3ml and it was increasing and the colour of the bile was becoming darker, then yes, you would take that more seriously.

Q. As it happens, production of bile may be an indicator of NEC, do you agree, dark bile?

A. Aspiration of bile in the nasogastric tube?

Q. Like this.

A. Well, bile is produced all the time and normally it goes into the gut and comes out in the stool. But bile in aspirates may be an indication of any gut pathology: not just NEC, it can be any problem with the gut.

Q. It may be. And with blood in, it would further support that there's a problem with the gut potentially?

A. That very much depends. Sometimes babies can, early on in their life, not in [Baby Q]'s case, it can be that they swallowed blood and that they've swallowed blood during the birth process but this was several days on so that blood would have gone. Also if you have gastric erosions, that can cause blood. NEC doesn't normally affect the stomach, so you don't normally get blood up the nasogastric tube for necrotising enterocolitis. But you can get it for other gut pathology.

Q. The aspirates or, rather, not digesting feeds may indicate or be consistent with NEC, do you agree, with NEC?

A. It's much more common that the child's just got a temporary food intolerance or that their gut hasn't started to work yet; that's the whole point of giving trophic feeds. But it can also -- feed intolerance can also be a feature of NEC.
Q. It can. We've heard a lot in this case about the importance not of taking isolated findings but looking at the constellation of findings, which is something that clinicians should do; is that right?
A. Yes, but you do it over a period of time, looking at the sequence.
Q. That's what I'd doing, precisely that, with you right now. So on 23 June we have bile marked here, 2ml of bile and blood; that's right, isn't it?
A. Yes.
Q. We have, as we go into 25 June, we looked at it moments ago on the feeding charts, aspirates being produced -- milk aspirates being produced and replaced, don't we?
A. Yes.
Q. Which may indicate that feeds are not being digested, as it happens?
A. Yes.
Q. Do you agree?
A. Yes.
Q. The deterioration on 25 June, the one we're looking at

with this count, 9.10, may be connected to NEC in fact. It could be, couldn't it, if that's evident in [Baby Q]?

A. I don't think it is connected to NEC, no. I think he had feed intolerance, as we can see by the aspirates that were aspirated, but I don't think at that stage there were any signs of necrotising enterocolitis.

Q. Then could the vomit be due to feed intolerance if that's the case?

A. He wasn't having feed, so at that time he hadn't had any feed so you wouldn't have vomit +++.

Q. He has had milk recycled during the course of the morning, hadn't he?

A. Not at the time he collapsed, no. He'd only been having 0.5ml. So 0.5ml and at 7 o'clock 1.5ml returned along with his feeds, so the total volume given at 7 o'clock was 2ml, so at almost 10 o'clock, to have vomit +++ -- that was clear, it wasn't milky, it was clear, so where did that clear fluid come from?

Q. I've asked you about mucus for example and we have dealt with that already and there's a dispute on the facts there.

A. Yes.

Q. Moving into the 26th and his condition that day, we see from the 10.25 ward round with [Dr A] -- it's page 24199, if you could put it up, please, just to remind

ourselves. Just a couple of the entries here, but we will scroll to them, Dr Bohin.

If we look towards the top, this is the following day, 10.25, just maybe the first third or the first half of the form, however it works. Thank you, Mr Murphy.

We can see the reference at the bottom of the first section to:

"Bilious aspirates noted this morning."

Do you see that, Dr Bohin?

A. Yes, but in fact there was only one aspirate.

Q. Let's carry on then down to feeds just -- if we scroll down, please.

When we look at feeds, we can see there it's got:

"Bile: 0.5ml dark green bile."

(Inaudible) but it says "OG tube" but it says "0.5ml, dark green bile".

A. Yes.

Q. That is something that may be consistent with early stage NEC, isn't it?

A. It might be, but it's also consistent with an ileus, which what I think [Baby Q] had. At that time he was on very large doses of morphine, which affects the motility of your gut, so it would not be unusual to find bile there. So yes it is consistent with NEC but it's also consistent with other things.

Q. Scrolling down a little further, we've got next to where we've got O/C --
A. I think it's O/E, "on examination".
Q. Of course, on examination. Temperature -- it's got temperature -- is that 36.8?
A. "Up and down yesterday."
Q. Up and down. We've heard temperature instability is another one of the features that can be indicative of NEC, isn't it?
A. It can be, but if you look at the observation charts you can see that the nurses have changed the incubator temperature quite a lot over the course of [Baby Q]'s life, so there are periods when his temperature is very stable, there are periods where he is under phototherapy, where he needs to have all his clothes taken off, so the incubator temperature is increased to to stop him getting cold. And despite what [Dr A] says -- said yesterday, being under phototherapy does cause a change in the baby's temperature, so the nurses have to alter the incubator temperature accordingly. So where that's happening it's difficult to establish whether the -- what is perceived as temperature instability is a problem with the baby or as a result of the nurses changing the incubator temperature up and down.

Q. Do you agree there's a number of features, as we're going through, that are, when you look at them collectively, consistent with NEC as it happens?
A. Temperature instability is not diagnostic of NEC. You can get temperature instability that can be artefactual, environmental, like I have just explained. You can get it with infection, but it does not give you the diagnosis of necrotising enterocolitis.
Q. What I've said is a number of features, not just the temperature instability, Dr Bohin. There's a number of features, first of all, that could be relevant, aren't there?
A. There are a number of features that would make one think that a baby may have NEC but they are not diagnostic of NEC. The diagnosis of proven NEC is on X-ray findings that are very characteristic or for babies who are at the severe end of the spectrum and go on to require surgery and you get a histological diagnosis. So there are lots of times when we have, "Is this NEC?", "[Question mark] NEC", and babies get treated as a precaution. Those babies get treated on things like temperature instability and the things we've already mentioned but they don't necessarily add up to a diagnosis of NEC. It's always a presumptive or tentative diagnosis.

Q. And it may well be that if it's at an early stage and if a baby is treated conservatively, that will resolve the problem and it will cease to be a health concern; that's right, isn't it?

A. But then you have to question whether this was NEC in the first place and whether the baby would have got better anyway. The whole issue around the treatment of possible NEC is fraught with difficulty and making a diagnosis is, as I say, based on X-ray findings and surgical findings. Prior to that, you'd have to say this is a presumptive diagnosis and I don't think there's enough here to give a presumptive diagnosis of NEC.

Q. I'm not talking about a diagnosis, I'm talking about the fact it's consistent with early stage NEC, isn't it?

A. It's consistent with early stage NEC.

Q. And in fact the abdominal -- the loops or the loop felt by [Dr A] when he was palpating [Baby Q]'s stomach is something that could be consistent with that, isn't it?

A. It could be consistent with an ileus as well, which is not related to any underlying pathology.

Q. And the abdominal X-ray that was taken, again, is consistent with NEC, isn't it?

A. Yes, it's also consistent with a volvulus, it's also consistent with an ileus, which a -- a volvulus is very,

very serious. An ileus is not, it just means that your tummy isn't working the same -- as anyone who has had abdominal surgery will realise, their tummy doesn't work for a while after they've had surgery, so it's also consistent with that, but it's not pathognomonic of NEC.

Q. No. We're looking at what could be here.

Could we go to page 24200, please, 24200 at the end of this section. 24200, I apologise. Where we've got impression, Dr Bohin:

"Probable NEC, Bell's stage 2."

That is an impression that is utterly reasonable on the circumstances that [Dr A] was dealing with, isn't it?

A. He says "probable NEC", I'd say "possible NEC", but it's absolutely reasonable for him to have carried out the actions that he did, yes.

Q. Then if it is treated in the appropriate way, which may be conservative, that can succeed in resolving that problem, can't it?

A. It can, but I would say that [Baby Q], I think, got better too quickly for that to be the case. So children that have mild NEC, the treatment is to give gut rest, so you don't feed them, usually for around 10 days, and to give three antibiotics empirically. And you rest their gut for 10 days before very slowly reintroducing

feeds.

Now here he did have conservative treatment, but also he recovered, got off the ventilator, didn't have any more bilious aspirates, didn't have any bloody aspirates, didn't have any bloody stools. His gut was completely fine within 24 hours and he was off the ventilator, so for me that isn't a baby that's got mild NEC.

Q. If he had, as you put it, bloody aspirates and bilious aspirates and the things we've seen, there was something wrong with him, wasn't there?

A. I think he had an ileus. He didn't have bloody aspirates. That was days and days before. That was several days before. I don't think that had anything to do with his collapse and I don't think that had anything to do with what happened after he was ventilated.
I think he had an ileus because he had been destabilised, he was on very large doses of morphine, which would account for what was seen once he was ventilated. I don't think he had NEC -- well, he didn't have NEC. You know, the Alder Hey surgeons sent him back as he didn't have NEC.

Q. Well, that's as conjectural as saying you can make a diagnosis of NEC, Dr Bohin. He may have had it, he may have been treated conservatively, he may have

recovered and come back. That's entirely possible, isn't it?

A. If that's the case, he got better remarkably quickly for a baby with the early stages of NEC.

MR MYERS: Thank you, Dr Bohin.

Re-examination by MR JOHNSON

MR JOHNSON: There are two issues I would like to ask you about, doctor, arising out of those questions. One was the point about the mucus, which was noted by Minna Lappalainen. If Mr Murphy would help, please, can we go back to Lucy Letby's nursing notes at tile 102?

Can we expand the same section we looked at in the top left-hand corner of the notes and also have open, from the hard copy notes, the third page, page 3, which is J24307? Sorry, the second page.

The nursing note, as we can see, says:

"Written for care given from 8 o'clock."

A. Yes.

Q. "Emergency equipment checked, fluids calculated, [Baby Q] nursed in an incubator. Observations as charted. Abdomen soft and non-distended."

So if we go to the observations as charted, there's heart rate, respiration, temperature. As a matter of fact there's a missing section under the oxygen and saturations. We have the humidity and then we have

Lucy Letby's initials at the bottom of the page. There's no mention there 10 minutes before this event of any mucus, is there?

A. No.

Q. Is there any significance in that being absolutely nothing at 9 o'clock and then at 9.10 there being significant amount or not?

A. I think there is. Some babies can be labelled as mucousy babies. Up until this point, there'd been no suggestion at all that that could be ascribed to [Baby Q]. So a nurse taking hourly observations would look at his -- count his respiratory rate, but would also look at the rest of him, and if there'd been a suggestion of a lot of mucus, I think it would have been noted, not only then but previously.

Q. Yes. That's the first point. The second point is the one -- you were referred to the feeding chart and it was the one at page 5 in the hard copy. It's the chart from -- actually, it's not page 5, it's page 3B, J24311.

A. Yes.

Q. You were referred to the two aspirates at 09.00 hours and at 21.30 on 23 June 2016.

A. Yes.

Q. We will remember Tanya Downes' evidence relating to coffee grounds or something like that at 21.30.

A. Yes.
Q. In that context, when you were being asked questions a short time ago, you referred to the fact that there were no further aspirates and you pointed out that at 23.30, Tanya Downes made a note of "new NGT".
A. That's correct.
Q. There was no evidence from her about what she did then, but in order for a nurse to check that an NGT is in the correct place, what mechanical eventuality would follow?
A. They have to aspirate. They have to aspirate it and then note the pH, so that it is in the right place and it's not in the lungs. And they would also note if there was anything else that they aspirated at the same time when aspirating the fluid to check for pH. If there was blood or bile at that time then that would almost certainly have been noted, particularly as she'd previously mentioned blood and bile. It would be noteworthy, so she would have written it down.
Q. So are you inferring from that standard practice that in the absence of a note, you can necessarily infer that there was no bile at that stage?
A. Yes, because a nurse would not put a nasogastric tube in and not check it. They would absolutely check that it was in the right place because that's a safety measure. So having aspirated that tube, if you then saw blood and

bile, you would write it down. So the fact that she hasn't written it down, for me it means it wasn't there.

MR JOHNSON: Thank you very much. Does your Lordship have any questions?

MR JUSTICE GOSS: I don't, thank you very much.

Thank you very much, Dr Bohin. That completes your evidence and it's not anticipated you'll be required to give any further evidence. Thank you very much.

(The witness withdrew)