

Monday, 16 April 2012

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(10.00 am)

THE CHAIRMAN: Good morning, everybody. Welcome back to Banbridge. The conclusion of the opening address in Adam's case was circulated on Friday afternoon and then a further copy of some additions were sent yesterday evening and hard copies have been made available this morning.

As a result of that, Ms Anyadike-Danes will present that address this morning and she will finish by lunchtime. That means inevitably that she will not go through the paper which has been circulated line by line; instead she will highlight various issues to which she particularly wants to draw attention and it's possible to do that because it has been circulated in advance and it will go on the inquiry website later on today.

The other point about finishing by lunchtime is that this will allow witnesses, particularly this week's witnesses, some time to consider the content of the opening with their lawyers before they come to give evidence. This is effectively what Mr Fortune asked for on 27 March on behalf of Dr Savage. Mr Fortune, should we be calling your client "professor" or "doctor"?

MR FORTUNE: Professor Savage.

1 THE CHAIRMAN: Thank you very much. We will then start,
2 having concluded the opening by lunchtime, we will then
3 be in a position to start the oral evidence tomorrow.

4 In that context, could I remind the lawyers for the
5 various parties that, under our hearing procedures at
6 paragraph 6.3, they are required to give inquiry counsel
7 at least 72 hours' notice of topics, issues or lines of
8 questioning which they want to be raised with each
9 witness.

10 We have received some notes along these lines, but
11 comparatively few. This procedure is in place to help
12 us plan and time the questioning and therefore adhere to
13 our witness schedule as best we can. I'm laying down
14 that marker now because if it isn't followed, it'll make
15 the hearings more difficult. And if it is not followed,
16 I may draw an inference -- and counsel may draw an
17 inference -- that you don't have any particular lines of
18 questioning which you want to be raised. Beyond that,
19 ladies and gentlemen, any outstanding issues can be
20 raised at the end of the openings and I invite
21 Ms Anyadike-Danes to present the conclusion of the
22 opening, which was started on 26 and 27 March.

23 Opening by MS ANYADIKE-DANES (continued)

24 MS ANYADIKE-DANES: Thank you very much, Mr Chairman. Good
25 morning, everybody. You have the opening, sir.

1 You will see from the table of contents that where
2 we were last time is I was going through the selection
3 of issues to be addressed through the oral hearing.
4 I had got as far as the conclusion of the preoperative
5 stage. What was to follow then is the perioperative
6 stage, which is the stage during which Adam would have
7 been in theatre, the operating theatre, and then the
8 issues to be addressed in the immediate post-operative
9 stage, which takes us through to PICU and to the
10 brainstem tests. And then the period following his
11 death.

12 So those are the three issues, areas, that still
13 have to be addressed. I should also say that you have
14 three schedules; they should have been provided,
15 accompanying the opening. Two of those deal with the
16 position of the experts. As you know, that was also one
17 of the reasons why I did not continue last time because
18 it required an analysis of the experts' positions and
19 their reports weren't all finally in. We now have them,
20 and so what you should have is a schedule which is
21 a summary of the points prior to the experts' meeting,
22 and then a longer schedule of a summary of points after
23 the experts' meeting.

24 I have to say, those are schedules that have been
25 compiled by the legal team, so it's not that the experts

1 themselves have approved those schedules; it is our take
2 on the essential issues that they have made. I will go
3 through -- not literally go through it -- but I will
4 take you to it in a little more detail towards the end
5 of the opening. But I just want to be sure that
6 you have that.

7 You will appreciate there were some changes made to
8 the opening that was delivered on Monday and Tuesday of
9 26 and 27 March. The reason for that is the purpose of
10 this opening is not really like an opening in
11 litigation; the purpose of it is to communicate to the
12 chairman and to the public, for that matter, the
13 evidence that the investigation has to date acquired and
14 to set out, therefore, the basis upon which we still
15 need to obtain further evidence in order for the
16 chairman to be in a position to make his determination,
17 rulings and, ultimately, his recommendations.

18 So if there is information, as indeed was the case,
19 that came to the inquiry after the opening was
20 delivered, which calls into question something that had
21 previously been in the opening, then obviously we have
22 to change that, or if there is further information that
23 we should have put in to put matters in a better context
24 or make sure that matters were put more broadly, where
25 that's appropriate, then obviously we have to deal with

1 that. I just want to take you to two issues and draw
2 your attention to them. All of them have been
3 underlined. Obviously, I'm not going to go through
4 everything, but there are two which are worth noting.

5 The first appears on page 28, paragraph 81. That
6 deals with the question of the experience and expertise
7 of the anaesthetists. You may remember that when
8 I first delivered the opening, we were in possession of
9 information in relation to transplant surgeons prior to
10 Adam's surgery, which enabled us to make comparisons as
11 to people's relative experience.

12 But we didn't have that information in relation to
13 the anaesthetists. We had it, but not that would enable
14 us to know who had what information prior to his
15 surgery. We now have that and so you will see that
16 we've been able to provide you with the information of
17 those anaesthetists who had been involved in paediatric
18 renal transplant prior to Adam's. If you look on
19 page 29 you will see who they are. This is information
20 from the DLS. I'm not in a position to vouch for its
21 accuracy, but I hope that it is since they have provided
22 it. There is an unidentified anaesthetic team who had
23 been involved in a renal paediatric transplant on
24 7 October 1993 and then in 27 September 1995,
25 Dr Peter Crean was involved. He was, of course, a

1 consultant in paediatric anaesthesia and intensive care.
2 His name comes up in the list of persons. Then on
3 17 October, literally just before Adam's transplant
4 surgery, he again was involved with a Dr David Hill,
5 who's a senior registrar, and David Hill also has a role
6 other than that for the purposes of Adam's case. And
7 you can look him up on the list of persons involved.

8 So there we are. That seems to be the extent of the
9 anaesthetic experience that was available prior to
10 Adam's transplant. Then if you go to page 42, the other
11 change that's worth drawing to your attention. It's
12 something that Professor Savage's counsel was good
13 enough to draw my attention to. It all relates to the
14 paediatric fluid balance tables. His client had
15 produced a table which provided his accurate figures and
16 we also subsequently had reports from Dr Coulthard and
17 Dr Haynes and Professor Gross, but Dr Coulthard in
18 particular had somewhat changed figures, and so they are
19 all reflected in an updated paediatric fluid table and
20 we can see that from the comparison table. So it's
21 there. I have referenced where it is. You can see that
22 from the footnote, so I don't propose to go into exactly
23 how they changed it at this stage, but simply to flag up
24 that we now have that.

25 So then, any other changes like those are all

1 underlined and you can see them for yourselves.

2 If I then go to the perioperative stage. As I said,
3 that commences with Adam being anaesthetised at 07.00 on
4 Monday the 27th, and ends with his transfer to PICU,
5 which was roughly at about noon. We have some schedules
6 to assist you with exactly what was going on and what
7 the evidence says was going on, if I can put it that
8 way. That's in his chronology of events and we have,
9 obviously, the reports of the experts that deal with
10 that period and, of course, all the witnesses, their
11 statements and notes and records. The identity of those
12 who were specifically involved in that period are in the
13 list of persons and that describes exactly how they were
14 involved.

15 We have analysed his condition, Adam's condition,
16 at the start of the period by reference to two charts
17 that we have compiled and reference has already been
18 made to them. The first is his perioperative fluid
19 balance, and that distills the information on and the
20 calculations by the clinicians and the experts and
21 that's the chart, one of the charts, I was just talking
22 about. You will appreciate, Mr Chairman, that the
23 purpose of all of that is -- at least the purpose of the
24 comparative one is to provide a comparative analysis of
25 his fluid balance at the start of his transplant

1 surgery. It does other things as well. Obviously, it
2 goes on and talks about what was happening throughout
3 the surgery, but an important part is to try and get
4 a fix on Adam's condition as he went into the surgery
5 and the assumptions that the experts and the clinicians
6 have made about his surface area, about his fluid losses
7 and about the effect of dialysis, both on his serum
8 sodium level and also on his fluid balance. It is all
9 to try and set it out so that one can make appropriate
10 comparisons and see where they differ and the reasons
11 why they differ, for that matter.

12 If we then go to his condition and the risk factors
13 presurgery. The second chart is Adam's pre-surgical
14 state and that's a chart that the legal team provided
15 and you have already seen it. It sets out certain
16 pre-admission details as well as summarising his
17 condition going into surgery according to a variety of
18 factors. I'm not going to pull these charts up because
19 I already did that previously, you'll have seen them,
20 and, in any event, they are referenced in the footnote
21 and you can pull them up and see them. I'm also very
22 conscious of the time, so you'll forgive me if I don't
23 go through all those compiled documents in quite the
24 detail I might otherwise have done.

25 There is also the timeline of main events, which is

1 a very, very long timeline. That takes you from as
2 early as would appear to be appropriate, right up until
3 past this period -- actually right up until his death --
4 and I took you through that timeline before and
5 identified how it had been put together and the
6 significance of the colour scheme used, particularly
7 those factors that were highlighted in red, the acute
8 factors, and we also provided a summary of that to try
9 and indicate the extent to which Adam was relatively
10 free of significant factors. You will have seen that as
11 well.

12 The view of Adam's mother of his condition is set
13 out in her first inquiry witness statement. She is very
14 clear:

15 "Adam had been ill -- "

16 And you can see that from the charts that I have
17 referred to and the timelines:

18 "-- all that summer and he was now back on top form.
19 He was really well at that point, but I was told that
20 I wouldn't know when another kidney would come up. This
21 was a really good match."

22 Doctor Savage also considered that Adam was fit and
23 well going into his transplant surgery, and you can see
24 that from his correspondence with Adam's GP.

25 Such a view seems to have been generally accepted,

1 actually, by everyone treating him at the time. It's
2 reflected in the coroner's letter, which he said when
3 he was briefing Dr John Alexander, to provide an expert
4 anaesthetist report. He said:

5 "I understand the child was healthy and considered
6 to be an ideal candidate for transplant surgery. No
7 complications were anticipated."

8 And that view is also echoed by Dr Coulthard during
9 the experts' meetings in Newcastle. He says:

10 "If you put all the evidence together as to what
11 condition he was in when he went to theatre, everything
12 else [other than his CVP reading] points to him being in
13 a relatively good condition."

14 And Dr Taylor, initially, would appear to have
15 provided a slight discordant note because he states in
16 his PSNI interview under caution that:

17 "[Adam was] in good health. However, his chronic
18 status of congenital nephritic [sic] syndrome did not
19 make him a perfect candidate."

20 He was pressed about that because that particular
21 syndrome had not previously been associated with Adam.
22 He resiled from it and states in his inquiry witness
23 statement in May of last year that his diagnosis -- that
24 is Adam's diagnosis -- was:

25 "... 'bilateral dysplastic kidneys with large cyst'

1 as diagnosed by Dr Savage and 'reflux nephropathy' by
2 Dr O'Connor, not as I suggested."

3 So the precise implications of what that means about
4 what he considered Adam's condition to be, if you remove
5 the chronic status and the congenital nephrotic
6 syndrome, is not entirely clear, but I'm sure that
7 we can pursue that with Dr Taylor.

8 There remains, of course, as of yet, unresolved
9 issues raised by Professor Kirkham in her reports as to
10 whether Adam nonetheless arrived for his surgery with
11 risk factors for the development of chronic venous sinus
12 thrombosis. And if you have read the transcripts of the
13 meetings of the experts and also the reports, you will
14 know what she considered those risk factors to be. The
15 first was the administration of erythropoietin. And
16 then there was: anemia, at least in part secondary to
17 iron deficiency; polyuric and intermittently at risk of
18 dehydration; and ligation of the left internal jugular
19 vein with the CVP catheter in the other side of his
20 neck. Those, she considered, were the risk factors.

21 And she also considered that they were present in
22 Adam when he arrived for his transplant surgery and she
23 considered he developed an additional risk factor for
24 chronic venous sinus thrombosis when methylprednisolone
25 was administered in the operating theatre as the

1 immunosuppressant drug. So those are her issues about
2 Adam's condition, if I can put it that way.

3 Alternatively, Professor Kirkham also considered
4 that Adam may have arrived at the operating theatre for
5 his transplant surgery with a compromised ability to
6 deal with the cerebral oedema that he subsequently
7 developed. She refers in her reports to the
8 compensatory mechanisms in the brain of increase in
9 venous drainage and, two, increase in the reabsorption
10 of central spinal fluid -- that's CSF.

11 I have provided two diagrams and, although I'm not
12 going to go through all the material that's provided,
13 some of these are actually quite helpful to understand
14 what's going on. If I can pull up, please, 300-088-186.
15 That's not going to pull up, okay. That's unfortunate.
16 I would ask you, please, to look at that diagram in the
17 footnotes because it explains in a way that's to be
18 readily appreciated what the contents within the skull
19 are and how they may or may not be affected by
20 pressures. Ah, here we are.

21 There's the intracranial contents. In figure 1A we
22 see the central spinal fluid. Then you see where the
23 brain is and you can see the space that exists between
24 those, and you see the arterial supply coming in from
25 the left-hand side, on the right-hand, exiting venous,

1 and then if you look at the contents during raised
2 intracranial pressure, there you can see that the
3 central spinal fluid has been -- the pressure pushes
4 that down so far as is possible, but you also see how
5 the brain swells and once everything has been pressed
6 out that it can be -- if I can put it in those layman's
7 terms -- there's nowhere else to go and if the brain is
8 still swelling, you can see what's happening right
9 at the top, you can see the flattening of the brain
10 against the skull.

11 When we come to talk about the evidence that
12 Dr Squier saw, and when she talks about the flattening
13 of the dura and so forth. You can appreciate how that
14 happens and how that assists them in interpreting quite
15 how much pressure may or may not have been exerted.

16 Professor Kirkham also produced a diagram with both
17 of her reports. That shows the Monroe-Kellie Principle.
18 That's also a diagram that's worth pulling up because it
19 helps understand what she's talking about. That's
20 300-092-192. There we are. So you can see that she has
21 got the same intracranial components of brain, blood --
22 both arterial and venous -- and the central spinal
23 fluid. She has the normal arrangement, then
24 "compensated", "normal", and then "decompensated" with
25 an increase in intracranial pressure.

1 This is to try and explain what the brain does when
2 it comes under pressure and, of course, the brain's
3 intention -- if one can attribute an intention in that
4 way -- is to try and survive. Those are its mechanisms.
5 So she was using that to demonstrate that if the volume
6 of one of these components increases, there is
7 a cerebral oedema leading to increased volume of the
8 brain, there is some reserve capacity related to the
9 reduction of venous blood by compression and/or drainage
10 into the jugular veins and, two, reduction of
11 cerebrospinal fluid volume by increased absorption into
12 the subarachnoid space of the brain around the spinal
13 cord. That point where she talks about drainage into
14 the jugular veins, you can begin to see the significance
15 of that if there is any compromise of venous drainage.
16 So that's a diagram to try and explain the basis upon
17 which Professor Kirkham says the brain responds to
18 pressure.

19 So she considered it a possibility that the efficacy
20 of those compensatory mechanisms in Adam's brain were
21 likely to have been reduced by reduced jugular venous
22 drainage due to a combination of, one, the possible
23 ligation of Adam's left internal jugular vein -- as
24 noted by Dr Armour in her report and autopsy -- and the
25 position of the central venous line catheter in the

1 right jugular vein. And as we go on -- and you can look
2 and see from the comparative schedule that I referred
3 you to right at the beginning of the experts'
4 positions -- you can see the extent to which there is or
5 is not agreement with her about the effect of any kind
6 of compromise to the venous drainage.

7 So she states in her preliminary report that such
8 a combination would have reduced the opportunity for
9 compensating for increasing cerebral oedema by drainage
10 of blood into the jugular veins and she reiterates that
11 in her final report. She also expresses the view in her
12 final report that such a compromising effect was
13 possibly exacerbated by Adam's position during surgery,
14 which was head down and turned slightly to one side. As
15 you'll have appreciated, Mr Chairman, whether Adam had
16 any risk factors going in to his transplant surgery, and
17 if he did, whether they played any part in the
18 development of his fatal cerebral oedema, has been and
19 continues to be a matter of considerable debate amongst
20 the inquiry's experts. His condition going into
21 transplant surgery and its significance are issues that
22 will require to be explored in the oral hearing.

23 If we then move on to the responsibilities of the
24 members of the transplant team. Professor Savage
25 accepted that the responsibility for getting Adam to the

1 operating theatre in an appropriate condition for his
2 transplant surgery rested to a large extent with him.
3 As you are aware, Mr Chairman, the anaesthetic team for
4 Adam's transplant are comprised, at the outset, of
5 Dr Taylor, a consultant paediatric anaesthetist, and
6 Dr Terence Montague, who assisted him. He had started
7 as a senior registrar in anaesthesia at the
8 Children's Hospital in November 1995, so he was quite
9 new there. And Dr Taylor has accepted that, in large
10 part, the responsibility for Adam's well-being during
11 this perioperative stage -- so if we can put it this
12 way: Dr Savage is really responsible for that
13 preoperative stage and making sure that Adam comes
14 through that stage in a fit as state as possible for his
15 surgery. Once we get to the perioperative stage,
16 Dr Savage is accepting in large part the responsibility
17 for Adam's well-being during that stage with the
18 anaesthetic team generally and with him as consultant in
19 particular. And the extent to which the assistant
20 anaesthetist assisting and working under the supervision
21 of Dr Taylor had an obligation to intervene so as to
22 advise on and help to correct mistakes, if any, made by
23 Dr Taylor during Adam's surgery is a matter that's going
24 to be considered during the oral hearing. In other
25 words, whether there was any kind of active role that

1 the assistant anaesthetist would have. That's a matter
2 to be considered.

3 The inquiry's expert Dr Haynes has described the
4 nature of the responsibility. He says that:

5 "The consultant anaesthetists would be responsible
6 for assessing the preoperative condition of the patient,
7 including liaising with referring clinicians [paediatric
8 nephrology in this case] and this would include ensuring
9 that appropriate fluid management took place in the
10 hours leading up to the operation, the appropriate
11 investigations had taken place, that the results were
12 obtained and noted and the impact of previous surgical
13 procedures -- for example, the central line insertion --
14 would be assessed. The consultant anaesthetist would
15 decide on the conduct of anaesthesia, including fluid
16 and electrolytes administered. He or she would either
17 carry out the (see p95 para320, [Adam Opening](#)) epidural
18 catheter insertion, urinary catheter insertion
19 ...(see p95 para320, [Adam Opening](#))... on the consultant
20 anaesthetist to appraise the surgeon of any difficulties
21 encountered ...(see p95 para320, [Adam Opening](#))... and an
22 alternative strategy, for example, surgery cutdown
23 agreed.

24 "If present, a trainee anaesthetist would assist the
25 consultant anaesthetist with the role as described above

1 within his or her capabilities, with the consultant
2 being responsible for the actions of the trainee."

3 And the trainee is really anybody of less than
4 consultant grade.

5 So if you recall, from the table of paediatric renal
6 transplants, Dr Taylor and the other lead members of the
7 transplant team, Dr Savage, Mr Keane, together with the
8 inquiry's experts, have all set out what they consider
9 should have been the level of involvement of the medical
10 and nursing personnel in the various phases of the
11 transplant process. I'm not going to go through all of
12 that now. I took you to an example of those last time
13 and you have them there. They have all indicated the
14 various levels of priority who they think should have
15 been involved at any given phase of the surgery.

16 Dr Taylor has provided a number of inquiry witness
17 statements in addition to his evidence to the coroner
18 and his PSNI statement under caution in which he sets
19 out how he went about discharging that responsibility.
20 In addition, his conduct over the period of
21 26 November 1995 until Adam failed to wake from his
22 transplant surgery at about noon on 27 November has been
23 commented upon and criticised by Dr Sumner as an expert
24 for the Coroner and PSNI and the inquiry's experts,
25 Dr Coulthard, Professor Gross and Dr Haynes, in numerous

1 reports, and I'm not going to refer to them all here.

2 Nevertheless, there remain outstanding matters
3 concerning the way in which Dr Taylor sought to
4 discharge his responsibilities to Adam during the
5 perioperative stage and the possible consequences of his
6 conduct. They are matters that we will consider during
7 the oral hearing.

8 So if we go to the preparation of the operating
9 theatre and equipment. Dr Taylor acknowledges that the
10 preparation of the theatre is largely a matter for the
11 anaesthetic team, assisted by the medical technical
12 officer. He states in his deposition that he was
13 familiar with all of the anaesthetic equipment used and
14 it was checked prior to the start of its use. In his
15 inquiry witness statement, he confirms that the
16 equipment was, in fact, checked on 27 November prior to
17 the start. He makes the following comments:

18 "Checking the equipment involved. Checking the
19 pipes were securely plugged in ...(see p96 para324(i)
20 [Adam Opening](#))... and so on and, in particular, patient monitors
21 were in working order, airway equipment, drugs and
22 resuscitation equipment."

23 He also says Dr Montague was with him when he made
24 those routine checks and that neither the checks nor the
25 results were recorded because they were routine checks.

1 Messrs McLaughlin and Wilson provided a report to the
2 coroner as part of the inquest into Adam's death dealing
3 with the equipment. They, in that report, indicate
4 that:

5 "All cylinders were removed from the Lamtec and five
6 pins were discovered to be loose and could be removed."

7 And they go to talk about the significance of that
8 and how serious they regarded that to be. It's not
9 clear when that happened or whether that was the
10 condition of the equipment at the time of Dr Taylor's
11 inspection and, even if it was the condition of the
12 equipment, whether that's the sort of thing that could
13 or should have been noted by him when he checked it.
14 The report also states that the anaesthetist using the
15 machine is also expected to sign a log before commencing
16 the list, but this does not happen on most occasions.
17 Then they say a reason for this omission should be
18 requested.

19 It's not entirely clear whether Dr Taylor did sign
20 the log as he was expected to do or whether the kind of
21 checks that he said he carried out as routine checks
22 required a signing of the log. We just don't know and
23 it's something we're going to pursue during the oral
24 hearing.

25 I should just say that it also has governance

1 implications. The main starting point for the
2 perioperative stage is, of course, the anaesthetising of
3 Adam, and according to Dr Montague's inquiry witness
4 statement the, anaesthetic room was not used to
5 anaesthetise Adam. He was brought directly into the
6 operating theatre with his mother to be anaesthetised
7 there. I showed you a plan last time and I'm not going
8 to take you to that now, but it is referenced here and
9 you will be able to see it yourselves, exactly where the
10 operating theatre used for Adam and the adjacent
11 anaesthetic room are, and you'll be able to see that.
12 So you'll appreciate what Dr Montague may or may not
13 have been able to see from where he was, bearing in mind
14 that Debra Slavin, Adam's mother, and Dr Taylor are
15 in the operating theatre with Adam.

16 So Dr Montague claims that he was in the anaesthetic
17 room preparing drugs and equipment when Adam was brought
18 into the theatre. Adam's recorded as having been
19 brought in crying, and Dr Taylor says that he
20 anaesthetised him in the presence of his mother.
21 Dr Montague goes to say that he doesn't actually recall
22 who else was in the operating theatre, but he does
23 state:

24 "Normally, one of the theatre nurses helps the
25 anaesthetist and I don't recall which nurses were

1 there."

2 Mr Chairman, that's going to be an issue, as you
3 know. There is an issue as to how many nurses were
4 available in the operating theatre and whether any of
5 them was an anaesthetic nurse. Adam's mother states in
6 her inquiry witness statement that the theatre staff was
7 present when she arrived with Adam and while she
8 concedes she doesn't know whether there were any nurses
9 specifically assisting Dr Taylor anaesthetising Adam,
10 she is clear there were nurses in the room. Dr Montague
11 claims that he didn't go into the operating theatre
12 until Adam was asleep as he thought it would be less
13 upsetting for him if there were fewer strangers about.
14 But he does state:

15 "Dr Taylor didn't need me for the induction of
16 anaesthesia."

17 So there will be an issue as to who was exactly in
18 the operating theatre helping or assisting Dr Taylor
19 with anaesthetising Adam.

20 The anaesthetic record shows anaesthesia commencing
21 at 07.00 with the intravenous administration of those
22 drugs and his mother states in her inquiry witness
23 statement that:

24 "Adam spoke directly to Dr Taylor saying that he
25 wanted to be anaesthetised by the butterfly and not the

1 mask."

2 And, in fact, Dr Taylor confirms in his deposition
3 to the Coroner that's that is exactly how he was
4 anaesthetised: through a 25G butterfly needle in his
5 right antecubital fossa.

6 No criticism appears to be made of the conduct of
7 Adam's anaesthetic by the inquiry's expert. He
8 describes it in his report as "satisfactory". As part
9 of the arrangements to provide Adam with appropriate
10 pain relief during the transplant surgery, Dr Montague
11 also cited an epidural once Adam was anaesthetised. The
12 purpose of that was also to assist with Adam's
13 post-operative pain management. It seems that Adam's
14 mother was unaware that an epidural would be
15 administered. When she first learned of it, when
16 Dr Savage updated her on his way to perform his other
17 duties, she states that she was unhappy about it as Adam
18 had experienced considerable pain last time an epidural
19 had been used. So it may well be that there will be an
20 issue as to exactly the fulsomeness of the information
21 that was given to Adam's mother.

22 A number of things then happened prior to surgery
23 and they are recorded in the chronology that I referred
24 to earlier. A cannula was inserted into a vein in
25 Adam's left hand and Dr Taylor started an infusion of

1 500 ml of number 18 solution, which he recorded as being
2 fluids as per Dr Savage.

3 The fluid calculations that Dr Taylor made and the
4 principles which he applied in relation to the
5 replacement of the fluid deficit in the first hour --
6 which he considered it to be -- and addressing the
7 ongoing renal losses associated with Adam's native
8 kidneys are discussed later on. They're also obviously
9 going to be an important part of the oral hearing.

10 Secondly, there was arterial access gained with a
11 fine catheter into the right artery to continue to
12 monitor arterial blood pressure. Dr Savage appreciated
13 at the outset that there was an opportunity to check
14 Adam's electrolytes. As soon as that happened -- in
15 fact, very early on -- he wrote a letter to Dr Murnaghan
16 and he stated:

17 "I understand that venous access was readily
18 achieved in theatre and therefore it would have been
19 possible to check the electrolyte picture at that
20 stage."

21 And that matter was further addressed by Dr Savage
22 in his witness statement to the inquiry. He said:

23 "I made it clear to Dr Taylor that it was important
24 that his sodium and electrolytes were checked
25 immediately prior to theatre."

1 We know that we have received a subsequent witness
2 statement, but in any event, I'm simply reciting what
3 the position was at the time and people's thoughts of
4 it.

5 Mr Keane's own view as stated in his inquiry witness
6 statement is:

7 "I cannot explain why Adam's electrolytes were not
8 checked when the central line was inserted. He should
9 have had his electrolytes checked once the central or
10 arterial lines were inserted."

11 Dr Taylor, in his PSNI statement under caution, sets
12 out his view that the checking of the electrolytes was
13 not a priority and, when asked whether it was accurate
14 to say it was not a priority, he agreed but added an
15 element of explanation namely:

16 "We had knowledge that his sodium didn't vary."

17 In other words, not only was it not a priority, but
18 it really didn't matter because his sodium levels were
19 fairly constant. He addressed that matter in his
20 witness statement to the inquiry when he stated:

21 "When I commenced Adam's anaesthetic at around 7 on
22 27 November, I appear to have been preoccupied with the
23 anaesthetic procedures -- endotracheal intubation, the
24 insertion of a peripheral intravenous line, arterial
25 line and central line and epidural -- and omitted

1 sending a blood sample for electrolyte analysis to the
2 laboratory, as I should have done. I accept that
3 I should have sent the electrolyte sample before
4 starting the operation. I should also have sent other
5 samples as necessary and used the results to adjust the
6 rate and type of intravenous fluids."

7 That is an acceptance that has come very recently,
8 on 1 February of this year, and it raises its own
9 queries. But it should be noted that from the
10 correspondence from the DLS, it would have been
11 necessary to use the main laboratory for electrolyte
12 testing for anything that was required to be tested
13 before 9 o'clock because the children's laboratory
14 didn't open until then. That will require some
15 investigation as to what the implications of that are
16 for the turnaround times and so forth.

17 Dr Haynes reiterates in his report the view that he
18 expressed right at the outset that a sample of Adam's
19 blood should have been sent off to the laboratory for
20 assay as soon as he was anaesthetised, as well as
21 a sample being retained for testing with the blood gas
22 analyser for a speedy result. In other words, that
23 would give you an almost instantaneous result and he
24 goes on to say:

25 "This would have been a priority."

1 So quite why Dr Taylor was able to think it wasn't
2 a priority is something obviously that will be explored.

3 A triple lumen central venous catheter was inserted
4 into the right subclavian vein and the legal team has
5 provided a photo of one of those. I'm not going to take
6 you to it now, but it's there, you'll be able to see it.
7 We have also provided a diagrammatic representation of
8 marks found on Adam's body, as compiled by Dr Haynes.
9 I am going to take you to that: it's at 300-090-189.

10 There we are. That is something that I had wanted
11 to show you previously, but we weren't able to get it
12 up. That is to try and put on a diagram all the marks
13 that Dr Armour says she identified at autopsy. And if
14 you look at box 4, up there to the right, you will see:

15 "Needle puncture mark in left upper chest in region
16 of subclavian vein."

17 That's where that went in. It's also necessary to
18 refer to a chest X-ray that was taken of Adam
19 post-operatively, which clearly shows the catheter tip
20 turning away from the heart and up towards Adam's neck.
21 You can see that; it is there available for you. I'm
22 not going to pull it up now.

23 Dr Taylor states in his deposition that:

24 "A central venous catheter was placed without undue
25 difficulty."

1 However, it should be noted, firstly, that that's
2 not the view of absolutely everybody and he even
3 comments that a central venous line was attempted on
4 three occasions in the left subclavian, once in the left
5 internal jugular and then, successfully, in the right
6 subclavian. So the extent to which it was a central --
7 a central venous line was placed in Adam without
8 difficulty is a matter that is not consistently
9 approached by Dr Taylor.

10 It should be noted that Dr John Wilson, the chief
11 medical technical officer at that time for anaesthetics,
12 theatres and intensive care at The Royal Group explains
13 in his statement how the CVP transducer is connected and
14 calibrated and he explains how to check the reading for
15 accuracy and how to deal with anomalies, including
16 re-zeroing and replacing the transducer. He claims both
17 operations can be performed quickly, with the latter
18 taking about a minute. And that is relevant to what is
19 available to be done if you thought your equipment was
20 not functioning as it ought to.

21 So if I move now to the insertion of an urinary
22 catheter, which is also something to be done at an early
23 stage -- or can be done at an early stage -- in addition
24 to the failure to have Adam's electrolytes measured once
25 he was anaesthetised and arterial access was gained,

1 there was also a failure to insert a catheter so that
2 Adam's urine output could be monitored and measured
3 during surgery. The inquiry's experts on surgery have
4 provided diagrams of three urinary catheters in their
5 joint report and those three catheters, which are the
6 urethral, suprapubic and ureteric. 300-037-055.

7 There you are. The one, in fact, that was inserted
8 in Adam is a suprapubic. He also had a ureteric, which
9 is the one below, and you can see the purpose of the one
10 below is actually not to drain out urine for monitoring
11 it in any way, but really to protect that join. The
12 first is the issue whether or not a urethral catheter,
13 which would be a method of collecting urine and
14 monitoring output, should have been inserted.

15 Dr Haynes has included insertion of an urinary
16 catheter, one of those, as a task for the anaesthetic
17 team, and Dr Taylor states in his inquiry witness
18 statement that he believes Adam's bladder was not
19 catheterised at the outset so as to permit it to be as
20 full as possible. He says:

21 "I suspect it was as a result of discussions with
22 the surgeons, although I cannot remember. A catheter
23 would have provided me with information on urine output
24 and the surgeon with an empty bladder. Without it,
25 there is no information on urine output, but the surgeon

1 has a full bladder."

2 Those matters of communication between the two
3 respective teams is something to be pursued. Mr Keane
4 is quite clear in his inquiry witness statement. He
5 says:

6 "It was my decision not to catheterise. I believe
7 it was a correct decision. I decided to allow the
8 bladder to distend naturally."

9 The insertion of a catheter for the monitoring of
10 urine output during transplant surgery is discussed by
11 Dr Haynes and he says:

12 "Adam produced significant volumes of urine and his
13 urinary output should have been monitored when possible
14 during the operation and a urinary catheter should have
15 been inserted following induction of anaesthesia prior
16 to commencing surgery."

17 And he cites some guidelines in support of that.
18 Those guidelines indicate all patients have bladder
19 catheters inserted prior to surgery. Those guidelines
20 are not guidelines from the Royal, they're simply
21 referred to by Dr Haynes for the purpose of supporting
22 his position that it's something that really ought to
23 have happened. He goes on it give his reasons:

24 "It was known that Adam's native kidneys produced
25 large volumes of poor quality urine and measurement of

1 urine production during the initial part of the
2 operation while his native kidneys were still perfused
3 would have guided fluid therapy."

4 And he expands on that and he says that the fact
5 that Adam's previous extensive surgeries meant that his
6 transplant surgery prior to the re-implantation of the
7 transplanted ureter might be:

8 "... lengthy and involved significant blood loss
9 ...(p102 para 345 [Adam Opening](#))... the anaesthetist needed to
10 know as best he could the volume of urine produced,
11 especially in a patient such as Adam where urinary
12 losses because of the underlying disease may not reflect
13 his circulatory state. This is done by noting urine
14 volume drained from the bladder catheter."

15 Mr Koffman, who was the expert for the PSNI, he says
16 that the bladder should be -- should have been left on
17 free drainage if you have a polyuric patient, which is
18 obviously what Adam was. Dr Haynes claims that
19 Mr Koffman is considering the monitoring of urine from
20 the surgical perspective of ascertaining the function of
21 the engrafted donor kidney and not from the perspective
22 of the anaesthetist. He needs to consider the patient's
23 condition during the initial phase of a transplant
24 operation, remembering that the condition of the patient
25 is the primary responsibility of the anaesthetist.

1 Messrs Forsythe and Rigg express very similar views
2 to those of Dr Haynes:

3 "A urethral catheter [that's the first one, figure
4 2A] will always be placed at the beginning of the
5 operation, unless it is not technically possible."

6 Mr Keane was asked whether it was technically
7 possible to insert that and he said that it was, but
8 when he was pressed about why one wasn't inserted, he
9 then went on to say in a subsequent inquiry witness
10 statement:

11 "Adam's ureter was very small and, in my opinion,
12 urethral catheterisation was unnecessary. I wanted the
13 bladder full."

14 Messrs Forsythe and Rigg go on to address that
15 requirement for the distension of the bladder in their
16 report. They also comment on a statement by
17 Professor Alexander who was an expert for the Coroner,
18 who states:

19 "During renal transplantation, the urinary bladder
20 is allowed to fill so that it is easy to identify when
21 it is time to transplant the ureter into the bladder.
22 This is normal practice."

23 And they say:

24 "This is not and has not been the normal practice of
25 either of us or the units in which we have worked. If

1 an urethral catheter has been placed, then, as noted
2 above [in their report], it may be clamped during the
3 first part of the surgical procedure to allow the
4 bladder to distend. However, this is a controlled
5 situation rather than leaving the bladder to fill in an
6 uncontrolled way when one is not sure of the urinary
7 output of that individual."

8 And they deal with Mr Keane's claim that Adam's
9 urethra was very small in their joint report of November
10 last year:

11 "Adam's urethra was very small because he was young.
12 We are not aware of any reason why his urethra would
13 have been smaller than usual."

14 So there are a number of issues that arise from
15 that: whether or not a urethral catheter should have
16 been inserted at the outset and the significance, if
17 any, of it not having been done; whether Mr Keane's
18 requirement for the lack of a catheter at the outset so
19 that Adam's urine output might be used as a means of
20 distending his bladder was appropriate in the
21 circumstances; what type of discussion, if any, should
22 there have been between the anesthetic and surgical
23 teams over the insertion of the urethral catheter at the
24 outset; whose requirements, as between the anaesthetic
25 and surgical teams, should have prevailed in the

1 circumstances of Adam's transplant surgery; and the
2 significance of the size of Adam's ureter for an
3 insertion of an urethral catheter prior to the start of
4 the transplant surgery, including whether his ureter was
5 small for his age and size.

6 So if I move then to monitoring Adam. And before
7 I deal with the issues raised in the monitoring of Adam,
8 it may be helpful to have some appreciation of the
9 arrangement of a typical operating theatre during an
10 operation. We have provided some photographs and
11 we can, I hope, go through these fairly quickly, just to
12 give you some appreciation of what's goes on in this
13 relatively confined space. 300-046-064. That's
14 a general view of an operating theatre, showing the
15 renal transplant in progress. The object of doing
16 that is to show you how close all those people are to
17 each other. In this case one is talking about a child,
18 Adam, 4 years, 20 kilos, 103 centimetres, I believe,
19 long.

20 Then if we can pull up 300-047-065. None of these
21 photographs have anything to do with Adam's actual
22 surgery, I should say. You can see again -- look at the
23 heads of those involved, how close they all are. The
24 circulating nurse or the runner, as she's sometimes
25 called, is in the foreground. Then if we go to

1 300-048-066. There they are again. Not the same team.
2 And the scrub nurse is to the right, you see her there,
3 sterilised, in contra distinction to the runner. And
4 the last one, 300-049-067. There you can see the scrub
5 nurse is there to the left.

6 Interestingly, in that one, you can see the strong
7 operating lights that are used, you can really see them
8 there as they shine down. I will refer later on
9 in relation to the conduct of the transplant surgery to
10 the effect of those operating lights on the temperature
11 of the donor kidney prior to its anastomosis.

12 So moving to the anaesthetic assistance for
13 Dr Taylor. Dr Taylor accepts in his inquiry witness
14 statement that the monitoring of Adam throughout the
15 transplant surgery was the responsibility of the
16 anaesthetic team and that he had the lead role in the
17 monitoring of vital signs and blood fluid management.
18 And as you know, there is an unresolved issue about
19 whether Dr Taylor had the benefit of an assistant
20 anaesthetist for the duration of Adam's transplant
21 surgery, and that's an issue which includes when exactly
22 Dr Montague left the operating theatre and whether, and
23 if so when and by whom, he was replaced. And it's far
24 from clear from the statements of various witnesses when
25 Dr Montague actually left the operating theatre.

1 Dr Montague himself states in his PSNI statement
2 that he was there at the start, but then he was sent
3 home by Dr Taylor. That's because he had been on call
4 all night, and he believes that was prior to 9.32. The
5 significance of 9.32 is that is when they receive the
6 serum sodium level taken by the blood gas analyser and
7 it shows Adam's serum sodium level was 123 millimoles.

8 Dr Montague states in his inquiry witness statement,
9 his first one, that his 24-hour shift was due to end at
10 9 am of the Monday of Adam's operation and that he would
11 have been free to go home. He goes on to state that
12 at the time he left the surgery, it had started but the
13 donor kidney had not been transplanted. And in his
14 inquiry witness statement after that, he states that he
15 can't recall whether he was still in the operating
16 theatre when the third bag of Solution No. 18 was
17 erected, which happened about 8.43, and one can tell
18 that from the anaesthetic record:

19 "But I think I am likely to have left around 8.30
20 when the anaesthetic registrars would have started their
21 normal day."

22 And Dr O'Connor states in her inquiry witness
23 statement that she arrived at work at approximately
24 9 o'clock that morning. She then states in her
25 subsequent inquiry witness statement Dr Taylor and

1 Dr Montague were the anaesthetists that she saw in the
2 operating theatre and regarded as the anaesthetic team.

3 Obviously, there were timing issues of exactly when
4 there was a handover between Professor Savage and
5 Dr O'Connor, but here she is saying that Dr Montague was
6 present when she arrived in the operating theatre, but
7 she cannot recall if he was present for the whole
8 procedure or if there were any other anaesthetists.

9 Dr Taylor is unable to clarify matters at all in his
10 inquiry witness statement, apart from anything else,
11 because it wasn't until 16 May last year, after the
12 publication of Dr Montague's PSNI statement, that he
13 actually disclosed that Dr Montague was replaced by an
14 as yet unidentified trainee anaesthetist. He states
15 in that statement that surgery had just commenced when
16 he let Dr Montague go. It's not entirely clear what he
17 means by "surgery had just commenced". If he means
18 "knife to skin", that's about 8 o'clock. If he means
19 something more substantial than that in terms of the
20 actual transplant aspect of the surgery, then obviously
21 that's much later on.

22 He goes on to state in his inquiry witness statement
23 that he would accept that Dr Montague went home around
24 the expected changeover time of 9 am, so he would accept
25 it, but he does not specifically recall it. And the

1 significance of all of that, Mr Chairman, is that
2 Dr Taylor accepts that he did leave the operating
3 theatre from time to time. So if there wasn't an
4 assistant anaesthetist after Dr Montague left, then that
5 would leave the responsibility of monitoring Adam during
6 that period to the medical technical officer, Mr Shaw,
7 and the as yet unidentified anaesthetic nurse.

8 Monitoring issues. The inquiry's expert Dr Haynes
9 explains in his report that the purpose of the
10 anaesthetic team monitoring Adam was really a means of
11 them ensuring adequate depth of anaesthesia and
12 maintaining stability of respiratory and cardiovascular
13 systems, and all the time that Dr Taylor as a consultant
14 retained responsibility for Adam, which was until he
15 handed over Adam's care to paediatric intensive care or,
16 as the case may be, high dependency care or the ward
17 staff.

18 The monitoring of Adam was carried out, so far as
19 we can assess it, by four principal means. Firstly,
20 there was the continuous monitoring of Adam's vital
21 signs, namely his ECG, blood temperature, pressure,
22 heart rate, blood pressure, including his central venous
23 pressure. Then there were periodic checks and tests
24 including the measurements of his blood loss by weighing
25 swabs and towels and noting the administration of fluids

1 and medication as shown on his anaesthetic record and
2 the blood swab count. There were other checks and
3 tests, including the blood gas analysis to check his
4 haemoglobin and haematocrit levels. Fourthly, there was
5 continuous visual observation, which Dr Taylor refers to
6 on a number of occasions during his PSNI statement under
7 caution, and he attaches significance to this. He says:

8 "When continuously reassessing Adam's fluid
9 replacement, we used all the information available from
10 the anaesthetic monitors as well as visualising the
11 impact on the surgical field. But there would have been
12 a watchful [by that he means anaesthetic] eye at the
13 surgical field and the monitors constantly, so I would
14 have been aware of everything that happened."

15 And then yet again:

16 "So we anaesthetists must position ourselves in
17 a place as well as looking at our technology to actually
18 see what's happening in real time with the patient's
19 blood ..."

20 And then there's a typographical error in the
21 transcript of his interview:

22 "... doesn't [sic] be lost as maybe you can see
23 in the swab count ..."

24 And then it's, in a slightly incomprehensible
25 manner, that he says -- it's just a typographical error,

1 I'm sure, but I think you can get the sense of it:

2 "Visualising the impact in the surgical field
3 relates to blood loss and the colour of blood."

4 And then, finally, the general look at his veins.
5 Are his veins dilated or shrunken? Does the wound look
6 moist or dehydrated? All this is an important element
7 of the monitoring that Dr Taylor says was happening for
8 Adam during his transplant surgery.

9 We have compiled schedules and charts of the results
10 of the recordings made during the perioperative period,
11 and that's largely in relation to the first three that
12 I just mentioned to you. They show Adam's vital signs,
13 the drugs administered, temperature and central venous
14 pressure, fluid administered and lost, oxygen saturation
15 and end tidal carbon dioxide, serum sodium and
16 haemoglobin levels. I have shown you those charts last
17 time, so I'm not going to go through them again,
18 although obviously you can look at them yourselves to
19 familiarise yourself with the information they display.

20 There are a number of issues which arise in respect
21 of the perioperative monitoring of Adam during his
22 surgery, and they are going to be considered during the
23 oral hearing and, to assist, we have compiled a schedule
24 of them. It's a schedule of issues arising from
25 perioperative monitoring. Let's put that up quickly.

1 306-015-120.

2 There we are. You can see the structure of it.
3 We have the issue down the left-hand side, then you have
4 the members of the transplant team, particularly the
5 consultant members involved in this. You have Dr Taylor
6 and Mr Keane. Then you have the inquiry's experts that
7 are particularly involved, Dr Coulthard, Professor Gross
8 and Dr Haynes. And then you have the other experts, who
9 may or may not have made a comment on it.

10 It works through, in a summary fashion, the
11 principal issues in relation to perioperative
12 monitoring. First is the checking of serum electrolytes
13 prior to Adam being taken to the operating theatre.
14 Secondly is the turnaround of serum electrolyte
15 laboratory results. Third is the failure to insert
16 a urinary catheter after anaesthetic. Fourth, the
17 accuracy of CVP monitoring. Fifth, the subsequent blood
18 testing by the blood gas analyser. Sixth, whether there
19 was a regular monitoring and review and regulation of
20 Adam's fluid intake to keep up with his losses.
21 Seventh, visual observations. Eighth, the significance
22 of Adam being swollen, puffy and/or bloated after
23 surgery. And the ninth, compliance with the 1990
24 guidelines for renal transplantation in small children,
25 which is a protocol that was in operation at that time.

1 Beside each of those, I have set out in further columns
2 any comments made on those issues by those persons. As
3 I say, I'm not going to go through it. That's how it
4 works.

5 I have to say that that is a schedule that we have
6 compiled. I'm not saying that the persons involved have
7 confirmed that they accept all of that, but that
8 information is taken from either their witness
9 statements or from a report. We hope we have done it in
10 a balanced way.

11 Then the administration of fluids in response to
12 Adam's condition. As you know, Mr Chairman, the
13 appropriateness or otherwise of the intravenous fluids
14 that Adam received during surgery is one of the key
15 areas of investigation by the inquiry and that's
16 reflected by the terms of reference because it
17 specifically says, "Especially in relation to the
18 management of fluid balance and the choice and
19 administration of intravenous fluids in each case."

20 So we are charged with that. And the legal team has
21 therefore gone to some length to investigate that issue.
22 We've already made reference to the fluid management
23 comparison table and Dr Taylor states in his first
24 witness statement that the preoperative fluid
25 calculations were based on the following factors. And

1 he lists them as:

2 "Replace fluid deficit, mainly dilute urine.
3 Provide fluid management requirements each hour in
4 theatre. Replace any blood loss. Further fluid
5 management would depend on BP, heart rate, CVP and organ
6 perfusion. The need to ensure that Adam's blood volume
7 was certainly not deficient, but with careful monitoring
8 was actually increased in order to adequately perfuse
9 the new adult size donor kidney."

10 So his calculations were based bearing that in mind.
11 The issues related to Adam's fluid management can
12 therefore be considered in relation to Adam's
13 pre-surgical condition, including whether Adam was in
14 deficit prior to surgery and the effect of dialysis on
15 fluid and serum sodium balance. Adam's maintenance
16 requirements, including factoring in his urine or
17 anticipated urine output. Adam's blood loss during
18 surgery. I pause there. The reason I say "anticipated"
19 is, of course, it wasn't being measured, so some sort of
20 assumption was going to be made as to what it is. Then
21 Adam's blood loss during surgery, whether the fluids
22 chosen were appropriate in terms of their sodium and
23 glucose content and the volume of fluids administered
24 and the reason for doing so.

25 Then if we go through those items, Adam's

1 pre-surgical fluids. As I say, we've gone through this
2 in some detail because, to some extent, it does lie
3 at the heart of the fluid management element of Adam's
4 surgical time, if I can put it that way. So at the time
5 of Adam's transplant, he was receiving three bolus feeds
6 of 300 ml each, during the day and 1200 ml of Nutrison
7 over 8 hours every night as his feeds through his
8 gastrostomy tube. Dr Cartmill prescribed two amounts of
9 500 ml of IV fluids of Solution No. 18 to run at a rate
10 of 75 ml an hour, which she described as maintenance.

11 As 2200 hours, when fluids were actually started,
12 180 ml of clear fluids were to be administered through
13 his gastrostomy tube and Dr Savage has said that the
14 "clear fluids" administered were in fact Dioralyte.
15 This was in addition to his IV fluids which were now
16 reduced to 200 ml an hour. However, the IV cannula
17 tissued at about 01.42 and Dr O'Neill therefore
18 prescribed an increase in Adam's gastrostomy fluids to
19 200 ml. So he simply added the 20 to the 180.

20 That uncertainty is a lack of clarity over whether
21 the cannula was reinserted at 5 am. The nursing note
22 indicates it was, but Catherine Murphy queries whether
23 that actually happened, and we can see that in the PSNI
24 statement, and it is an issue to be pursued in the oral
25 hearing because it goes to the decisions that were made

1 at that time.

2 The inquiry's experts and Professor Savage, stated that
3 Dioralyte contains 57 to 60 millimoles of sodium.
4 However, Dr Taylor in his deposition to the coroner
5 stated that Dioralyte was equal to Solution No. 18 and
6 has stated that it contains only 35 millimoles of
7 sodium, though he states elsewhere that it contains
8 60 millimoles of sodium. This is also an issue to be
9 pursued during the oral hearing.

10 Adam's overnight fluid balance sheet shows that he
11 received a total of 952 ml of Dioralyte and 18 ml of
12 Solution No. 18. And his feeds were stopped at 05.00
13 because of pre-surgical fasting, and from 05.00 until
14 his transfer to surgery for anaesthetic preparation at
15 07.00, he received no fluids, so the records show.
16 Those are his fluids.

17 We move on to the effect of dialysis on fluid
18 balance and plasma sodium. There is an issue as to the
19 effect of dialysis on fluid balance and serum sodium,
20 particularly whether it's possible to fix one or other
21 of either a fluid imbalance or a sodium imbalance. Dr
22 Coulthard has stated that in his experience, peritoneal
23 dialysis tends to buffer the impact of variations in
24 fluid status that would otherwise result in children
25 becoming either dehydrated or fluid overloaded and the

1 dialysis would remove less fluid overnight if a child
2 was dehydrated and more if they're overhydrated. He
3 states that because of dialysis, Adam's overall fluid
4 balance was unlikely to have been significantly
5 perturbed by the events in the few hours prior to his
6 transplant. Likewise, he states that peritoneal
7 dialysis tends to correct any imbalances that may exist
8 in the plasma sodium because the dialysate contains
9 sodium at normal plasma concentrations. In Adam's case,
10 that would be 122 millimoles. Dr Coulthard says that
11 sodium diffuse down its concentration gradient from
12 fluid to plasma if the plasma sodium is low or from
13 plasma to the fluid if they are hyponatraemic. Thus he
14 states that the plasma sodium in the morning after an
15 overnight dialysis session is almost guaranteed to be
16 normal if the child starts off with a near normal value.

17 Adam received 8 cycles rather than his usual 15, but
18 Dr Coulthard doesn't think that that would have made
19 a substantial difference to his fluid balance, although
20 it may have reduced the change the dialysis had on the
21 sodium balance. It might have had that effect.

22 Dr Savage, in his most recent statement to the inquiry,
23 has stated that peritoneal dialysis tends to normalise
24 both plasma sodium concentration and fluid balance
25 status. In his earlier inquiry statement, he states

1 that:

2 "The effect of receiving 952 ml of clear fluid after
3 admission rather than the usual 1.5 litres of
4 Nutrison feed and a small volume of IV fluids meant that
5 Adam was in relative deficit of 500 ml compared to
6 previous days. He would therefore have been less well
7 hydrated than usual and it is possible that this may
8 have resulted in some degree of haemoconcentration,
9 which would have the possible effect of increasing his
10 serum sodium concentration. In normal circumstances,
11 this deficit would have been addressed by replacing the
12 deficit by extending his tube feed at 200 ml per hour
13 over 2 to 3 hours."

14 Then when one deals with the 8 rather than the 15
15 cycles of peritoneal dialysis, Dr Savage says in his
16 witness statement that:

17 "Furthermore Adam was having a short period of
18 dialysis and some tube and IV fluids overnight and,
19 again, I thought it would be wise to check that his
20 electrolytes had remained in the normal range."

21 Dr Taylor agrees it was usual for Adam's
22 electrolytes to remain stable following dialysis for
23 24 hours, so that his dialysis did not lead to deranged
24 electrolytes.

25 Well, the issue on the effect of Adam's sodium

1 levels of his 8 cycles of peritoneal dialysis as opposed
2 to his usual 15 cycles is something that will be
3 addressed further in the oral hearing, both in terms of
4 its effect on his fluid balance and also in terms of its
5 effect on his serum sodium levels.

6 I move now to fluid deficit. The fact that Adam
7 received less fluid overnight than his usual 1200 ml and
8 the fact that he received no fluids between 5 am and 7
9 am has raised an issue as to whether Adam was in deficit
10 of fluid or was dehydrated on his arrival to surgery at
11 7 am, and if so, what degree of deficit was it.

12 Dr Taylor stated that he believed that Adam was in fluid
13 deficit and therefore planned the administration of
14 fluid in the early part of the surgery to replace that
15 deficit and he judged this deficit to be between 300 ml
16 and 500 ml and stated that there was some evidence to
17 suggest that Adam may have been dehydrated prior to
18 surgery. In the witness statement he says:

19 "A total of 970 ml had been given over 6 hours.
20 I calculated that he should have received 1200 ml over
21 these 6 hours and therefore he had not had to receive in
22 excess of 200 ml an hour to provide for this planned
23 fluid administration."

24 In addition to believing there was a deficit,
25 Dr Taylor also considered that there was an urgency to

1 replace this deficit so Adam did not become dehydrated
2 or suffer from low blood circulation prior to transplant
3 and that:

4 "[He] wished to ensure that no potential deficit
5 remained as we began the process of increasing Adam's
6 circulating blood volume in preparation for his kidney
7 transplant."

8 That's his view. Professor Savage agrees that the
9 fact that Adam received 952 ml of Dioralyte plus a small
10 amount of IV fluids rather than his usual 1.5 litres of
11 Nutrison feed meant that Adam would have been less well
12 hydrated than normal and he stated that the deficit was
13 important to address so as to provide a good
14 intravascular volume prior to the removal of the
15 vascular clamps and therefore addressing deficit over 1
16 to 2 hours would seem to be reasonable. And in his
17 inquiry witness statement of September of last year, he
18 states:

19 "The amount of fluid deficit that I believed was
20 required to be corrected by IV infusion during Adam's
21 surgery was approximately 500 ml. This was based on the
22 fact that he normally received 1500 ml gastrostomy feeds
23 overnight, but on the night in question he only received
24 970 ml."

25 However, in his most recent statement to the inquiry

1 on 20 March he states he estimated Adam was 300 ml to
2 500 ml in deficit.

3 Dr Alexander, at the inquest, agreed. He was the
4 anaesthetic expert engaged by the Coroner. He agreed
5 that there was a fluid deficit between that period of
6 5 am to 7 am. So those are the clinicians and the
7 experts of the Coroner.

8 Dr Coulthard disagrees that Adam was in fluid
9 deficit before surgery and asserts that he would have
10 arrived in theatre at approximately normal salt and
11 water balance. He believes Adam arrived in theatre
12 somewhere between being in precise water balance and
13 between about 300 ml overloaded and that he would
14 certainly exclude him having been water deficient.

15 Professor Gross agrees that it was unlikely that
16 Adam was dehydrated prior to surgery, pointing to the
17 fact that Dr Taylor was able to place a right subclavian
18 access at his first attempt. So there are clearly
19 issues there as to exactly what the status, the fluid
20 status, of Adam was going into his surgery so far as one
21 can work it out at this remove, given the information
22 available.

23 Urine output. There is a significant disagreement
24 between the witnesses and the inquiry's experts as to
25 the level of Adam's urine output, which is a crucial

1 issue for you, Mr Chairman, as it is one of the major
2 factors taken into account when clinicians are
3 calculating the rate of fluid administration. And of
4 particular significance is the position of Dr Taylor,
5 which has altered since the beginning of the inquiry's
6 investigations.

7 Prior to January this year, Dr Taylor appears to
8 have made the assumption that Adam would pass around
9 200 ml per hour of dilute urine. This was despite the
10 note on 9 November 1995 in his medical notes by
11 Dr O'Connor. She made a note in the medical notes,
12 "PU++" -- that is "passes urine plus plus -- "how much,
13 query, 1 to 2 litres", ie she was querying whether he
14 passed 1 to 2 litres per day. Dr Taylor was proceeding
15 on the basis that he was passing 200 ml per hour.
16 Dr Savage's position is that Adam passed 1.5 litres of
17 urine a day, and that he planned with Dr Taylor that
18 Adam should receive intravenous fluid at 75 ml an hour
19 after his tube feeds. Dr Taylor also believed that Adam
20 could tolerate large quantities of Solution No. 18 as,
21 according to him, he had received 300 ml in one hour in
22 a previous operation on 18 October 1995. And he states
23 in his PSNI interview under caution that this showed
24 Adam was not a normal child because normal children
25 couldn't cope with 300 ml over an hour. Adam was

1 exceptional, and then he goes on to state that Adam's
2 body operated like a hole in a bucket and that he had to
3 get that bucket filled up. In addition, he stated that
4 his knowledge of Adam and his kidney disease were such
5 that he considered that 200 ml an hour to be a minimum
6 loss and that he may well have been unlimited and that
7 no one had established his maximum output. As a result,
8 it seems that Dr Taylor did not believe that Adam could
9 retain free water and could not suffer from dilutional
10 hyponatraemia. That was the position at the time. And
11 for that matter, some time afterwards.

12 THE CHAIRMAN: Sorry, Ms Anyadike-Danes, if you pause there.

13 If Dr Savage is right or Professor Savage is right that
14 he had planned with Dr Taylor that Adam should receive
15 only 75 ml an hour, then there would have to be for some
16 reason for Dr Taylor to depart from what Professor
17 Savage says was the agreed plan.

18 MS ANYADIKE-DANES: Well, I'm sure those are matters that
19 we're going to pursue.

20 THE CHAIRMAN: Okay.

21 MS ANYADIKE-DANES: Dr Taylor [sic], absolutely crucially,
22 disagrees with Dr Taylor's assumption, and he describes
23 it as "without foundation".

24 He states that:

25 "Dysplastic kidneys in end-stage failure will have

1 a relatively fixed urine output as regulation of
2 individual renal functions such as urine concentration
3 or water reabsorption will have failed by that stage."

4 And he therefore believes that prior to his surgery
5 in November 1995, Adam produced about 1.5 litres per day
6 of urine, which equates to somewhere between 60 to 65 ml
7 an hour, and that this was near both his maximum and
8 minimum volume capacity. In effect, his kidneys were
9 always working flat out. Therefore, if he was
10 administered more than the rate he was able to excrete,
11 he would simply retain the rest in his body.

12 As highlighted by his most recent witness statement,
13 Dr Taylor has since reflected on and recognised that
14 Adam did have a fixed urine output of around 70-80 ml
15 per hour and admitted that, based on his incorrect
16 assumption, he administered Solution No. 18 to Adam at
17 a rate in excess of his ability to excrete it,
18 particularly in the first hour of anaesthesia. He has
19 yet to accept that Adam suffered from dilutional
20 hyponatraemia and Dr Coulthard has commented that the
21 fluid regime would have been inappropriate even if Adam
22 could have excreted it at the rate previously assumed by
23 Dr Taylor.

24 Adam's renal output was not measured during his
25 surgery -- we all know that -- until a suprapubic

1 catheter was inserted by Mr Keane later in the operation
2 at around 10.30. It's not entirely clear.

3 There is a result of 49 ml for urine output from the
4 surgery and Dr Taylor considers his measurement begins
5 only after the insertion of the catheter. Sorry, that
6 that measurement for the 49 ml commences only after
7 insertion of the catheter.

8 Mr Keane seems to suggest that there was urine
9 produced during the surgery:

10 "In Adam's case, we allowed the bladder to distend
11 naturally and not measured his urine output [sic], but
12 depended on his CVP measurements, which is the parameter
13 of most value to a surgeon."

14 In contrast, Dr Coulthard, in fact, believes that
15 Adam probably produced the noted 49 ml at the beginning
16 of the procedure and that his general condition during
17 anaesthesia after the first period resulted in his very
18 vulnerable kidney function slowing or actually stopping
19 during the rest of the procedure. Whether and how much
20 urine Adam produced during the course of the surgery is
21 an issue to be addressed at the oral hearing.

22 THE CHAIRMAN: If we pause there and give our stenographer
23 the break, which I mentioned at the previous hearing,
24 and we'll resume at 11.40.

25 (11.25 am)

1 (A short break)

2 (11.46 am)

3 MS ANYADIKE-DANES: I wonder if I may just correct one of

4 those errors that you make inadvertently. It relates to

5 paragraph 387. What I should have said was:

6 "Crucially, Dr Coulthard disagrees with this

7 assumption, describing it as 'without foundation'."

8 In fact, I think what I said was, "Crucially,

9 Dr Taylor disagrees". I obviously didn't mean that.

10 THE CHAIRMAN: Which wouldn't have made any sense.

11 MS ANYADIKE-DANES: No, it wouldn't have made any sense at

12 all, and it was helpfully pointed out to me and I'm

13 grateful for that. Maybe the ultimate record of it can

14 show the correct form.

15 So Mr Chairman, just before the break I was about to

16 start on choice of fluids.

17 THE CHAIRMAN: You're starting at paragraph 390.

18 MS ANYADIKE-DANES: That is an important paragraph to be

19 starting with. Before one discusses the choice of

20 fluids, it's important to address the meaning of the

21 term "free water". It is used by several of the

22 inquiry's experts, most notably and most commonly by

23 Dr Coulthard and Professor Gross. Dr Coulthard explains

24 the term in this way:

25 "If you give a solution, which is less strong than

1 normal saline, you can calculate it as if you had given
2 a volume of normal saline and the rest of it as pure
3 water, whereas in reality you may have given it in
4 different combinations. So for example, one litre of
5 fifth normal saline is the equivalent of 200 ml of
6 normal saline and 800 ml -- four-fifths of it -- as
7 water."

8 That turns out, insofar as Dr Coulthard is
9 concerned, to be an important concept in the whole issue
10 of fluid management of Adam and the extent to which
11 he was overhydrated. So Dr Coulthard has taken the
12 inquiry's comparative fluid balance table and calculated
13 the amount of free water given to Adam based on each of
14 the contributors' fluid calculations. So he's also gone
15 and looked at each of the clinicians' or experts', as
16 the case may be, own fluid balance table and he has
17 taken those figures and reworked them to extract the
18 free water component.

19 The purpose of that is, not wishing to steal his
20 thunder -- and I'm sure he will address it himself when
21 he gives evidence -- but it is the free water element of
22 it that is the diluting aspect of it. That's what is
23 important: how much of that that was in Adam, how much
24 of that could be calculated to be in Adam. The issue of
25 free water and its significance for Adam's fluid

1 management in the development of his hyponatraemia is
2 obviously something that's going to be addressed during
3 the oral hearing.

4 Dr Coulthard's recalculations -- I'm not going to
5 take you to them, they're referred to in the footnotes
6 and you'll be able to get access to them, but you can
7 see the principle of what he has done and, obviously,
8 we're going to take him through that in the oral
9 hearing.

10 If I go on to choice of fluids. Adam had received
11 a total of 1500 ml of Solution No. 18 during his
12 transplant surgery. I had mentioned before what
13 Solution No. 18 is. The remainder of the part that's
14 not sodium and not glucose is free water. That means it
15 contains one fifth of the sodium and chloride ions that
16 are found in an isotonic solution, ie 0.9 per cent
17 sodium chloride. And an isotonic solution, such as
18 Hartmann's solution, contains approximately the same
19 number of sodium and chloride ions that are in human
20 blood and I went through that in the general opening.

21 So since Solution No. 18 contains one fifth of the
22 sodium content of normal saline, Professor Gross
23 comments that:

24 "Given that Adam received a total of 1500 ml of
25 Solution No. 18 during his transplant surgery, this was

1 equivalent to him receiving 300 ml of normal saline and
2 1200 ml of free water as the diluting agent."

3 As I also mentioned in my general opening, the
4 Alert No. 22 has directed hospitals across the UK to
5 remove Solution No. 18 from stock and general use in
6 areas that treat children and this is an issue in Adam's
7 care as to whether it was the appropriate fluid to be
8 administered as a maintenance fluid, as a replacement
9 fluid for any deficit Adam may have had, or at all, and
10 those issues are to be pursued in the oral hearing, both
11 in relation to the position as it was 1995 -- what
12 people would have understood and what was the practice
13 in 1995 -- and now.

14 Dr Taylor has stated that Solution No. 18 was the
15 standard IV maintenance fluid in paediatric practice and
16 that it was used widely for replacement fluid in
17 dehydration. He has also said that he would use it for
18 maintenance in healthy infants and children undergoing
19 surgery. In addition, Dr Taylor has stated that because
20 of Adam's inability to concentrate urine, he produced
21 very dilute urine with a low concentration of sodium.
22 In assessing this, he relied on urine biochemistry
23 results for almost four years prior to Adam's transplant
24 surgery, which showed his urine to have a sodium content
25 of 29 to 52 millimoles, and he has since estimated the

1 concentration of Adam's urine as 30 to 40 millimoles.

2 Professor Gross and Dr Haynes consider that Adam's
3 urine concentration, similarly, to be about 30 and 40
4 millimoles respectively. He therefore chose Solution
5 No. 18 with its sodium content of 30 millimoles as the
6 fluid which most closely represented the fluids lost.

7 Dr Coulthard has commented that because Adam's renal
8 function would have changed over time, particularly with
9 him starting dialysis in 1994, previous urinary sodium
10 measurements had no relevance to the situation that
11 pertained at the time of his death and he estimated
12 Adam's urinary sodium content to be about 75 millimoles.
13 As mentioned previously, Dr Taylor also believed that
14 Adam's urine sodium content resembled the sodium
15 concentration of his night feeds and Dioralyte, although
16 Dr Savage and the inquiry's experts disagree with that.
17 In addition, Dr Taylor states that he used Solution No.
18 18 because of its glucose content and the need to
19 provide sufficient sugar for Adam's metabolic
20 requirements and to prevent hypoglycaemia.

21 Adam also received other solution, so that wasn't
22 the only fluid he received. He received 1000 ml of
23 human plasma protein fraction -- which you'll see in his
24 notes very often as "HPPF" -- and 500 ml of packed blood
25 cells to replace blood loss during surgery. HPPF

1 contains 130 to 150 mmol of sodium and is accepted as
2 having a similar electrolyte profile to blood, and he
3 also received 500 ml of Hartmann's solution, which is
4 a sodium content of around 130 ml, which is also similar
5 to that of blood.

6 Dr Taylor has accepted that there were other
7 intravenous solutions available in the Children's
8 Hospital in November 1995: there was 5 per cent glucose,
9 10 per cent glucose, 0.9 per cent sodium chloride --
10 which is normal saline -- and Hartmann's solution. The
11 first two solutions contain no sodium chloride at all --
12 which is why Dr Taylor said he didn't use them -- and
13 the latter two are both balanced salt solutions. Dr
14 Taylor said that had he used them instead of Solution
15 No. 18, then Adam would have had a dangerously low blood
16 sugar at the end of his surgery. So that's the decision
17 that he made and Dr Haynes comments that hyponatraemia
18 is the inevitable consequence of the administration of
19 Solution No. 18 in significant volumes. Dr Coulthard
20 states that his default replacement fluid -- not
21 maintenance, replacement fluid -- would be 0.5 per cent
22 dextrose saline rather than the 0.18 per cent dextrose
23 saline used with Adam, although it would not be
24 unreasonable to use the latter to replace only the
25 insensible and urine losses.

1 However, he states that to use this fluid to replace
2 Adam's deficit or to increase Adam's circulating volume
3 to perfuse the transplant was just simply wrong. He
4 also states that half normal saline, 0.45 per cent, and
5 normal saline, 0.9 per cent, are both routinely
6 available on general paediatric wards with glucose
7 contents of 4 or 5 per cent.

8 Those are the fluids. The rate is another issue to
9 be considered, and Dr Taylor had decided that Adam
10 required 600 ml in the first hour of his transplant
11 surgery to address what he had calculated was Adam's
12 fluid deficit of approximately 400 ml and also Adam's
13 maintenance requirements. That's an important point to
14 grasp. He was trying to compensate for a deficit that
15 he thought Adam had, but also Adam's fluid needed to be
16 maintained and so there were two things going on. He
17 therefore administered 500 ml of Solution No. 18 during
18 the first 30 minutes of surgery and a second bag of
19 500 ml was started thereafter. Dr Taylor has accepted
20 that Adam received approximately 700 ml of Solution No.
21 18 in the first hour of his transplant surgery.

22 In his deposition, Dr Taylor states that the rate
23 that Solution No. 18 was administered at was calculated
24 to restore the deficit and supply maintenance of 150 ml
25 per hour in view of his polyuria and insensible losses,

1 as there's a large area of the abdominal cavity that's
2 exposed. In his first statement to the inquiry, he
3 describes Adam's fluid maintenance requirements as
4 200 ml an hour -- which is something that he repeated in
5 his PSNI interview -- and he explained that his
6 assessment of 200 ml for the maintenance rate was based
7 on Adam's overnight maintenance rate of 200 ml an hour.

8 He therefore administered 500 ml of Solution No. 18
9 to Adam during the first half hour of surgery and
10 a second bag of 500 ml was started afterwards. So there
11 is an issue as to the appropriateness of Dr Taylor's
12 rate of administration. So quite apart from the type of
13 fluids he selected, quite apart from the amount of
14 fluids he selected, there is an issue as to the rate of
15 administration which is to be addressed during the oral
16 hearing.

17 Several of the experts believe that the rate of
18 administration led to an acute fall in Adam's serum
19 sodium level, which was dangerous. Professor Gross
20 states that there is a significant difference between
21 acute hyponatraemia and chronic hyponatraemia. And
22 Dr Coulthard agrees that the quantity of low sodium
23 concentration infused into Adam was simply vast and
24 dramatically fast in a very short period of time. He
25 believes that an absolutely critical element of

1 management is about how quickly or how slowly you allow
2 the sodium to fall, and that letting the sodium fall
3 quickly leads to cerebral oedema and brain death. And
4 he contextualises that by refer to be to the literature
5 of three children who died having been administered free
6 water rates of between 3 and 7 ml per hour. In
7 contrast, Adam received 31.6 ml. If you compare that,
8 they had 3 to 7 ml per kilo hourly and, in contrast,
9 Adam received 31.6 ml per kilo of free water. He stated
10 that:

11 "There are no compensatory mechanisms in the body
12 that can come into play anywhere quickly enough to
13 prevent brain swelling in the face of such an
14 inappropriate and massive -- in the context of
15 administration of fluid."

16 So Dr Taylor's explained that he wanted to give Adam
17 fluids to make him hypervolemic -- that is to increase
18 his circulating blood volume -- and to increase Adam's
19 blood pressure, as that was vital to allow perfusion of
20 the vital organs and the donor kidney. The fluid that
21 he gave to do that was the HPPF, and Dr Taylor has
22 commented that his fluid management of Adam was going
23 according to his presurgery plan up to about 9 o'clock
24 when Adam's blood loss became problematic.

25 That brings me on to the next point, which is blood

1 loss. There is an issue and some disagreement,
2 particularly between Dr Taylor and Mr Keane, as to the
3 volume of blood Adam lost during the surgery. That is a
4 matter that will be pursued during the oral hearing.

5 Dr Taylor states in his deposition to the coroner
6 that there was substantial ongoing blood loss from the
7 surgery and he stated that the haemoglobin fell from
8 10.5 to an estimated 6.1 during the surgery, which
9 confirms significant blood loss, and that there was
10 328 ml of blood loss in the swabs, which started of
11 light but increased in size. There was 500 ml of blood
12 in the suction bottle and an unknown amount in the
13 towels and drapes, which he estimates to be greater than
14 300 ml.

15 So Dr Taylor has several estimates for the total
16 blood loss, including 1,128, 1,211, 1,211, 1,411,
17 depending on which statement you're looking at.

18 Mr Keane disagrees. He states:

19 "There was no major bleeding in Adam's case as no
20 more than two units were used to replace blood loss.
21 In addition, the blood loss of 1200CCs was not all
22 blood, but contained approximately 600 ml of urine --
23 which is another issue about how much urine people think
24 was produced by Adam during surgery -- peritoneal
25 dialysis fluid and slushed ice used to cool the kidney

1 until the vascular anastomoses were complete.

2 He also states that Adam received between 250 and
3 350 ml of blood, not 500 ml as stated by Dr Taylor.

4 Dr Haynes has examined the records and the statement of
5 Dr Taylor and Mr Keane and he suggests that the blood
6 loss was somewhere in between 528 and 1,128 ml, and most
7 probably 750 to 1,000 ml, although he concedes that this
8 remains an estimate little better than an informed guess
9 and it may be an issue for record keeping that one is
10 making a guess as to the extent of blood loss.

11 If I move then to CVP. Central venous pressure is
12 a measure of the pressure of blood in one of the main
13 veins draining into the heart and offers a guide to the
14 amount of blood returning to the heart and the ability
15 of the heart to pump that blood out of the arterial
16 system. It's affected by various events including
17 whether or not the circulation needs more fluid in it
18 for the heart to pump blood effectively or the opposite,
19 whether the circulation is overloaded, so putting
20 a strain on the heart. And Dr Haynes has commented that
21 a continuous display of central venous pressure would be
22 required in a patient such as Adam.

23 We have provided a photograph of a monitor to
24 indicate a continuous display. It's worth a quick look
25 at that. 300-036-054. There we are. This is not the

1 actual monitor that was used in Adam's case, and it may
2 not even be -- and probably isn't -- the particular
3 model. But it is being provided for illustrative
4 purposes so that you can see the sort of continuous
5 trace that would have been available to anybody wanting
6 to see what was happening to a range of values, and you
7 can see the second one there, CVP.

8 We have also provided a diagram to explain that CVP
9 waveform because, if you look at it, it's a very
10 particular shape. Let's have a look at 300-035-053.
11 There you are. That's the typical trace. I'm not going
12 to go through what all those highs and lows mean on the
13 trace. It's there for you to look at. What you will
14 have seen in the papers and in the statements as to
15 whether there was a waveform or a trace -- that's the
16 sort of typical waveform or trace one is looking for --
17 and one is looking for differences in that and
18 why we are seeing those differences.

19 So the CVP recording was commenced at just prior to
20 8 o'clock with a reading of 17 and it rose to -- these
21 measurements are in mercury. It's also possible to
22 measure them in water, but these are in mercury. It
23 rose to over 20, according to the trace, by 9 in the
24 morning and reached 30 at about 10. And you can see
25 that from the monitor printouts of his surgery.

1 If we just look very quickly at that so you see what I'm
2 talking about. 094-192-908.

3 Maybe it's not going to come up. Anyway, you will
4 have that in your papers and you can see that trace.
5 There is also a trace from the monitor printout of when
6 he was in paediatric intensive care and the intensive
7 care unit daily record sheet is there. It shows that
8 Adam's central venous pressure fell to about 11 on his
9 transfer to paediatric intensive care at about noon, and
10 it doesn't appear to go beyond about 14 all the time
11 he was there on 27 November.

12 A word of caution about these printouts. They don't
13 show the real time CVP readings. That would literally
14 have been spooling out in real time. What they show is
15 a compressed version which produces a graph of the
16 average CVP readings, and that's what's capable of
17 producing from 7 o'clock in the morning to 12 noon or
18 11 o'clock or whenever they stop into essentially
19 a one-page sheet. Dr Taylor stated in his deposition to
20 the coroner that there were both cardiac and respiratory
21 patterns to the waveform, confirming correct
22 intravascular placement.

23 THE CHAIRMAN: If you just pause. I'm conscious of the
24 promise that we've made to everyone to finish this by
25 lunch. But what you have done in the next, I think,

1 four pages of this opening from paragraph 418 to
2 paragraph 430 is to set out the positions of Dr Taylor
3 and various inquiry experts --

4 MS ANYADIKE-DANES: Yes.

5 THE CHAIRMAN: -- about CVP, including what was discussed
6 at the second experts' meeting on 9 March; isn't that
7 right?

8 MS ANYADIKE-DANES: Yes. Not just about the CVP levels, but
9 also, importantly, about whether there was or there
10 wasn't a waveform.

11 THE CHAIRMAN: Yes, and then you bring those to a head at
12 paragraph 431.

13 MS ANYADIKE-DANES: Yes.

14 THE CHAIRMAN: Perhaps you'd move to 431. As I said at the
15 start, a lot of the people here today have this in front
16 of them, and those who don't will be able to look at the
17 full opening on the inquiry website later on today. So
18 would it help to go forward to 431?

19 MS ANYADIKE-DANES: Yes, Mr Chairman.

20 So as a result of the various statements of the
21 actual clinicians, which is largely Dr Taylor, but the
22 comments on those that are in reports from Dr Coulthard,
23 Professor Gross, Dr Haynes and also, for that matter,
24 Mr Forsythe and Mr Rigg, who are all inquiry experts.
25 They have all looked at the contemporaneous information,

1 they have looked at Dr Taylor's statements and produced
2 their own comments in their reports. And as a result of
3 all of that, one can distill the issues in relation to
4 CVP that we really need to address at the oral hearing.

5 They are: what the CVP catheter was measuring over
6 the course of Adam's transplant surgery. The whole CVP
7 issue is a very important issue for two reasons. One,
8 it's something that guides the anaesthetist in his role
9 in managing the fluid management of Adam. Secondly,
10 it's something that the surgeons are very keen to know,
11 but you will recall that earlier Mr Keane said it's
12 actually one of the most important values for the
13 surgeon to know is what the CVP is. The surgeons are
14 acutely conscious of blood loss as it's very important
15 to them, as it is to the anaesthetists. So the CVP is
16 a very important value, and that's why a certain amount
17 of time has been spent trying to understand what people
18 at the time knew about it, thought about it and did
19 about it. So what the CVP catheter was actually
20 measuring over the course of Adam's surgery is
21 an important issue to be determined.

22 The use that can properly be made of the CVP
23 readings during the course of Adam's transplant surgery
24 is another issue. That monitor was producing certain
25 values. They were interpreted in a certain way by

1 Dr Taylor. There will be an issue as to whether or not
2 he was entitled to interpret them in that way.

3 Then whether he should have continued on with the
4 CVP. He expresses his views as to what he thought those
5 values were actually measuring and how accurate
6 a representation he thought they were of Adam's central
7 venous pressure. They were certainly measuring
8 something, something at the top of the catheter, but
9 what relevance that had or how that compared with what
10 Adam's central venous pressure actually was is the big
11 issue for him. And he expressed the view that he didn't
12 think that it was correctly measuring that, and so there
13 is an issue as to the extent to which he should have
14 simply carried on without having any accurate
15 measurement of Adam's central venous pressure.

16 What he, in fact, ended up using it for is for
17 relative change, but he didn't know, on his own
18 evidence, what Adam's central venous pressure actually
19 was. And he had various reasons why he didn't know
20 that.

21 Then fourthly, whether Dr Taylor should have relied
22 upon or otherwise reacted to the CVP readings that he
23 received. In other words, should he even have used them
24 for relative change? Were they even appropriate for
25 that? And what should he have done about it? When he

1 expressed the view that he didn't think it was measuring
2 Adam's central venous pressure, then what else could he
3 have done -- what else could anybody have done -- to
4 ensure that there was some accurate way of understanding
5 Adam's central venous pressure? And that, of course,
6 will go into another issue, which I raise later on,
7 which is the quality of the communication between the
8 two teams in that operating theatre during the course of
9 Adam's surgery.

10 So Dr Taylor has also stated in his deposition to
11 the coroner that there was a sudden increase in CVP to
12 28 when the table was raised 5 to 6 inches for surgical
13 reasons. We are not entirely sure why the table was
14 raised for surgical reasons, who requested it and what
15 consideration anybody should have given as to its
16 possible implications, so that's one of the things that
17 we will consider. It may be that there's a fairly
18 standard answer for that. But in any event, we will
19 explore who took that decision and what they should have
20 had in mind when they asked for it to happen.

21 Mr Keane has absolutely no recollection of being
22 made aware of any problems with the CVP although, as
23 I've just said, he does state that the central venous
24 pressure was the most important parameter I would rely
25 on:

1 "I would want his CVP to be 10 to 12 when the clamps
2 came off."

3 He also claims not to have been aware that the CVP
4 was recorded as 17 at the start of surgery, and he
5 expresses a view that such a value could be attributed
6 to misplacement, kinking of the line or overhydration
7 and states that:

8 "If [he] had been aware of the 17, I would have
9 asked the anaesthetist to ensure the CVP reading was
10 truly 17. It is normal to subtract 5 from the reading
11 in a ventilated patient. If it was truly 17, then seek
12 medical input from Savage. I would have checked the
13 position, the flow in the line and, if this was a true
14 reading, restricted Adam's fluids and considered giving
15 him a diuretic."

16 And there is therefore an issue to be addressed
17 at the oral hearing as to whether Mr Keane could or
18 should have known Adam's CVP was registering at levels
19 of 17, over 20 and as high as 30 at any time.

20 Dr O'Connor, who's the other nephrologist who
21 replaced Professor Savage and came into the operating
22 theatre from time to time, claims that she discussed the
23 CVP with Dr Taylor as she had noted a high reading of 30
24 perioperatively -- that's in this period we are talking
25 about. He informed her that the reading had been 17

1 at the time of the insertion of the line and that as
2 this was clinically unlikely in a child who had received
3 overnight dialysis, he had presumed the reading to be
4 inaccurate. Dr O'Connor formed the view that:

5 "Due to the high initial CVP, the accuracy of the
6 recordings was uncertain. I assumed that Adam may have
7 had one of his external jugular veins tied off as this
8 was common practice in the insertion of central venous
9 lines in the Royal in 1995."

10 And she expands on that a little bit in her
11 statement of September 2011:

12 "I noted that the CVP reading was 30 and expressed
13 my concern about this to Dr Taylor. He informed me that
14 the CVP line had been difficult to insert."

15 Which you will recall some of his earlier statements
16 about that insertion:

17 "And that the recording had been 17 at the time of
18 the insertion of the line as this was clinically
19 unlikely in a child who had received overnight dialysis
20 and who had received his full and normal quota of
21 fluids. I understood that he presumed the reading to be
22 inaccurate as the line could be malpositioned."

23 Whether Dr O'Connor dealt appropriately with the
24 issue of the CVP reading being high and whether she said
25 or should have said something about this to Mr Keane or

1 Dr Taylor or to both of them, that's a matter that will
2 be pursued at the oral hearing.

3 We'll move to the blood gas result of 09.32.
4 Dr Taylor sent a blood sample to be analysed at the
5 blood gas machine, which is quite close to the
6 paediatric intensive care. In fact, you can see where
7 it is from the photographs that I referred to in the
8 general opening. He gives his reason for doing so in
9 his statement of September last year, which was to
10 assess Adam's pH, pO₂ and haematocrit. He received the
11 results of the blood gas analysis at 09.32, which shows
12 a haematocrit of 18 per cent and a sodium level of
13 123 mmol/L. And it that sodium level that has focused
14 a lot of attention, but latterly so too has the
15 haematocrit.

16 Dr Taylor states in his statement of October that
17 he'd been told that the blood gas machine did not
18 produce reliable results for serum electrolytes, mainly
19 because of the dilutional effects of adding liquid
20 heparin to the syringe, which would tend to produce
21 artefactually low electrolyte concentrations. What he
22 means is that adding liquid heparin is something that
23 was done to flush through the line and what he's really
24 saying is that the presence of even traces of that
25 heparin in the line could lead to an incorrect serum

1 sodium value.

2 The inquiry obtained a witness statement from
3 David Wheeler from Instrumentation Laboratories.
4 They're the manufacturers of the blood gas analyser that
5 was used in Adam's case and he states that although they
6 don't recommend sodium heparin for use as an
7 anticoagulant -- that's actually what it is and why
8 that's why they use it to flush it through -- because
9 doing so will increase sodium levels by 1 to 3
10 millimoles, even in the presence of the correct
11 proportion of heparin and blood. So there you see the
12 significance: according to him, it increases the serum
13 sodium level.

14 Dr Haynes disagrees with Dr Taylor. He states in
15 his report of August last year that the measurement
16 should have been believed and steps taken to correct the
17 abnormality as well as any cerebral oedema that may have
18 ensued as a result. And he also states that he would
19 have considered ceasing immediately the administration
20 of any intravenous fluid containing less than 131
21 millimoles and would have given a dose of 0.5 grams per
22 kilo of mannitol. Ultimately, you know that mannitol
23 was prescribed to Adam, but much later on. In addition,
24 he says that he would have considered administering
25 hypertonic saline solution -- typically as a 3 per cent

1 solution -- and he was of the view that frequent blood
2 samples would have been required to monitor the
3 corrective progress. That's what he thinks should have
4 happened once they got the result back at 09.32.

5 Dr Coulthard calculates in his report that the
6 plasma sodium reading of 123 millimoles measured then
7 likely to be correct and he states in his report -- one
8 of his early reports in December 2010 -- that it should
9 have initiated an urgent serum sodium measurement from
10 the hospital laboratory. He reiterates that in one of
11 his recent reports from February this year.

12 So the following issues, we think, will need to be
13 addressed at the oral hearing: whether Dr Taylor had
14 been told that the serum sodium result from the blood
15 gas analyser should not be relied upon and, if so, in
16 what circumstances. That is possibly also an issue for
17 governance. Irrespective of what he had been told,
18 whether the blood gas sodium result should have been
19 relied upon by him and the other members of the
20 transplant team and for what purpose. And how Dr Taylor
21 and the other members of the transplant team should have
22 reacted to that result in terms of their treatment and
23 management of Adam during this perioperative stage.

24 If I move finally, on the monitoring side, to the
25 physical appearance. At the end of the transplant

1 surgery, Dr Taylor states that he noted that Adam's
2 face, hands and feet were swollen when the sterile
3 towels were removed. Professor Gross has suggested that
4 Adam may have been fluid overloaded to such degree that
5 he manifested oedema of the skin as a sign of increased
6 extracellular fluid. And Dr Haynes, when he saw the
7 photographs that were taken of Adam, he commented that,
8 in his opinion, they showed very marked swelling of
9 Adam's head and arms, so Adam's appearance and the
10 significance of it is something to be considered at the
11 oral hearing.

12 If I move now into the domain of the surgeons, which
13 is the conduct of the transplant surgery. The surgical
14 team was Mr Keane as consultant urologist and Mr Brown
15 as a consultant paediatric surgeon to assist him.
16 Mr Keane has set out the steps in transplant surgery in
17 his inquiry witness statement as to what he would have
18 done, and the order of those turns out to be quite
19 interesting for the purposes of timing. First was the
20 incision, identification and exposure of the vessels
21 which are going to be used and the approach. So he
22 would have started with an incision in Adam.

23 Then, isolating the vessels in preparation for
24 clamping. Then he would have moved to cleaning and
25 preparing the donor kidney, the vascular and ureteric

1 anastomoses and wound closure.

2 If we then go to timing of the surgery. It is not
3 entirely clear, Mr Chairman, when the actual transplant
4 surgery -- ie knife to skin -- commenced. That time is
5 not recorded in Adam's medical notes and records and it
6 really only appears by way of statements from those
7 involved, primarily Mr Keane. He states in his
8 deposition to the coroner the fact that he has a number
9 of differing views on it. If we start with his
10 deposition to the coroner on 18 June, he says the
11 operation started at 7.30. Then he's asked questions
12 during the inquest and he says: well, the operation
13 would have started between 7.15 and 8 am. And then in
14 his inquiry witness statement, when he's specifically
15 asked so we can bring some clarity to it, "Knife to
16 skin; when it did it start?", he says it started at
17 approximately 7.15. And then when he was pressed to
18 explain the basis of how he arrived at that time, he
19 said in his witness statement of September 2011:

20 "Having reflected on this and considering the
21 evidence, it would now appear that the surgery started
22 at around 8 am."

23 The position on timing is made even less clear
24 because he goes on in that September statement, when he
25 deals with the times in relation to the steps in the

1 procedure, as he states that between approximately 7 and
2 8 am, he would have scrubbed and prepared the kidney and
3 then he states that the surgery started at approximately
4 8 am:

5 "I made an incision into the right iliac fossa and
6 opened the peritoneum."

7 But it all depends whether he is following the order
8 he originally stated or not, and so that is an issue to
9 be clarified during the oral hearing.

10 Condition of the kidney and the ischaemic time. The
11 significance of the preparation time is its contribution
12 to what has previously been referred to as the warm
13 ischaemic time. Mr Keane describes in his statement of
14 September 2011 what he did by way of preparing the donor
15 kidney and states it would have taken several minutes.
16 And he sets it all out: excising the fats, cleaning the
17 artery and the vein, joining the two arteries on
18 a single patch. As you'll recall from the form, there
19 were two arteries on a single patch. In fact, we'll
20 come to that in a minute.

21 We have provided some photographs. I know that time
22 is pressing, but it may just help you understand the
23 sort of time that might be involved in some of these
24 processes. 300-041-059. That's what it comes in,
25 "Human kidney for transplant".

1 Then if we go to 300-042-060. Within that box,
2 that's how it's been preserved. If we move on to
3 300-043-061. There you see it being taken -- I have to
4 say none of this is anything to do with Adam's own
5 kidney or own transplant surgery.

6 THE CHAIRMAN: I think we should just make the general point
7 that I think there are no photographs at all which are
8 going to be produced which relate to Adam. These are
9 all illustrations?

10 MS ANYADIKE-DANES: There are photographs of Adam's brain
11 and as soon as we got to a photograph of Adam, I will
12 say that. But until then ... Then if we go to
13 300-044-062. That is a picture of the surgeon preparing
14 the donor kidney for transplant, cleaning and testing
15 it. At 300-045-063 -- in fact, on that one you can
16 actually see that that kidney actually has two arteries
17 and he's working on those. There are various ways of
18 deal with the fact if you have a kidney with two
19 arteries and that's something that I think that not only
20 Mr Keane, but also the inquiry's experts will address,
21 different ways of dealing with it. That one has two.

22 Mr Keane states that the kidney -- this is how he
23 addresses warm ischaemic time, and this is important:

24 "The kidney is kept in swabs, wrapped in slushed ice
25 during the preparation and returned to the ice-water

1 solution at the end of the preparation."

2 You'll have seen in the photographs someone working
3 on one:

4 "I cannot state the time of the vascular
5 anastomoses, but the kidney is kept wrapped in
6 ice-soaked swabs during the time taken to perform the
7 anastomoses ...(reading to the words)... arterial clamp
8 was seconds as there was no need to reapply them."

9 So in his view, the warm ischaemic time is seconds.
10 Messrs Forsythe and Rigg describe the process in their
11 report and they explain that the donor kidney is in
12 a sterile bowl containing ice and cold fluid whilst the
13 surgeon is working on it. They acknowledge that the
14 time for the surgeon to inspect, clean and trim and
15 separate the vessels varies and will be longer when
16 there is a complex anatomy or there is damage to repair.
17 They state that, typically, the preparation time takes
18 20 to 30 minutes to do that and it's recognised good
19 practice to do this before the patient is anaesthetised
20 in case the kidney is unusable and the transplant cannot
21 proceed. In case they find it's damaged or there's some
22 other anatomical defect with it, they won't have put,
23 unnecessarily, a patient under anaesthesia.

24 As you know, the UK transplant form shows that the
25 kidney had two arteries. In fact, perhaps we'd better

1 look at it since there might be some -- I wonder if
2 we can pull it up. 058-009-027. Yes. You can see up
3 there:

4 "Two arteries. Number of arterial patches, 1.
5 Number of arteries on patches, 3. Number of
6 veins [can't entirely see it, it looks like 1].
7 Branches tied, 1."

8 Then there's a whole long list of things to which 1
9 is added and right down at the bottom, "Other, please
10 specify".

11 It's pretty difficult to make out. We are, in fact,
12 getting Adam's original medical notes and records into
13 Banbridge for the start of the evidence and hopefully
14 the original will be easier to work out. But in any
15 event, the DLS has provided correspondence to the
16 inquiry to say that what that says is:

17 "Query, third artery tied off plus cut-off patch."

18 And they have deciphered that with the assistance of
19 Miss Donaghy, who was actually the transplant
20 coordinator. She, it would appear, completed some part
21 of the form, although she wouldn't have completed that
22 side of the form because that's the side that comes from
23 the donor end.

24 The inquiry's experts have been asked to address
25 that and their response is: that doesn't change the

1 facts of our report, but it does re-emphasise the need
2 for the surgeon to have been involved in the decision to
3 accept the kidney and the need to inspect the kidney and
4 to do the bench work before the patient was
5 anaesthetised. The likely effect of those features of
6 the donor kidney on its preparation time is something
7 that will be addressed during the oral hearing.

8 I just want to whizz through a few photographs which
9 are important to continue to understand this aspect of
10 warm ischaemic time. 300-050-068. Apologies for the
11 squeamish. That is a donor kidney about to be
12 transplanted. You see it's very pale. Then if we look
13 at 300-051-069. There it is held in a swab by -- it's
14 being sutured in place.

15 Then if we look at 300-052-070. You can see it
16 better. It's being held in a swab there as they're
17 working to suture it in place. Then if we look at
18 300-053-071, if you recall how pale it was before, there
19 you see it pinker at one end. That's the pinking up
20 that you will see in the papers. And that is what
21 happens, as I understand it, as the blood begins to flow
22 into the kidney.

23 Messrs Forsythe and Rigg address in their joint
24 report this whole issue of the warm ischaemic time and,
25 more to the point, how Mr Keane categorises it. They

1 say:

2 "The first period of warm ischaemic time occurs at
3 the time of organ retrieval ...(reading to the
4 words)... circulation of the kidney stops until the
5 kidneys are cooled by ...(reading to the words)... zero
6 minutes for Adam's donor."

7 So we don't have to worry about warm ischaemic time
8 at the donor end:

9 "The second warm ischaemic time starts from when the
10 kidney is removed from the cold and finishes when the
11 recipient blood is perfused into the kidney."

12 That's what you see happening there. They go on to
13 deal with the anastomosis time -- which they state is
14 the same thing as the second warm ischaemic time -- and
15 they address in particular the extent to which the donor
16 kidney may become warmed up during anastomosis. And
17 that's important. They say:

18 "It begins when the kidney is removed from the cold
19 and ends when the recipient's blood is perfused into the
20 kidney. During this time, the assistant surgeon holds
21 the kidney [which you'll have seen] in a manner which
22 facilitates the operating surgeon in performing the
23 anastomoses, which is the ...(reading to the words)...
24 direct contact with both the recipient and also the
25 gloved hands of the surgeon. These two forms of

1 contact, the ambient temperature and the energy of the
2 strong operating lights [which is something that I
3 mentioned before when I showed you the photograph of the
4 operating theatre] mean that the kidney gradually warms,
5 rising to a core temperature above 10 centigrade at
6 approximately 20 minutes."

7 And in their joint report, Messrs Forsythe and Rigg
8 state:

9 "The anastomosis time will usually be under 30 to 40
10 minutes ...(reading to the words)... 60 minutes would be
11 exceptional and be due to intraoperative technical
12 difficulties."

13 Their view echoes that of Mr Koffman. You'll recall
14 he was the surgeon expert for the PSNI:

15 "Anastomosis times may vary from approximately
16 20 minutes to 60 minutes in the case of a difficult
17 anastomosis."

18 And Messrs Forsythe and Rigg go on to say that two
19 hours of warm ischaemic time is very likely to cause
20 irrevocable damage to the kidney. In fact, if one looks
21 at the UK transplant form, it records the donor kidney
22 as having been removed from the ice in Belfast at 8.30
23 in the morning and perfused with Adam's blood at 10.30
24 in the morning. That's recorded on the form itself,
25 which, according to Messrs Forsythe and Rigg, means that

1 the warm ischaemic time of the donor kidney, or the
2 anastomosis time, was two hours. And the length of that
3 warm ischaemic time or anastomosis time is something
4 that is going to be pursued in the oral hearing, as will
5 the question of what effect, if any, it is likely to
6 have had on the donor kidney at or after its
7 transplantation.

8 If we move now to surgical approach, once all the
9 cleaning and preparation work has been done, we go to
10 the surgical approach. The actual method of anastomosis
11 used by Mr Keane was to join the renal vein of the donor
12 kidney to Adam's external iliac vein and the two renal
13 arteries of the donor kidney on a common patch to Adam's
14 iliac artery. Messrs Forsythe and Rigg have provided
15 a diagrammatic representation of what was happening and
16 I wonder if we can see that. 203-004-083.

17 There we are. So there you can see exactly what
18 it is that Mr Keane says he did in terms of the arteries
19 and veins that were available for use. As you can see,
20 the external iliac artery that Mr Keane used is
21 a considerably narrower vessel than either the common
22 iliac artery or the aorta, and similarly the external
23 iliac vein that he used is considerably narrower than
24 either the inferior vena cava. And he explains in his
25 witness statement:

1 "I considered using the aorta common iliac, but it
2 was my judgment that Adam's iliac vessels were
3 satisfactory in calibre. No surgical complication
4 occurred. I considered the common iliac and vena cava,
5 but my judgment was that the external, iliac vein was
6 suitable. No surgical complication occurred."

7 Mr Koffman considered Mr Keane's approach in his
8 report. He says:

9 "... the major decision would have been about
10 whether to anastomise the transplant renal vessels
11 (artery and vein) to the iliac vessels, as in adults, or
12 because of Adam's small size, to choose larger blood
13 vessels such as the aorta and vena cava for those
14 anastomoses ...(reading to the words)... chose to use
15 iliac vessels and, although this is not the approach
16 I would use normally for a four year-old, 20 kilos,
17 it is used by some surgeons carrying out paediatric
18 transplants. Therefore, I would not criticise the use
19 of this approach."

20 And he goes on to state:

21 "There were considerable difficulties experienced
22 during this operation, chiefly because of the previous
23 surgery, but also partly because of Adam's age and
24 weight, and it is impossible to ascertain from the
25 operation note whether the anastomoses were performed in

1 a technically sound way."

2 And the significance of the anastomoses is explained
3 and he says:

4 "The likelihood is that the kidney was viable at the
5 time of the implantation in Adam, but there was
6 subsequent thrombosis of the artery or the vein either
7 due to technical factors or due to low blood flow
8 secondary to acute tubular necrosis or due to some
9 hypercoaguable."

10 And finally, he says in a letter that he provided to
11 the inquiry:

12 "I cannot be certain that there was not a technical
13 error in the performance of the arterial or venous
14 anastomoses or in the positioning of the kidney before
15 closure."

16 If I pause there to explain the significance of all
17 of this. Adam is a four year-old boy, 20 kilos. He is
18 having transplanted into him, effectively, an adult
19 kidney. So he has a four year-old boy 20 kilos sized
20 vessels to be anastomosed onto an adult kidney,
21 effectively. And the issue is: if you do the normal
22 like-for-like, are you going to provide sufficiently
23 large dimension vessels to allow an adequate flow of
24 blood to support the survival of the graft of that
25 kidney? That's what this is all about. And the

1 question is if you're dealing with a small child, should
2 you use the child's larger vessels to enable an adequate
3 supply of blood to the transplanted kidney?

4 Messrs Forsythe and Rigg take a different view in
5 their joint report and agree with Mr Koffman that they
6 would not have performed the anastomoses in the way that
7 Mr Keane did and they disagree that it was nonetheless
8 an acceptable method in view of Adam's size and the
9 effectively adult-sized donor kidney. This is what they
10 say:

11 "Children under five years of age or under 20 kilos
12 do require special consideration in terms of surgical
13 approach. The surgical approach would usually be an
14 extraperitoneal approach in the right iliac fossa with
15 a view to using the common iliac artery or the aorta,
16 the main artery of the abdomen, for the arterial
17 anastomoses and the common iliac vein or inferior vena
18 cava -- the larger veins -- for the venous anastomoses.
19 In a young child aged 5 years of age, it is unacceptable
20 to use the external iliac artery. This would
21 significantly increase the chance of renal artery
22 thrombosis and loss of the kidney. Conventional
23 practice both in 1995 and now would be to use the larger
24 common iliac artery or aorta."

25 Just before where they had referred to the approach,

1 what they're really saying is: if you were to do this
2 method that they say, just as Mr Koffman said, it
3 requires a different approach. You can't go in the same
4 way and choose to hook it up in the way you would with
5 adult surgery and try this alternative method with
6 a child. If you're doing this, you have a different
7 approach to how you conduct the surgery.

8 Then they go on to say that:

9 "Mr Keane's reference to Adam's iliac vessels being
10 of satisfactory calibre is inappropriate as a normal
11 calibre external iliac artery is not suitable to use in
12 a five year-old child."

13 In other words, that he may have had perfectly
14 acceptable normal calibre, his artery is just too small.
15 That is effectively what they're saying. None of the
16 experts have stated that the infarction of the kidney
17 contributed to Adam's death. That's important to note.
18 But Professor Gross states in his report as far back
19 as January 2011:

20 "The malfunctioning transplant in itself did not
21 contribute to Adam's hyponatraemia since it was the
22 renal failure of his native kidneys that presented
23 excretion of major amounts of free water. However, if
24 the transplant functioned well, it is likely that
25 it would have begun to excrete free water, which could

1 have reduced the degree of hyponatraemia in Adam."

2 So there are issues to be addressed in the oral
3 hearing as to the way in which the anastomosis was
4 carried out, the adequacy or the justification for the
5 method and any possible consequences for the viability
6 of the donor kidney and generally.

7 If I move now to something I've mentioned before,
8 which is the communication between the anaesthetic and
9 surgical teams. That is a very important issue to be
10 addressed in the oral hearing in terms of the adequacy
11 of communication between the anaesthetic and surgical
12 teams. And a number of experts identify its importance
13 for successful procedure. But a real query has been
14 raised by some of the experts as to whether the two
15 teams communicated appropriately with each other over
16 the course of transplant surgery and, if they did not do
17 so, then what effect that had. If one looks at
18 Dr Haynes, he says:

19 "Communication between surgeon and anaesthetist,
20 especially with regard to the volume of blood loss
21 during the operation, does not appear to have been good.
22 While certainly the anaesthetists and surgeon had
23 different views as to what blood loss was, my overall
24 impression is that there appears to be a failure of
25 senior clinicians involved in Adam's transplant

1 operation to work effectively as a team. Reading and
2 re-reading the various witness statements does not
3 reassure me that surgeon and anaesthetist were working
4 effectively together as a team, communicating well with
5 each other."

6 They are not the only ones to comment on that. But
7 in any event, that is going to be an issue that will be
8 explored in the oral hearing.

9 If one moves now to the role of the nephrologist
10 during the surgery. That is an issue that we also want
11 to consider during the oral hearings. Dr Savage states
12 that it was his habit to observe the procedure
13 intermittently and to be close at hand. He states that
14 he would have changed into theatre scrubs, but would not
15 have been gowned as an observer. He also states that he
16 left "around 9 o'clock" to undertake some duties at the
17 university.

18 Dr O'Connor states that Adam's surgery was in
19 progress when she arrived that morning and made herself
20 available to attend to Adam's post-operative care. She
21 was present in theatre towards the end of the operation
22 and also that she went into theatre on several occasions
23 as she was keen to know how quickly the operation was
24 progressing.

25 Pausing there. A principal reason for that is that

1 the nephrologist is usually there when the
2 immunosuppressant drugs are being given so the
3 nephrologist needs to what stage they have reached in
4 the operation, quite apart from any other reason they
5 might be there.

6 Dr Coulthard considered all of that in his report to
7 the inquiry and he describes consultant paediatric
8 nephrologists as the main medical carers for children
9 with end-stage renal failure. He says that the
10 consultant paediatric nephrologist should visit the
11 operating theatre intermittently during the child's
12 transplantation, when it's practicable, but it doesn't
13 constitute a formal part of the paediatric
14 nephrologist's role. Then he went on to say it's more
15 a social aspect of providing holistic care to these
16 children and their families.

17 Well, that will be pursued as exactly what the role
18 is. You will recall that they all produced that form
19 where they ascribe various roles to various clinicians
20 and the role of the nephrologist is also addressed
21 in the various stages and phases of the transplant
22 surgery. So if I move now to the end of the transplant
23 surgery and the issues that arise.

24 Just as it's a little bit difficult to work out
25 precisely when the surgery commenced, knife to skin,

1 because it is not recorded, it's also not quite so
2 clear-cut to work out exactly when it ended. That is
3 when the transplant surgery itself ended because that's
4 not recorded either. What we do have is the anaesthetic
5 record ends at 11 with Dr Taylor administering drugs to
6 reverse the neuromuscular blockade and Adam's medical
7 notes record that he was admitted to paediatric
8 intensive care at 12.05. But we are dependent upon the
9 statements of the clinicians who were directly involved
10 for the actual time that Mr Keane left the operating
11 theatre and the actual time of the end of the surgery.

12 There is no reference in Mr Keane's deposition and
13 evidence to the coroner to him not staying until the end
14 of the transplant surgery or of Mr Brown being involved
15 in any particular task in relation to the surgery. But
16 Mr Keane states in his inquiry witness statement of 2005
17 that he left 10 minutes prior to the end of anaesthesia
18 to attend an emergency, leaving Mr Brown to close the
19 wound. Mr Brown has provided a report to the coroner or
20 did provide a report to the coroner, but it makes no
21 reference to him closing the wound or to Mr Keane
22 leaving before the end of the transplant surgery.
23 Indeed, he refers to it in less than categorical terms
24 in his PSNI statement. He says:

25 "It would appear to be the case that Mr Keane left

1 myself to sew up the wound. I don't have any
2 recollection of the end of the operation or the
3 anaesthetist trying to bring Adam round."

4 Subsequently, Mr Keane puts the time that he left
5 the operating theatre at approximately 10.30. And he
6 claims that, at that stage:

7 "There was pulsatile flow in the artery, the ureter
8 had been connected successfully and the kidney was well
9 perfused."

10 Earlier in his deposition to the coroner, he says at
11 the end of the procedure it was obvious that the kidney
12 was not perfusing as well as it had done. Obviously
13 an issue there.

14 The views of the other witnesses are not entirely
15 consistent on the condition of the donor kidney. So
16 Dr O'Connor, just going through them quickly, has
17 recorded in Adam's medical notes and records that the
18 kidney looked bluish at the end of theatre. Staff Nurse
19 Popplestone was in the operating theatre as a scrub
20 nurse and she says in her PSNI statement that she
21 recalls the surgeons discussing possible discolouration
22 of the kidney at the time of the transplant, but then
23 she says the concern appears to have subsided as the
24 operation progressed.

25 Then Mr Brown says:

1 "From what I can remember, the kidney turned pink in
2 colour when it was transplanted and blood was put
3 through it. As far as I can remember, the kidney
4 remained pink in colour."

5 Mr Taylor comments in his deposition for the Coroner
6 that the kidney, at around 10 am, was not looking good
7 and not producing urine. Mr Keane says in his inquiry
8 witness statement:

9 "A minute or so after the completion of the vascular
10 anastomoses, a few drops of urine were produced."

11 Mr Brown has never been of that view. In his
12 statement to the coroner, he says:

13 "The perfusion of the kidney was satisfactory,
14 though at no stage did it produce any urine."

15 And he has reiterated that to the PSNI.

16 Then it seems that the pressure for Mr Keane to
17 leave -- so why he didn't stay to the end and close
18 himself -- was that he had received a phone call from
19 the Belfast City Hospital about a patient who was
20 undergoing -- and this may prove significant -- a
21 percutaneous nephrolithotomy was bleeding heavily in the
22 operating theatre and they needed help urgently.

23 However, Miss Donaghy, the transplant coordinator,
24 says in her PSNI statement, that when she went in to the
25 operating theatre, having spoken to Staff Nurse

1 Clingham, who told her that Adam might be brainstem dead
2 and was still in the operating theatre, she describes
3 the mood as very sombre and believes that the surgeons
4 were still at the table although she didn't know what
5 stage they were at or what time it was. Staff Nurse
6 Clingham says she doesn't recall any conversations in
7 respect of the progress. Miss Donaghy then goes on in a
8 further statement for the PSNI in which she is very
9 clear. She says:

10 "I can only say that I remember Patrick Keane,
11 surgeon, being at the table. There was another surgeon,
12 however I do not recall who it was. There were other
13 staff present in the operating theatre. However, I do
14 not recall who they were. I remember when I was in the
15 theatre wondering why they were all continuing on with
16 the procedure if the child was supposed to be brainstem
17 dead. However, I would not be able to say what part of
18 the procedure they were at."

19 She has made a witness statement for the inquiry in
20 much the same vein. For example, the one in September
21 was that:

22 "[She remembers] two surgeons standing at opposite
23 sides of the operating theatre. There was an
24 anaesthetist and a nursing staff in theatre."

25 The narrative of actually what happened is something

1 to be explored during the oral hearing, as is the issue
2 of the condition of the donor kidney, particularly in
3 view of the report of Professor Berry for the coroner.
4 He states that:

5 "The transplant kidney was infarcted [dead]. The
6 extent of the change suggested that this occurred at or
7 before the time of transplantation."

8 Professor Risdon, who was engaged as an expert for
9 the PSNI, states:

10 "In my opinion, the transplant kidney must have
11 suffered significant ischaemic damage prior to its
12 insertion for this degree of ischaemic damage to be
13 apparent at post-mortem."

14 Messrs Forsythe and Rigg state, in their view, that:

15 "... thrombosis of the kidney happened soon after
16 implantation due to poor positioning of the kidney, the
17 use of the smaller external iliac artery inflow or due
18 to a surgical technical problem."

19 And they deal with what those surgical technical
20 problems might be. One of them is the positioning of
21 the kidney before closure. I should say it is only, so
22 far as we're aware, Professor Berry and Professor Risdon
23 who have actually looked at histological slides of the
24 kidney to form a view as to what the extent of cellular
25 change had been and therefore to try and work back as to

1 what its condition may or may not have been at or around
2 the time it was being transplanted.

3 The issue of the positioning of the transplanted
4 kidney and closure of the wound, including the fact that
5 Mr Brown had never previously been involved in
6 a paediatric or adult, for that matter, renal transplant
7 and was left to do it is something that's going to be
8 considered further during the oral hearing.

9 If we go back to the information we have, it would
10 seem that the skin closure occurred at about 11 and over
11 a further 30 to 40 minutes, Adam was prepared for
12 transfer to paediatric intensive care and unsuccessful
13 attempts were made to wake him.

14 The theatre log of the other operating theatre shows
15 that Mr Brown was involved in a surgery that started at
16 12.15 and finished at 12.50 with Dr Campbell as the
17 anaesthetist and, during that period, at about 11.30,
18 blood was taken from Adam for laboratory testing and the
19 results of that were received at 1 o'clock, roughly,
20 showing his serum sodium levels had fallen further to
21 19 millimoles.

22 The turnaround time on that sample is obviously
23 something that will be pursued because it was taken at
24 11.30 and was back at 1 o'clock.

25 If we go to record keeping. Dr Taylor is very clear

1 when he gave his report to the coroner -- Dr Alexander
2 is very clear that:

3 "Dr Taylor is to be commended on the detailed notes
4 and records he kept throughout the anaesthesia."

5 Messrs Forsythe and Rigg in their report say that it
6 was brief and the key points were there. Then they go
7 on to identify further information that should have been
8 included to produce what they regard as a complete
9 record, and they list those out. I'm not going to go
10 through them all, but essentially it's confirmation of
11 the extraperitoneal approach and whether the peritoneum
12 had been breached. Further detail or a diagram to the
13 reference to the arteries, inclusion of the time at the
14 beginning and end of anastomoses and, ideally, the cold
15 ischaemic time and better comments on the perfusion of
16 the kidney and the post-operative management plan.

17 Miss Ramsay is also an expert for the inquiry on
18 nursing. She is looked at the perioperative record of
19 nurses kept and she notes that Adam arrived in the
20 operating theatre with no care plan. Nevertheless, she
21 concludes that the operating theatre nursing records
22 were of an acceptable standard. The absence of a formal
23 care plan will be addressed during the oral hearing, as
24 will the fact that the anaesthetic record was neither
25 completed nor signed, and she says that it was "poor

1 practice to fail to sign records" -- "she" being
2 Ms Ramsay.

3 Two final sections really then in this phase.
4 Keeping Adam's family informed. Adam's mother sets out
5 in her witness statement that she left Adam in the
6 operating theatre with Dr Taylor. She believes, at
7 about 6.45, and waited in Musgrave Ward with her sister.
8 That time differs slightly from the anaesthetic record
9 and others. She goes on to say that she was notified of
10 Adam's progress on two occasions: at 9.30 by Dr Savage,
11 who was leaving for other duties; and at 10.30 by
12 Dr O'Connor. And she's pretty clear about the times.
13 She says that:

14 "Dr Savage and Dr O'Connor were very good at keeping
15 me informed of what they understood was happening in
16 theatre. At 9.30, I was told that things were
17 progressing well and that Mr Brown was assisting
18 Mr Keane."

19 You know her views on that. They have already been
20 rehearsed earlier:

21 "Some time after 10, I was told that the operation
22 was taking longer than expected because of Adam's
23 previous surgery and because of his weight. At around
24 12, I was told that Adam was out of theatre."

25 And she goes on to state that she was completely

1 unaware, and therefore by inference uninformed of the
2 dangers of fluid mismanagement until after Adam's death.
3 She goes on in her witness statement also to say that it
4 was not until 9.30 that she learned that Adam had
5 received an epidural and she wasn't happy because he had
6 been in a lot of pain before when he had received one
7 and she didn't want that again. She reiterates that
8 Dr Savage told her that all was well and, in the same
9 witness statement, she states that she was told that
10 Adam's bladder was enlarged and that, after the
11 transplant, she would need to catheterise him several
12 times a day. It seems she was told nothing about his
13 low serum sodium measurement at 9.32.

14 Dr O'Connor doesn't actually recall talking to
15 Adam's mother. Dr Savage does not believe he was in the
16 operating theatre at 9.32 or that he was aware of the
17 serum sodium value of 123. He thinks he left when he
18 handed over to Dr O'Connor at about 9 o'clock. That's
19 an issue to be pursued in the oral hearing, whether
20 either of the nephrologists knew about the low serum
21 sodium level at 9.32 and whether, even if they had, it
22 was the sort of information that should have been passed
23 on to Adam's mother and to what end. And generally, the
24 extent to which she was being kept adequately informed
25 of Adam's condition.

1 Finally in this phase, the response to Adam's
2 failure to wake. Dr O'Connor was present in the theatre
3 towards the end of Adam's operation and she says that
4 she was aware that Dr Taylor discovered Adam to have
5 fixed and dilated pupils. Dr Hill states in his Inquiry
6 witness statement I mentioned him previously as somebody who
7 had been part of an anaesthetic team with Dr Peter Crean in
8 carrying out a paediatric transplant prior to Adam's. He says in
9 his inquiry witness statement:

10 "In or around that time, I was assisting
11 Dr Rosalie Campbell in the adjacent theatre."

12 If you pull up the site plan that I have referred to
13 earlier in the general opening, you'll be able to see
14 the proximity between those two theatres. He states:

15 "At some point during the course of their theatre
16 list, Dr Campbell left to assist Dr Taylor because
17 a patient, which I now understand to be Adam Strain, was
18 slow to wake up."

19 The theatre log records Dr Campbell's attendance
20 in that adjacent theatre throughout both the morning and
21 afternoon list, so it appears she was there, but she
22 says though that she does not recall entering the
23 theatre during Adam's transplant and she has no
24 recollection of being asked for or of offering advice.
25 Obviously, that is something to be pursued at the oral

1 hearing.

2 Then, Mr Chairman, there's the next issue. I know
3 the time. I will do my best. There's the treatment
4 following surgery. This whole section is called "The
5 immediate post-operative stage", and the treatment
6 following surgery is essentially what was done when they
7 realised that Adam was slow to wake up. If I move
8 through that quickly, you will see that essentially
9 Dr O'Connor had noted that he was puffy, his CVP
10 measurement was 11 -- of water, not mercury -- and
11 he had no recorded output from the transplanted kidney.
12 She also queried two causes for his neurological
13 abnormalities. She thought he might have coned due to
14 cerebral oedema and that he had had high fluid intake
15 and possible abnormal cerebral venous drainage. Her
16 immediate plan was to give mannitol to decrease any
17 possible cerebral oedema and to restrict his fluid
18 intake.

19 She agreed with Dr Taylor's management of his
20 hyperventilation. She urgently requested urea and
21 electrolyte profiles and a neurological opinion.
22 Dr Haynes says what he would have done and he says
23 mannitol rather than hypertonic saline as a first line
24 therapy. He describes why and he says that he would
25 have been more likely to have administered mannitol as

1 initial therapy if he suspected the presence of cerebral
2 oedema in a patient, and the urgency is to reduce the
3 potential injury to brain cells.

4 Then there's communication with Adam's mother.
5 That is obviously an important area of investigation for
6 the inquiry, and who should have been informing the
7 mother as to what had happened. There is an issue as to
8 whether the surgeons should have been part of the
9 clinicians who spoke to the mother.

10 As it happens, none of the surgeons were present for
11 any of the discussions with Adam's mother. Mr Keane
12 says that he had left at that stage, having been called
13 away to his emergency. However, he does say that he
14 would have spoken to Adam's family in accordance with
15 his customary practice and that, in his absence, he
16 expected Mr Brown to speak to Adam's family.

17 Now, Mr Brown says that when he was asked why he
18 didn't do that, he said, "This is not a paediatric
19 surgical operation but a transplant. As I have
20 emphasised, my role was a technical one of acting as
21 assistant to the surgeon. I did not take any
22 responsibility either before or after the operation."

23 Well, that's his position. Dr Coulthard deals with
24 speaking to Adam's mother in his report. He says he
25 would have expected the anaesthetist to join the

1 anaesthetist [sic] as the patient's general management
2 and support would be his primary responsibility at the
3 time:

4 "... but in most cases I think the surgeon would
5 usually join the discussion as well."

6 So there will be an issue as to who should have
7 spoken and why people made the assumptions that they did
8 about speaking to Adam's mother.

9 If we go quickly to the CT scan, a lot of that is
10 covered in the discussions between the experts, but it's
11 simply just to record that there was one, and to compare
12 how the initial description of it compares with
13 Dr Anslow, who's the expert brought in by Dr Squier, the
14 inquiry expert. I won't go through it now, you'll see
15 it in his medical notes and records. But the important
16 thing to note is that Dr Anslow thinks that the
17 swelling, rather than being generalised, was more severe
18 in the posterior fossa. That is a point of significance
19 for Professor Kirkham and you'll have seen the way that
20 features in her report.

21 I will move very, very quickly to the X-rays. There
22 was an issue. The X-rays -- in fact, there were two of
23 them: one at 1.20 and one at 8.30. They were there
24 because they had detected a pulmonary oedema. As you
25 know, we haven't been able to track the X-ray that

1 should have been taken of Adam on the 26th. In fact, we
2 don't know that one was, but in any event we haven't
3 seen it so we can't compare between the before and
4 after.

5 But one can look at these two X-rays and there is
6 a difference of view amongst the experts and the
7 clinicians as to exactly what can be seen on these
8 X-rays. I think everybody is clear that you can see
9 where the CVP catheter is going. Dr Landes, the
10 inquiry's expert, has examined the X-rays and she says
11 that the lungs are clear in both photographs and she
12 doesn't consider that there was any oedema. That's
13 something that the clinicians had thought was present.
14 If one reads her report, she gives her reasons for how
15 it is that sometimes oedema is mistaken.

16 Then the DLS have provided a witness statement from
17 Dr Louise Sweeney. She is a consultant paediatric
18 radiologist at the Children's Hospital. She states that
19 there had been an increase in the heart size and
20 a deterioration in the appearance of the lungs due to an
21 increase in pulmonary oedema in both lungs. So
22 obviously there's a difference between the inquiry's
23 experts and Dr Louise Sweeney, and appropriate
24 interpretation of those two X-rays is something to be
25 considered at the oral hearing.

1 Possible venous obstruction is an important issue;
2 it assumed importance for not only the -- well, I can't
3 say the clinicians at the time, but certainly for
4 Dr Armour on the autopsy report and for the experts
5 thereafter. She says in her autopsy report:

6 "Another factor to be considered in this case is
7 cerebral perfusion. The autopsy revealed ligation of
8 the left internal jugular vein. The catheter tip of the
9 CVP was situated on the right side. This would mean
10 that the cerebral perfusion would be less than that in
11 a normal child. This would exacerbate the effects of
12 the cerebral oedema and should also be considered
13 a factor in the cause of death."

14 And I think I have taken you to what Dr Sumner made
15 of that in his evidence to the Coroner.

16 THE CHAIRMAN: Yes.

17 MS ANYADIKE-DANES: Dr Haynes takes the issue further.

18 He says:

19 "The central venous cannulation in small children
20 frequently leads to thrombosis in proximity to a cannula
21 with subsequent obstruction of veins and this leads me
22 to suspect that there may have been some narrowing of
23 Adam's great veins caused by previous central line
24 insertion."

25 That whole issue as to what extent there was any

1 compromise to the venous drainage from Adam's brain is
2 something that's going to be pursued. Dr O'Connor sets
3 out her analysis of the post-operative period.

4 THE CHAIRMAN: We have that at paragraph 525.

5 MS ANYADIKE-DANES: Yes, so I'm not going to go into that.

6 If I move on to the neurological observation and
7 brainstem deaths. That was carried out by Dr David
8 Webb. He explains that he had found evidence for
9 osmotic disequilibrium syndrome that was thought to
10 occur because of shifts of urea concentration between
11 blood and brain and was associated with brain swelling.
12 But then he provided the inquiry with a statement
13 in August of last year, and he expresses a different
14 view:

15 "I'm fairly sure that no one informed me that the
16 sodium level was so low because if I had been aware of
17 the low sodium, I would have considered hyponatraemia to
18 be the likely cause of the fluid shift."

19 There is one issue to be addressed there that came
20 out during the experts' meeting of 9 March. There was
21 a discussion about the appropriate protocol with
22 brainstem testing and Dr Haynes said with reference to
23 Adam's sodium level that he would have expected to see
24 more active steps taken to bring Adam's sodium within
25 normal range. That is before the brainstem test was

1 found to be positive in the sense that there was no
2 brain activity. And Professor Kirkham agreed that you'd
3 certainly want to have a normal metabolic range. That's
4 obviously something to be considered. Nobody has
5 suggested that it made any difference, but if one is
6 looking at lessons learned and protocols and procedures,
7 it may be something that we need to consider.

8 Then the period following Adam's death. Much of
9 that is taken up with the discussion of what the mother
10 was told and the autopsy.

11 THE CHAIRMAN: And the change that we have since the last
12 hearing is that we have now circulated a report from
13 Professor Lucas, who has given a report on how well the
14 autopsy was performed by Dr Armour.

15 MS ANYADIKE-DANES: Yes. I can deal with that. There is
16 actually -- if you'll bear with me, Mr Chairman, there's
17 not very much more to go, and I think people would like,
18 if it can be done, to finish now rather than come back.

19 THE CHAIRMAN: Absolutely, yes.

20 MS ANYADIKE-DANES: If we go straight to Dr Armour's report
21 on autopsy. Leaving aside the witness statements and so
22 forth and her evidence to the Coroner, we do actually
23 have two documents from Dr Armour. We have the notes
24 that she made, which presumably were going to inform her
25 report, and we have her report on autopsy. There are

1 differences between those two and I hope to highlight
2 those very briefly as we go through.

3 She appears to have removed Adam's heart, weighed
4 it, recorded its weight as 120 grams and noted the organ
5 was taken for transplant. It appears that the heart
6 itself was not examined, although the pericardial sac
7 and aorta were described as normal. Dr Armour did not
8 carry out, so far as we understand, an examination of
9 the heart and its surrounding vessels and there was no
10 comment from her on the weight of the heart.

11 Dr Sweeney has referred to an increase in heart size
12 and I think Professor Kirkham does also. She refers to
13 that between the taking of the chest X-ray at 13.20 and
14 that at 21.30, but it's not known how the size of Adam's
15 heart compared with that of a normal 4 year-old boy, ie
16 one of 20 kilos in weight and 104 centimetres in height.
17 There is simply no comment on it.

18 It should also be noted that, as you have said,
19 Mr Chairman, the inquiry did engage Professor Lucas.
20 He is a consultant histopathologist. He was engaged in
21 relation to the autopsy and its performance. He came to
22 the view in his preliminary report that in the context
23 of current practice in London, this removal would not
24 take place -- "this removal" meaning the removal of the
25 heart -- would not take place in a case that would be

1 regarded as high profile. The unexpected post-operative
2 death of a young child in hospital he regards as high
3 profile.

4 We are clarifying with Professor Lucas what may or
5 may not have happened in 1995 to the extent that he's
6 aware of it. So the issue of what should have been done
7 about Adam's heart is something that will be considered.
8 We don't now know what is to be made of its weight, if
9 anything.

10 If I go now to the conduct of the autopsy, which is
11 the last section in this, and provision of the report on
12 autopsy. As you know, Mr Chairman, the inquiry has
13 instructed Dr Wayne Squier -- she's a consultant
14 neuropathologist at the John Radcliffe Hospital -- to
15 provide an expert neuropathological opinion from the
16 histological slides that she made from tissue blocks
17 taken by Dr Armour of Adam's brain. And throughout the
18 inquiry's investigation, the issue of whether a thorough
19 and accurate post-mortem was carried out into Adam's
20 death has risen in importance, particularly in the light
21 of the recent discussions amongst the inquiry's experts
22 as to the cause of Adam's death.

23 So the inquiry sought advice from Dr Squier
24 regarding some of the issues that have arisen regarding
25 the autopsy. She has assisted with the

1 neuropathological issues and, in general terms, with
2 issue of autopsy practice. Since then, we've briefed,
3 or the inquiry has, Professor Sebastian Lucas. He is a
4 professor of clinical histopathology and a consultant
5 histopathologist at Guy's and Tommy's, and he provided
6 a preliminary report.

7 The issues that have arisen regarding the autopsy
8 that was carried out by Dr Armour and which are matters
9 that will be pursued in the oral hearing and, in some
10 cases, from a governance perspective, are these: whether
11 Dr Armour had the requisite experience as a trainee
12 forensic pathologist for Adam's autopsy and/or whether
13 she should have been supervised by a consultant
14 pathologist. Professor Lucas has found Dr Armour's
15 autopsy to have been performed competently and was
16 internally consistent. He stated that he would
17 regularly review coronial autopsy reports and he would
18 grade Dr Armour's as good and it addressed the central
19 issue and produced a coherent answer.

20 That's not a view entirely shared by Dr Squier, who
21 states in her report of January this year:

22 "It is impossible to answer the question of whether
23 the suture was causing venous obstruction from the
24 description given. Dr Armour writes that there was no
25 congestion or obstruction of the jugular veins but that

1 the left internal jugular vein was ligated. These
2 statements are not consistent with one another."

3 Whether there was ligation of the left internal
4 jugular vein, as I have explained previously -- so
5 I don't propose to explain it again -- is an issue.
6 Suffice it to say that there is disagreement between the
7 trust and Dr Armour as to whether there actually was
8 a suture present. And if you look back in the earlier
9 parts, you will see that one of the changes that was
10 made was when we received some information to indicate
11 that there were actually X-rays of the neck that showed
12 that jugular vein to be patent. You will see it as you
13 go through it; it's highlighted and underlined in red,
14 as are all the other changes.

15 Professor Lucas has stated that the autopsy
16 description of the ligature apparently found in Adam's
17 left neck was sub-optimal since it was not then and has
18 not since become clear whether or not there really was
19 a ligature that obstructed the venous outflow of the
20 left internal jugular vein. He stated:

21 "This lack of clarity is an important criticism of
22 the autopsy and report."

23 And Dr Squier agrees that Dr Armour's report is
24 unclear on this matter and her report is inconsistent
25 when addressing the question of whether the suture was

1 causing venous obstruction, and she states that
2 Dr Armour could have made further investigations to see
3 how long the suture had been present, including sampling
4 for histology.

5 You will recall that when Dr Armour gave evidence to
6 the Coroner, she said that that ligature had been there
7 for some time. So really what Dr Squier is getting at
8 here is: what is the investigation that was carried out
9 to enable Dr Armour to give that evidence to the
10 Coroner?

11 Another issue is whether the donor kidney was
12 infarcted. Dr Armour examined histological slides with
13 the internal organs under a microscope, which allegedly
14 revealed complete infarction of the transplanted kidney
15 and she sent Professor Berry histological slides of a
16 number of different parts of Adam's organs, and he noted
17 that there was unexplained cellular change in the
18 hepatocytes scattered throughout his liver, but he did
19 not know the significance of it. He concluded that the
20 transplanted kidney was infarcted, dead, at or about the
21 time of the transplant.

22 Professor Lucas has criticised Dr Armour for failing
23 to pursue the issue of the cellular change in the liver
24 and her omission to carry out any histopathological
25 investigation of why the transplanted kidney had

1 infarcted. There are also differences between her
2 contemporaneous notes, which is a point I was just
3 mentioning, and the final autopsy report. Dr Armour
4 made notes in order to assist her and would necessarily
5 have to be -- sorry, to assist her in the provision of
6 her report. Those notes would necessarily have to be
7 made before she could write a report. The report would
8 take some time because she had to wait for the brain to
9 be fixed. Until it's fixed, you can't make the
10 histological slides from which to conduct your
11 examination.

12 THE CHAIRMAN: And you have set out there what the
13 inconsistencies are.

14 MS ANYADIKE-DANES: Yes. They are inconsistencies in --
15 well, the notes themselves have their own
16 inconsistencies to the brain weight. That may just be
17 a simple transcription error or something. But the very
18 important thing is that although she's recorded the
19 fresh, ie unfixed brain weight in her notes, there is no
20 record in the autopsy of the unfixed brain weight; all
21 you have is the fixed brain weight, and that is
22 considerably heavier than that.

23 Then there's the lungs. She did weigh the lungs,
24 left and right are different weights, and she regarded
25 them as both being moderately oedematous, but that is

1 not recorded in her report on autopsy and she can't
2 explain why it wasn't.

3 I have said something about the fixed weight. The
4 fixed weight was in fact noted at 1,680 grams. The
5 difficulty there is, of course, is that without an
6 accurate -- assuming without an accurate unfixed brain
7 weight, one is left to try and back calculate it from
8 the fixed brain weight. That is an issue as to whether
9 or not the weights that she -- what she ascribed to the
10 unfixed brain weight is accurate and, if it's not
11 accurate, how does she come to write it and then how it
12 compares at all with the fixed brain weight and, if you
13 can't use the unfixed brain weight at all, how do you
14 try and get a handle on what the unfixed brain weight
15 was. All of that, of course, is extremely important
16 because what we're really dealing with here is cerebral
17 oedema, so the swelling of the brain. That's why it's
18 all so important.

19 The appropriateness of the description of the brain
20 in the report on autopsy and in Dr Armour's evidence --
21 she describes the brain as:

22 "Grossly swollen with loss of sulci and uncal
23 swelling."

24 In her evidence to the Coroner, she says:

25 "There was massive cerebral oedema and I have never

1 come across anything of a similar degree."

2 When Dr Squier wrote her report, she doesn't
3 describe it in those terms. She says:

4 "The external appearances of the brain at the vertex
5 showed mild swelling with compression of the sulci but
6 the shape of the gyri is relatively well preserved.
7 At the base of the brain the cerebellar tonsils are
8 haemorrhagic and appear damaged ... In some slices gyri
9 are flattened and sulci compressed, in others the gyri
10 are better preserved. Pictures of the cerebellum show
11 this to be extremely swollen. No spaces are seen
12 between the folds of the cerebellar cortex."

13 So that's quite important. She has a different
14 picture of the definition that still was in the brain
15 at the time. I haven't pulled them up for you, but she
16 provided photographs which show you an impression for
17 comparison purposes of a grossly swollen brain and one
18 that wasn't. Given the time, I'm not going to take you
19 to them now, but they are there for you to see,
20 I encourage you to look at them. There are also
21 pictures of Adam's brain and you'll be able to make
22 comparisons and perhaps appreciate better the debate
23 between Dr Squier and Professor Kirkham about that.

24 Then finally -- almost finally -- there's the
25 involvement of Dr Mirakhur. Dr Armour says that she

1 sought a second opinion on the brain and sent material
2 to Dr Mirakhur. She was a consultant neuropathologist
3 at the Royal. Unfortunately, there's no record of her
4 having done that. Dr Armour is pretty adamant that not
5 only did she do that and receive a report from her, but
6 the views of Dr Mirakhur are what she reflected in the
7 report on autopsy. Dr Mirakhur doesn't know anything
8 about that, denies all knowledge of it, having seen any
9 slides, knowing anything about Adam and certainly of
10 having seen the report on autopsy in order to confirm
11 whether or not she agreed with how the brain is being
12 described there.

13 Dr Squier says:

14 "In a case such as this where the cause of death was
15 thought to have been in the brain and was potentially
16 the result of a hospital procedure, surgery and
17 anaesthesia, best practice would have been to ask
18 a neuropathologist to undertake a formal and complete
19 brain examination. This is particularly important as
20 Dr Armour was not at the time fully qualified as
21 a consultant pathologist. I am surprised her report was
22 not countersigned by a consultant supervisor."

23 Then there's the involvement of Dr O'Hara and the
24 Doctors Bharucha, and I think I touched on the fact that
25 unfortunately we don't have -- Dr O'Hara is since

1 deceased so he can't assist us. But it all comes about
2 from a note that the Coroner made, which I took you to
3 before, which refers to Dr Armour showing slides to
4 Dr O'Hara and a Dr Bharucha and they being of the view
5 that there was clear evidence of hypoxia. That,
6 of course, is an issue because nobody else seems to
7 have -- well, certainly Dr Armour did not record there
8 being any hypoxia. Quite the reverse. She says there
9 was no evidence of terminal hypoxia.

10 The basis upon which she formed a different view
11 from Dr O'Hara and Dr Bharucha is not known and that is
12 a matter to be pursued. There's also a small matter to
13 be pursued as to who the actual Dr Bharuchas are. There
14 are two Dr Bharuchas, married to each other. One is
15 a Dr Chitra Bharucha. She's a histopathologist,
16 I believe.

17 THE CHAIRMAN: Haematologist?

18 MS ANYADIKE-DANES: Haematologist, I beg your pardon. And
19 then there's a Dr Hoshang Bharucha, and he's the
20 pathologist. We've had witness statements from both of
21 them and they don't remember anything, have no
22 knowledge, don't concede they were involved in any way.
23 But nonetheless there stands the note of the Coroner, so
24 that will be also investigated.

25 Dr Squier considered that Adam's case was complex

1 and that specialist assistance should have been sought
2 formally and reports of those specialists included
3 signed reports within the final pathology report. Then
4 whether the lungs were oedematous, I have been through
5 that. And one knows now, with hindsight, looking at
6 those X-rays, the difference of views that exist between
7 Dr Landes and Dr Sweeney.

8 It's not clear whether Dr Armour herself examined
9 the X-rays or whether she simply relied upon the
10 description in Adam's medical notes and records. It's
11 also not clear whether she examined the CT scan. You'll
12 be aware, Mr Chairman, that the experts for the inquiry
13 considered that it was necessary in a case such as this
14 to have specific expert assistance with both the X-ray
15 and the CT scan. So if she didn't seek that, the basis
16 on which she felt competent to do so will be a matter
17 that will be progressed in the oral hearing.

18 I have mentioned a bit about that there was no
19 examination of the heart and I have referred to whether
20 she should have asked for expert opinion on the CT scan.
21 There is another matter to do with the conduct of the
22 autopsy itself. It was conducted on hospital site and
23 Dr Squier has stated that:

24 "Where there is a question regarding the conduct of
25 the treating clinician, it would today be most unusual

1 for the autopsy to be performed in the same hospital.
2 It would be normal for the body to be removed to another
3 hospital so that there can be no question of conflict of
4 interest."

5 Well, there will be an issue to be pursued as to
6 whether that would have been the position in 1995 and
7 what in fact the protocols were, or the guidance was,
8 for Northern Ireland about that. That is a matter that
9 will also be viewed from a governance perspective.

10 Leading on from that is an issue as to Dr Taylor and
11 Dr Savage. They were both present during the autopsy
12 and, interestingly enough, one of the criticisms that
13 Professor Lucas makes of Dr Armour is that she simply
14 included too much, what he calls, non-pathology
15 information, so all her views as to what effect there
16 might have been on Adam's cerebral venous drainage.
17 Those were all areas where Professor Lucas feels that
18 she moved away from her role as a pathologist. And
19 whether or not the effect of Dr Taylor or any of the
20 clinicians being there or any of her discussions that
21 she had with the clinicians -- those are all matters
22 that will be discussed.

23 Finally, in this section, there is the reason for
24 Dr Armour's letter of 8 December 1995 to Professor Jack
25 Crane. Professor Jack Crane, of course, was then and

1 still is the state pathologist, and she copied that
2 letter to the Medical Protection Society and the British
3 Medical Association and also to George Murnaghan, who
4 was the hospital administrator, and to the Coroner.

5 I will just read it out:

6 "I am willing to attend any meeting about this case,
7 including a meeting with clinicians, administrative
8 staff, HM Coroner, and whoever else wishes to attend.
9 As I was the pathologist who carried out the autopsy,
10 I feel my opinion on the case is relevant to such
11 a meeting and, as such, the case could be discussed in
12 full."

13 That's a letter sent on 8 December 1995. Autopsy
14 carried out on 29 November 1995, report on autopsy some
15 time in the third week of April 1996. So this is well
16 before she actually produced her report and there will
17 be an issue as to the circumstances in which she was
18 writing such a letter and why.

19 Then the "final final" is the whole question of the
20 cause of Adam's cerebral oedema and death. Of course,
21 you all know what the verdict on inquest was. And
22 you will note, Mr Chairman, the debate which one sees at
23 paragraph 545 amongst the experts about the role of
24 dilutional hyponatraemia and any other causes or
25 contributing factors. I set them out, all the ones that

1 have so far been mentioned. I just want to take you to
2 two documents that we prepared and I mentioned right at
3 the beginning. The first, if we pull it up, is
4 306-016-130.

5 This is a schedule. As I said before, this is the
6 legal team's work, so I hope we've been fair to
7 everybody to try and represent their views, but they're
8 not to be held to it. This is the summary of key
9 points, as we are understood them to be, going into the
10 expert meetings on 22 February of this year. Basically,
11 we have across the top the experts and then we have,
12 down the left-hand side, starting with
13 Professor Kirkham, the issues that we think had arisen.
14 If you go through them, developmental delay and so
15 forth.

16 Developmental delay is the first one. Then there's
17 the literature. There's quite a long debate about the
18 literature and to what extent it forms the basis for
19 various people's views. Then there are the risk factors
20 for chronic venous thrombosis and we go through what
21 those risk factors were: erythropoietin, polyuria,
22 intermittent dehydration, ligation, anaemia, and so
23 forth.

24 Then there's venous sinus thrombosis itself. Then
25 there is the effect of the reduced jugular venous

1 drainage. Then there's PRES; Adam's presentation during
2 surgery, which is an important area; the blood pressure
3 and potential seizures; arguments on brain death caused
4 by dilutional hyponatraemia is quite a lengthy section.

5 So that was everybody's views, so far as we could
6 summarise them, in order to assist with what is
7 a considerable volume of material going into those
8 meetings.

9 Then if we pull up 306-017-146. These are the legal
10 team's views on what the experts say in relation to the
11 key points following those meetings. As you know, there
12 were two and you can read the transcripts blow-by-blow
13 on 22 February and 9 March. And thereafter, there was
14 an absolute slew of reports from all of them, really.
15 What we have tried to do is to try and go through all of
16 that and try and extract their points in relation to the
17 same issues as were in the first schedule that I have
18 shown you, which is to try and help you do a sort of
19 before and after to see to what extent anybody's changed
20 their view and, if so, on what basis. So I will not go
21 through it all because it goes through exactly those
22 same points, but that's the idea. It's a much lengthier
23 document because since then they've had a lot more to
24 say, but in any event that's the purpose of that.

25 I had said before that we would try and address the

1 differences amongst the experts. In fact, it was one of
2 the reasons why the matter was adjourned. This is our
3 attempt to do it. To put it all into the opening would
4 take a huge amount of time and it is hoped that this
5 provides an easier means to try and access what the
6 experts were saying and why and its significance.

7 So Mr Chairman, I'm late and I'm sorry.

8 THE CHAIRMAN: Thank you very much indeed. I'm very
9 grateful to Ms Anyadike-Danes for that exceptionally
10 comprehensive analysis of the issues which we'll be
11 looking at during the next four weeks. As I've
12 indicated, there are to be various discussions, I think,
13 about how we will move forward and there are some of the
14 lawyers representing the interested parties who wanted
15 some time with their clients this afternoon in light of
16 the opening, subject to one issue, which I need to deal
17 with, I want to deal with separately without everybody
18 being present, and that's about the representation of
19 one interested party and issues developed about that,
20 but I don't need everybody to be present for that.

21 Apart from that, is there anything anybody needs to
22 raise or wants to raise before we stop for today and
23 resume at 10 o'clock tomorrow with Professor Savage?
24 Good. You've had a chance to put your hands up. Let me
25 break for a few minutes and see if we can deal with one

1 issue on representation of a witness after a few
2 minutes' break.

3 (1.30 pm)

4 (The hearing adjourned until 10.00 am the following day)

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I N D E X

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3 Opening by MS ANYADIKE-DANES2
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