Witness Statement Ref. No. 008/2

NAME OF CHILD: Adam Strain

Name: *Robert Taylor*

Title: *Dr*

Present position and institution: *Consultant Anaesthetist, Belfast HSC Trust*

Previous position and institution:
[Since your Witness Statement of 18th July 2005]
Same

Membership of Advisory Panels and Committees:
[Identify by date and title all of those since your Witness Statement of 18th July 2005]

End-of life Guidance; Working Party. General Medical Council, London 2008-2010
Clinical Ethics Committee, Belfast HSC Trust 2008-11
Clinical Ethics Committee, NI Hospice 2007-11
Regional Fertility Ethics Committee, 2006-11

Previous Statements, Depositions and Reports:
[Identify by date and title all those since your Witness Statement of 18th July 2005]

OFFICIAL USE:
List of previous statements, depositions and reports attached :

Ref:	Date:	
011-002	30.11.1995	Draft Statement
011-014	21.06.1996	Deposition of Witness
008/1	18.07.2005	Inquiry Witness Statement
093-038	17.10.2006	Transcript of PSNI interviews

IMPORTANT INSTRUCTIONS FOR ANSWERING:
Please identify clearly any document to which you refer or rely upon for your answer. If the document has an Inquiry reference number, e.g. Ref: 049-001-001 which is 'Chart No.1 Old Notes', then please provide that number. If the document does not have such a number then please provide a copy of the document.

I QUERIES ARISING OUT OF YOUR INITIAL WITNESS STATEMENT

With reference to your witness statement dated 18th July 2005, please provide clarification and/or further information in respect of the following:

(1) Response to position and institution: *"Consultant Paediatric Anaesthetist, Royal Belfast Hospital for Sick Children"*

(a) Describe your work commitments to the Royal Belfast Hospital for Sick Children (RBHSC) from the date of your appointment as a Consultant and particularly over the period 26th November to 28th November 1995

Paediatric ICU and Theatres and on call. Responsibilities to provide anaesthesia and intensive care to infants and children.

(2) State what you considered to be your role in relation to and responsibilities towards Adam from learning on 26th November 1995 of a potential donor kidney for him until 28th November 1995 when ventilatory support for him was withdrawn, and in particular:

- **from Adam's admission to RBHSC until his arrival in theatre**

Lead role, responsibilities; Pre-operative assessment. Preparation of equipment and drugs.

- **while Adam was in theatre until his admission to PICU**

Lead role, responsibilities; Induction and maintenance of anaesthesia including iv access, epidural, central venous and arterial line insertion. Monitoring of vital signs and fluid/blood management. Recording and documentation of vital signs, drugs, fluids, investigations, losses.

- **from admission to PICU until his death**

Lead role, responsibilities; Handover of patient and information to PICU team. Providing information to relatives (mother). Taking Adam from PICU for a CT scan on 27th November 1995.

(3) Answer to Question 1(i) at p.2:

"Prof Maurice Savage phoned me on Sunday night 26th November 1995, to inform me that a Renal Transplant was scheduled on Adam Strain for early next morning (058-003-005)"

(a) State the time at which Prof. Savage telephoned you *"on Sunday night 26th November 1995 to inform you that a Renal Transplant was scheduled on Adam Strain for early next morning"* and what was discussed during that telephone call

I cannot remember what time on Sunday night Dr. Savage telephoned me. The discussion covered the matters I have referred to in my Coroner's Deposition dated 21.06.96, my Inquiry Witness Statement 008/1, and my police interview of 17.10.06

(b) Explain the purpose of the document Ref: 058-003-0025 and state when the various entries were made and by whom

I think this should be 058-002-002. I do not know when the entries were made or by whom

(4) Answer to Question 1(i) at p.2:

"I was informed that Adam retained his native kidneys. I suggested coming in to assess him, but we concluded that the relevant information could be given by phone and that I would be required to start case at 6.00 hrs next morning"

(a) Explain the significance of Adam having retained his native kidneys and how that information was factored into your plans for the management of his fluids

It meant that he would continue to pass large quantities of urine during a fasting period and throughout surgery. This would obviously have impacted on his fluid management and made the calculations more complex.

(b) Describe and explain ***"the relevant information"*** that you concluded could be given by telephone and:

The relevant information that could be given by telephone was that which I have referred to in my Coroner's Deposition dated 21.06.96, my Inquiry Witness Statement 008/1, and my police interview of 17.10.06

- the identity of those to be involved in providing that ***"relevant information"***

This was Dr Savage. As I remember he was the only one I spoke to.

- how the process of obtaining that ***"the relevant information"*** was to be managed so as to enable you to comply with the required start at 6.00am

The relevant information was given by telephone as is commonplace. The process was managed as I have referred to in my Coroner's Deposition dated 21.06.96, my Inquiry Witness Statement 008/1, and my police interview of 17.10.06

(c) Identify all of those to whom ***"we concluded that the relevant information could be given by phone"*** refers

Dr Savage and me.

(5) Answer to Question 1(i) at p.2:

"During this phone call pre-transplant information was given and my many questions were answered (058-002-002). However, I knew I would have to make a more detailed examination of the medical records and Adam before embarking on the transplant anaesthetic."

(a) Describe and explain the ***"pre-transplant information"*** that Prof. Savage gave you

The pre-transplant information given by Dr. Savage is referred to in my Coroner's Deposition dated 21.06.96, my Inquiry Witness Statement 008/1, and my police interview of 17.10.06

(b) Describe and explain the ***"many questions"*** that you put to Prof Savage and the answers to them that you received

My many questions are not remembered now but the information obtained is referred to in my Coroner's Deposition dated 21.06.96, my Inquiry Witness Statement 008/1, and my police interview of 17.10.06

(c) **Describe and explain how the *"pre-transplant information"* given to you by Prof. Savage and the answers provided to your *"many questions"* influenced your plans for Adam's fluid management**

The pre-transplant information and Dr. Savage's answers to my questions contributed to my plans for Adam's fluid management which are referred to in my Coroner's Deposition dated 21.06.96, my Inquiry Witness Statement 008/1, and my police interview of 17.10.06

(d) **Explain the purpose of the document Ref: 058-002-002 and state when the various entries were made and by whom**

This is a summary of the pre-transplant information. I do not know who made the entries or when they were made.

(e) **Explain what in Adam's medical notes and records you wished to examine 'in detail' and the relevance of it to your plans for Adam's fluid management**

I had not seen the notes so could not judge in advance what I would find relevant in them.

(f) **Specify what medical records you examined and the location of those medical records**

I can recall going through his notes, reading his current admission including blood investigations, previous anaesthetic records and drug kardex. These were located on the ward as I remember.

(6) Answer to Question 1(i) at p.2:

"I asked for 4 units of blood and to check FBC/U&E, etc, fasting instructions, and a request to erect IV fluids at the usual maintenance rate"

(a) **Explain what you mean by *"the usual maintenance rate"***

I meant at the rate that Dr. Savage would consider appropriate

(b) **State the type and volume of IV fluids that you prescribed to be administered *"at the usual maintenance rate"***

The type and volume of IV fluids were those which Dr. Savage considered appropriate.

(c) **Explain the reason you requested a check on Adam's U&E**

A check on Adam's U&E pre-operatively would be routine in a patient undergoing peritoneal dialysis prior to kidney transplant.

(7) Answer to Question 1(i) at p.2:

"The next morning, on 27th November 1995 I was told by a ward nurse that blood tests and IV fluids were not done because of poor venous access"

(a) **State when you first learned of the problem with venous access**

I am aware from Dr. Montague's police statement (093-037-113) that he reports advising me by telephone during the night regarding Adam's iv access however I do not recollect that telephone call now. I had previously believed it was shortly after I had arrived on the ward that I first learned of the problem with Adam's venous access.

(b) **Identify the ward nurse to whom you refer and the time at which she told you *"that blood tests and IV fluids were not done"***

I cannot remember which nurse told me or the time I was told.

(c) **Describe what you did on receiving that information and the impact of it upon your plans for Adam's fluid management**

It led me to calculate how much deficit I would need to replace as well as maintenance fluids and losses.

(d) **Describe your involvement in any of the actions that were taken after Adam's IV cannula tissued at 1.30am on 27th November 1995, including:**

- **the increase in fluids through his gastrostomy from 180mls/hr to 200mls/hr**

I did not prescribe these fluids

- **the continuation of fluids through his gastrostomy until 5.00am on 27th November 1995**

I did not prescribe these fluids

(e) **Identify the medical Registrar on duty between 9pm on 26th November and 7am on 27th November 1995.**

I cannot remember the medical Registrar on duty or his/her name.

(f) **Explain when, by whom and in what circumstances, it was agreed that Adam's surgery would take place at 7.00am as opposed to 6.00am**

I cannot remember the circumstances which led to a change in plan for surgery from 6.00am to 7.00am however my police statement (093-038-125) relates this as a team decision.

(8) **Answer to Question 1(i) at p.2:**

"At about 05.45 hrs I met with Adam and his mother and reviewed all available information pre-operatively. I now discussed the effect of having no post-dialysis, U&E results and the impact of no intravenous fluids for the fasting period of the two hours since his night feeds were stopped with Dr. Montague"

(a) **Explain the purpose and nature of your meeting with Adam and his mother**

The meeting with Adam was to assess him pre-operatively. The meeting with his mother was to explain the anaesthetic for the surgery.

(b) **Describe and explain the *"available information"* that you reviewed, its source and how it impacted on your plans for Adam's fluid management**

I can recall going through his notes, reading his current admission including blood investigations, previous anaesthetic records and drug kardex. I used this information to calculate his anaesthetic drugs and fluids, in particular his deficit and maintenance rate.

(c) **State the time at which you had your discussion with Dr. Montague**

Between arriving in the hospital and starting the anaesthetic

(d) **Describe what you discussed with Dr. Montague about *"the effect of having no post-dialysis, U&E results and the impact of no intravenous fluids for the fasting period of the two hours since his night feeds were stopped"***

My police statement of 17.10.06 at 093-038-124 reports what was discussed.

(e) **State when the 2 hour *"fasting period"* commenced**

5am.

(9) **Answer to Question 1(i) at p.2:**

"I reviewed his fluid balance sheet (057-010-013) and noted that he was to have received 200ml/hour of oral fluids (I think this was by artificial feeding tube). In actual fact Adam had received in excess of this 200 ml/hr which suggested to Dr Montague and myself that he was capable of tolerating rates of fluid in excess of the normal amounts because of his underlying high-output renal failure.
This meant that we had to make several unusual fluid calculations."

(a) **Describe and explain exactly what volume of fluid and content of fluid you concluded Adam had received at the stage of your 'review' of his fluid balance sheet and how you reached that conclusion**

The fluid balance sheet (057-010-013) shows that iv fluids were prescribed at 20 ml/hr and clear enteral fluids at 180 ml/hr from 23.00. By 1.30am 269mls had been delivered enterally and 18 mls iv. Following failed attempts to get iv access enteral fluids were increased to 200 ml/hr around 2.00am. By 5.00am a further 683mls had been given.

(b) **State how much you calculated that he had received *"in excess of this 200ml/hr"* at the stage of your 'review'**

The fluid balance sheet (057-010-013) shows a running total of 18 mls of iv fluid (No18) and 952mls of clear fluid (dioralyte) from 23.00 to 5.00am. Therefore a total of 970 mls had been given over 6 hours. I calculated that he should have received 1200mls over these 6 hours and therefore he now had to receive in excess of 200ml/hr to provide for this planned fluid administration.

(c) **Explain when you consider that *"excess"* to have occurred**

He had needed to receive the excess between 1.30 and 05.00 (3.5 hrs)

(d) **Explain how that *"excess"* suggested to you and to Dr. Montague that Adam was *"capable of tolerating rates of fluid in excess of normal amounts"***

I meant he could be given in excess of 200mls/hr because he passed large volumes of dilute urine.

(e) **Describe the *"unusual fluid calculations"* that you made and explain in what way those fluid calculations were *"unusual"***

Normally when a patient fasts before an operation their kidneys can conserve water by reducing the volume and increasing the concentration of urine. Adam had native, high-output kidneys that excreted dilute urine. Also his operation was for a kidney transplant which meant that he needed to be "hypervolaemic". This made his fluid calculations unusual

(f) **Identify all of those to whom *"we had to make several unusual fluid calculations"* refers**

Me and Dr Montague.

(10) **Answer to Question 1(i) at p.2:**

"Although I noted that he did have a sodium of 124 mmol/l on one occasion without ill effects I was informed that it was usual for Adam's electrolytes to remain stable following dialysis for 24hrs as demonstrated in a summary of his biochemistry results in 1995 (058-041-187-224)."

(a) **Identify the *"one occasion"* when Adam had *"a sodium of 124 mmol/L"***

Date 08/06/1995 (058-041-197)

(b) State when you were informed that *"it was usual for Adam's electrolytes to remain stable following dialysis for 24hrs"* and identify the person who gave you that information

I could see this from his U&E results eg, (058-041-199, 058-041-200,058-041-201) with only one exception (058-041-197)

(c) State what you considered Adam's serum sodium to be at *"about 05.45 hrs"* and explain the basis for that view

I expected it to be stable in keeping with his usual U&E results eg (058-041-199, 058-041-200,058-041-201) with only one exception (058-041-197). Also he was receiving a common type of enteral hydration and had a high output renal loss.

(11) Answer to Question 1(ii) at p.3:

"I then sought information on Adam's previous anaesthetic management. He had undergone a shorter procedure on 18th October 1995. I examined the anaesthetic record (058-025-069 to 074) ... Otherwise there were no difficulties noted with his anaesthetic management ... Although there were no fluid calculations performed on this, I noted that 300mls of '1/5 NSaline/4%' were given over approximately 1hr. "

(a) Identify the person or persons from whom you sought information *"on Adam's previous anaesthetic management"*

I could see this from an examination of his notes. (058-025-069 to 074)

(b) Describe the response that you received

I could see this from an examination of his notes. (058-025-069 to 074)

(c) Explain the conclusions you reached and how you factored them into your fluid management of Adam for his transplant surgery

I think it led me to conclude that Adam could tolerate a large volume of 0.18NaCl/4%Glucose to replace deficit and urine losses.

(d) A sample taken on 18th October 1995 indicated that Adam's serum sodium on that day was 142 mmol/L (Ref: 058-041-200). State if you were aware of whether this sample was pre-operative or post-operative and give the relevance (if any) for your claim of there being *"no difficulties noted with his anaesthetic management."*

I cannot say if this was pre or postoperative as there is no time on it. The only relevance is that his electrolytes generally stayed stable (as in answer 10(c)).

(e) Explain the conclusions that you reached about the fluid management of Adam's surgery on 18th October 1995 from the Anaesthetic Record (Ref: 058-025-071) and how you factored that into your fluid management of Adam for his transplant surgery

It led me to conclude that Adam could tolerate a large volume of 0.18NaCl/4%Glucose to replace deficit and urine losses.

(12) Answer to Question 1(ii) at p.3:

"I therefore had to make a decision about further delaying surgery to gain IV access and blood tests against prolonging the "cold ischaemic time" of the donor kidney."

(a) **Explain what you understood the *"cold ischaemic time"* of the donor kidney to have been and on what basis you formed that view**

I think I was informed after I arrived in the hospital on Monday morning that it was a long cold ischaemic time. I cannot recall the exact length nor who told me.

(b) **Explain the significance of that *"cold ischaemic time"* and the impact of it, if any, on your plans for Adam's fluid management**

The long "cold ischaemic time" meant that I did not wish to delay transplanting the kidney by getting iv access or performing blood tests eg U&E.

(13) **Answer to Question 1(ii) at p.3:**

"In close discussion with the nursing staff in PICU, theatres, Nephrology ward and Mr Keane, a "team" decision was made to go ahead with the kidney transplant on Adam at about 0700hrs on 27th November 1995."

(a) **Identify those from the *"nursing staff in PICU"*, from *"theatres"*, and from the *"Nephrology ward"* who were involved in the *"close discussion"* that led to the *"team decision"* to proceed with Adam's surgery *"at about 0700hrs on 27th November 1995"***

I would have discussed the case with the nursing Sister on duty in PICU, the nursing Sister on duty in Theatre and the nurse in charge in the nephrology ward. I do not remember their names.

(b) **State when and where the *"close discussion"* took place and describe the issues that were discussed**

I would have spoken to these people individually and ascertained that there was team agreement to proceed with surgery. I cannot remember the details of the discussion but it would have been to ensure the progress of the case from the ward to theatre and on to PICU.

(14) **Answer to Question 1(iii) at p.3:**

"From about 0630 or 0640 I spent some time with my experienced senior registrar, Dr Terence Montague, calculating the dose of anaesthetic drugs and fluids."

(a) **Describe and explain the calculations that you made with Dr. Montague in relation to fluids and the basis upon which you made them**

We calculated the deficit, maintenance rate and blood volume on the anaesthetic record. (058-003-005)

(15) **Answer to Question 1(iii) at p.3:**

"The need to replace fluid deficit is calculated on the known urine and insensible losses and it was agreed that there was an urgency to replace this deficit so that Adam did not become dehydrated or suffer from low blood circulation prior to transplant"

(a) **Describe and explain the figures that you used as Adam's *"known urine and insensible losses"* and the source of those figures**

I knew that he normally received around 150 ml/hr input overnight which I would have expected to be matched with similar losses. His urine output is stated as "PU++ ?how much ?1-2 litres"(058-035-143)

(b) **Explain how those figures for Adam's *"known urine and insensible losses"* were factored into your plans for his fluid management**

We had to provide a similar type and volume of fluids in the background as well as replacing the deficit.

(c) **Explain the particular *"urgency to replace [the] deficit"* which you consider had arisen**

I was concerned that he was behind in this fluid and we should replace it urgently.

(d) **Explain the basis for your view that there was such a *"deficit"***

He had received "clear fluid" until 0500 but did not receive any fluid between 05.00 and 07.00

(e) **Explain your choice of *"replacement fluid"***

Replacement fluid for his deficit and on-going urine losses was given as a similar type to those losses to include sodium lost and glucose required for metabolism, ie 0.18% NaCl and 4%Glucose.

(16) **Answer to Question 2(i) at p.4:**

"I only agreed to provide a general anaesthetic for Adam with an experienced senior registrar, Dr. T Montague, experienced theatre nursing staff and the ready access to experienced surgeons, and nephrologists who were in theatre dress and present beside me in theatre for large parts of the procedure"

(a) **Describe how Dr. Montague became part of the anaesthetic team for Adam's surgery and when you first knew he would be assisting you**

He was on call with me that weekend. I was aware of this on Sunday morning 26/11/1995.

(b) **Describe the experience of Dr. Montague as a senior registrar and explain the particular experience of Dr. Montague that contributed to your decision to provide general anaesthesia for Adam**

Dr Montague was the anaesthetic trainee available at the start of the case as he was also on call with me on that weekend. He was an experienced senior registrar in anaesthesia. He had worked in adult and paediatric anaesthesia and was a good trainee to assist me. He was able to place the epidural and monitor the patient as I was inserting the central line.

(c) **State the times and periods when there was a nephrologist *'in theatre dress'* in the operating theatre and identify the person(s) concerned**

I cannot remember the times and periods that Dr O'Connor the Consultant Nephrologist was present.

(17) **Answer to Question 2(i) at p.4:**

"Dr T Montague and/or myself were present with Adam at all times. The degree of vigilance and personal comfort cannot be provided by a single individual."

(a) **State whether you left the theatre at any time after surgery started and if so when and for how long**

It is likely that I left theatre for a number of minutes for a beverage or a toilet break but the other anaesthetist would have remained in theatre during my absence.

(b) State whether Dr. Montague left the theatre at any time and if so when and for how long

As in answer 17 (a) It is likely that Dr Montague or the other trainee who replaced him left theatre for a number of minutes for a beverage or a toilet break but I would have remained in theatre during his absence.

(c) State at what time and at what stage of the transplant surgery you finally left the operating theatre

It was at the end when we took him to PICU around 11.45 am

(d) State at what time and at what stage of the transplant surgery Dr Montague finally left the operating theatre

After the start of the surgery another trainee whose name I cannot remember came on duty to assist me and I was able to let Dr Montague go home as he had been on call for 24hrs as he confirms in his statement. (093-037-114). He states that the surgery had just commenced.

(18) Answer to Question 2(i) at p.4:

"I cannot remember the exact reasons why Adam's surgery did not start at 06.00 as originally planned. I can only speculate that it took a considerable amount of time to work out an agreed management plan and review previous notes despite my very early attendance at the hospital that morning."

(a) Explain what aspect(s) of reaching *"an agreed management plan"* took time to work out

It was after confirming everybody was ready to start.

(b) Describe those involved in working out the *"agreed management plan"* and what *"previous notes"* were being reviewed as part of formulating that agreed plan

Dr Montague and myself agreed this plan after we had read the patient notes, in particular his previous anaesthetics, background, blood results and fluid charts.

(19) Answer to Question 2(ii) at p.4:

"The IV fluids were reassessed several times during the first hour"

(a) State when the *"IV fluids were reassessed during the first hour"*

This was on a continual basis. We were always aware of the fluids given and lost.

(b) Explain what prompted that 'reassessment', identify who was involved in it and describe what the 'reassessment' of Adam's IV fluids entailed

During anaesthesia we were continually monitoring his vital signs and reassessing his fluids on this continuing basis. Dr Montague and I were involved.

(20) Answer to Question 2(iii) at p.5:

"We were concerned about this loss [600mls ie 200mls blood in swabs, 200mls in suction bottle and 200mls on the towels] and together with others present, decided to commence a second fluid infusion of Human Plasma Protein Fraction (HPPF)"

(a) State what fluids were in the suction bottle and what fluids were on the towels

Blood

(b) Identify all those to whom you refer in *"We were concerned"*

Dr Montague or his replacement trainee and I were concerned

(c) Identify the others that were involved in the decision *"to commence a second fluid infusion of Human Plasma Protein Fraction"*

Dr Montague or his replacement trainee and I were involved in the decision

(21) Answer to Question 2(iii) at p.5:

"... giving a total input of 1400mls and a loss exceeding 500mls of blood and urine lost by Adam's native kidneys"

(a) Describe how the *"urine lost by Adam's native kidneys"* was measured

It could not be measured at this stage of the procedure as he was not catheterised. When he had his suprapubic catheter inserted at the end of the procedure we could measure his urine volume.

(22) Answer to Question 2(iii) at p.5:

"We were reasonably satisfied towards the end of the 2nd hour of surgery that the renal losses were now adequately replaced and therefore erected a 3rd bag (500mls) of 0.18NaCl/4% Glucose to be given at a much reduced rate, over the following two hours twenty minutes"

(a) Identify all those to whom you refer in *"We were reasonably satisfied"*

Myself and either Dr Montague or his replacement whichever was present.

(b) Explain the basis upon which you were *"reasonably satisfied"* that *"the renal losses were now adequately replaced"*, including identifying how much fluid you had given Adam at that stage and how that meant his *"renal losses were ... adequately replaced"*

That was based on the calculations of his deficit and requirements. We had given 1000mls of 0.18NaCl/4%Glucose and 400 mls of HPPF giving a total input of 1400mls and a loss exceeding 500mls of blood and urine lost by Adams native kidneys.

(c) Explain your choice of fluid

This was based on his urine output and quality from his native kidneys

(d) Specify the *"much reduced rate"* at which the fluid was administered

The rate is as stated 500mls of 0.18%NaCl/4%Glucose over 2 hours 20 minutes.

(e) Explain what you mean by the term *"renal losses"* and how they were measured during the transplant surgery

Renal losses are the native kidneys urine output and were not measured until the surgeon inserted a suprapubic catheter late in the operation.

(23) Answer to Question 2(iii) at p.5:
"All aspects of the anaesthetic were reassessed during the 2nd hour"

(a) Explain what prompted that reassessment of the anaesthetic and describe what the reassessment of the anaesthetic entailed

Reassessment is a continuous process and relates to continuing monitoring as recorded in the anaesthetic record (058-003-005). This is one of the reasons why we inserted the arterial line, so that the blood pressure could be recorded continuously rather than intermittently using a non-invasive blood pressure device.

(b) Who was involved in reassessing *"all aspects of the anaesthetic"*

Myself and either Dr Montague or his replacement whichever was present.

(24) Answer to Question 2(iii) at p.5:

"The computerised record (058-008-023) indicated that Adam's Central Venous Pressure CVP was initially 17mmHg at 08.00 hrs and had risen to 20mmHg at 0900 hrs a modest rise of 3mmHg after 2 hours of surgery. Although the initial CVP of 17 is higher than normally expected (8-12 normal range), we concluded that the tip had curved upward into the neck vessels as confirmed by compression. Therefore ... we accepted the 17 mmHg as a marker to look for relative change rather than an absolute level"

(a) Explain how a rise of 3mmHg is calculated from the CVP trace

The rise of 3mmHg is not calculated from the CVP trace but is a direct reading.

(b) Explain the reasons why it appears that the first CVP reading on the trend printout was not taken until just before 0800

This corresponded to the placement of the Central Line

(c) Explain the basis of your statement that 8-12 mm Hg is the normal range for central venous pressure

This is from my knowledge for a ventilated patient in Theatres and PICU when making a patient hypervolaemic.

(d) Identify all those to whom you refer in *"we concluded that the tip had curved upward into the neck vessels"* and *"we accepted the 17 mmHg as a marker to look for relative change rather than an absolute level"*

Myself and Dr Montague

(e) Describe and explain the factors that were taken into account in reaching the conclusion that the CVP could only be used as a *"marker to look for relative change rather than an absolute level"*

After I concluded that the tip of the CVP line was "obstructed" in the neck the CVP could not be trusted as an absolute number but could be useful as a relative marker.

(f) Explain the significance for your management of Adam's fluids for your conclusion that the CVP could only be used to look for *"relative change rather than an absolute level"*

I could only use the CVP readings as a general indicator of changing blood volume.

(g) Explain why you concluded that the pressure of 17 mmHg did not reflect central venous pressure

The CVP line was partially obstructed in the neck so the CVP could not be trusted as a true indicator of blood volume.

(h) Explain why you thought the pressure reading generated could not accurately reflect central venous pressure, even if the CVP catheter tip was in a large proximal neck vessel

The CVP line was partially obstructed in the neck so the CVP could not be trusted as a true indicator of blood volume.

(25) Answer to Question 2(iii) at p.5:

"By the 3rd hour, 0900 – 1000 (058-003-005), the blood loss was continuing and Adam's blood pressure, CVP and general status indicated that we may still require further fluid to be administered. We were moving to a stage when more blood products were now appropriate"

(a) Describe and explain the aspects of the following that *"indicated we may still require further fluid"*:

- *"blood loss"*
- *"blood pressure"*
- *"CVP"*
- *"general status"*

Blood loss as recorded on the blood loss form (058-007-021), Blood pressure as recorded on the anaesthetic record form (058-003-005), CVP as recorded on the CVP trace (058-008-023) and general status-other parameters on the anesthetic record form (058-003-005), all were indicators that further fluid may potentially be required.

(b) Describe the stage of surgery that had been reached and explain the basis upon which you concluded that it meant *"more blood products were now appropriate"*

When observed blood loss exceeded 400 mls corresponding to 25% of Adams blood volume there was a need to consider giving blood.

(26) Answer to Question 2(iii) at p.6:

"A blood gas analysis was taken at 09.32hrs which confirmed ... sodium of 123 mmol/L (058-003-003)".

(a) Identify the person(s) involved in taking, transporting and analysing the arterial blood sample from Adam in the blood gas machine

It could have been me, the trainee anaesthetist or the medical technical officer on duty.

(27) Answer to Question 2(iii) at p.6:

"This result [sodium of 123mmol/L] led to an immediate re-appraisal of the blood loss."

(a) Explain what you considered had occurred to produce the sodium result of 123mmol/L

The sodium content of the sample is likely to have been altered by the addition of heparin to the sample syringe.

(b) Explain the statement *"an immediate re-appraisal of the blood loss"*

The factor that led me to check blood loss was the Haematocrit of 18, normally around 30. (058-003-003)

(c) **Explain why an abnormally low serum sodium concentration should result in a re-appraisal of blood loss**

It was not the low sodium which resulted in the re-appraisal of blood loss, see 27b

(d) **Describe and explain what the *"immediate re-appraisal of the blood loss"* entailed, identify who was involved and what you concluded from it**

A low haematocrit would lead me to check for calculated and possible hidden blood loss. Myself and the anaesthetic trainee.

(28) **Answer to Question 2(iii) at p.6:**

"We were aware that Adam had sodium levels as low as this [123mmol/L)] without any ill effects (058-041-187 to 224)."

(a) **Identify the others to whom you refer in *"We were aware that Adam had sodium levels as low as this"***

Myself and the anaesthetic trainee.

(b) **Explain when you first became aware of those low sodium levels and in what circumstances**

I had noted it pre-operatively

(c) **Describe the circumstances in which Adam's sodium concentration level had previously fallen to that level (Ref: 058-041-197)**

The blood sample on 08.06.1995(058-041-197) refers to an out-patient sample taken by Dr Savage's Dialysis Clinic (057-056-114,115)

(d) **State the information and its source from which you concluded that Adam had suffered no *"ill effects"***

The out-patient clinic letter from Dr Savage (057-056-114,115) records no ill-effects

(29) **Answer to Question 2(iii) at p.6:**

"The new kidney was in place toward the end of the 3rd hour of surgery. This can be interpreted from the anaesthetic record (058-003-005) as being the time when Prednisone and Azothiaprone [sic] were given under the direction of Dr. O'Connor. This was another opportunity [new kidney was in place towards the end of the 3rd hour of surgery] for the team to review the fluid management, blood loss and general status of the new kidney. In that review it was clear that the appropriate amount of fluid was being delivered"

(a) **Explain why the new kidney being in place towards the end of the third hour of surgery provided an opportunity for the fluid management to be reviewed**

When the new kidney was connected we looked to see if it was getting sufficient blood, ie was the blood pressure sufficient to perfuse it.

(b) **Describe and explain what the *"review [of] the fluid management, blood loss"* entailed, identify who was involved as *"the team"* and what was concluded from it**

Reassessment is a continuous process and relates to continuing monitoring as recorded in the anaesthetic record (058-003-005). Myself and the anaesthetic trainee were involved and the conclusion was that the appropriate amount of fluid was being delivered.

(c) Describe and explain what was involved in the *"review"* of the *"general status of the new kidney"*, why it was instituted and what was concluded from it

When the new kidney was connected we looked to see if it was getting sufficient blood, ie was the blood pressure sufficient to perfuse it, which it appeared to be.

(d) State when the Prednisone and Azathioprine were prescribed by Dr. O'Connor and whether she was in the operating theatre when they were being administered

The anaesthetic record notes that the Prednisolone and Azathioprine were given at 10.00-10.15am (058-003-005). I cannot remember if Dr O'Connor was present.

(e) Identify the person who administered the Prednisone and Azathioprine

Myself and the anaesthetic trainee

(f) Describe and explain how that review made it *"clear that the appropriate amount was being delivered"*

We were satisfied that the vital signs were adequate and appropriate.

(30) Answer to Question 2(iii) at p.6:

"The fluids were again reassessed during the 4th hour of surgery"

(a) Describe and explain what the *"reassessment"* of the *"fluids"* entailed

Reassessment is a continuous process and relates to continuing monitoring as recorded in the anaesthetic record (058-003-005).

(b) Identify who was involved in that *"reassessment"*

Myself and the anaesthetic trainee

(c) Explain what was concluded from that *"reassessment"*, what action was taken in the light of it and by whom

The fluid reassessment is explained in the remainder of this paragraph. [WS-008/1 page 6 2(iii)]

(31) Answer to Question 2(iii) at p.6:

"My anaesthetic record finishes at 11.00 indicating that surgery was completed. However, there was a further 30-40 minutes when Adam was being prepared for transfer to PICU"

(a) State the total volume of urine passed by Adam in the period 7.00am to 11.00am

Urine loss was not measured until the surgeon inserted a suprapubic catheter late in the operation.

(b) Explain why your anaesthetic record does not extend to include the *"further 30-40 minutes when Adam was being prepared for transfer to PICU"*

Myself and the anaesthetic trainee were investigating the reasons why he did not wake up. The vital signs were continued and recorded on the monitor to just before transfer to PICU at 11.45 (058-008-023, 024)

(c) Describe and explain what was happening in the theatre during the 30-40 minutes when Adam was *"being prepared for transfer to PICU"*, including:

Myself and the anaesthetic trainee were investigating the reasons why he did not wake up.

- **what you mean by *"being prepared for transfer"***
- **identifying all those involved and what they were doing**

Myself and the anaesthetic trainee were continuing to monitor the vital signs and prepare the arterial, CVP lines and infusions for transfer to the PICU.

(d) State the time at which Adam left theatre

The vital sign monitoring was discontinued just before 11.45am which indicates the time Adam left theatre

(32) Answer to Question 2(iv) at p.6:

"It was therefore a terrible shock to me and all those present when Adam did not wake-up when his anaesthetic was switched off"

(a) Identify all those present when *"Adam did not wake-up"*

Myself and the anaesthetic trainee and probably a member of nursing staff although I cannot recollect which one.

(33) Answer to Question 2(iv) at p.6:

"I also re-examined his losses from the surgery and took account of the measurements taken (swabs and suction) as well as an estimate of that lost in the towels and on the floor."

(a) State the estimate made of the losses in the towels and on the floor and explain how that estimate was made

I rechecked the blood loss measurements. (058-007-021)

(b) Describe and explain the result of your examination of Adam's losses from his surgery, including:

- **the quantity and type of fluid**

It confirmed approx 911mls of blood

- **the means of measurement**

Measured blood loss, swabs are weighed dry and wet and the net difference is the blood loss. Blood stained towels and drapes are estimated.

(c) Describe and explain how the content, volume and rate of fluids administered to Adam during his surgery corresponded to your fluid management plan developed for Adam

I believed that I had corrected his deficit, provided maintenance and met his losses as well as preparing his circulation for a kidney transplant, as planned.

(34) Answer to Question 2(iv) at p.7:

"In my previous experience of anaesthesia for renal transplantation there has always been the option to institute renal dialysis after surgery if there is evidence of fluid overload. This gives anaesthetists and nephrologists an opportunity to give generous intravenous fluids provided careful and continuous monitoring is provided to ensure the function of the donor kidney. In most of the cases I have been

involved with there has been evidence of pulmonary oedema following renal transplants. Often the patient needs oxygen therapy or even mechanical ventilation to manage this complication ... Therefore we were administering fluids to Adam with the express purpose of increasing his blood volume to ensure that the donor kidney (with a long ischaemic time) would have sufficient preload and be given the best possible chance of working."

(a) Provide details of all your paediatric cases to which you refer in *"In my previous experience of anaesthesia for renal transplantation there has always been the option to institute renal dialysis after surgery if there is evidence of fluid overload."*

I do not have numbers of cases of renal transplant. My comment was a generalisation of my experience that it is usual to increase the patients fluids and blood volume (hypervolaemic) during kidney transplants.

(b) Describe the renal transplant cases in which you have been involved where *"there has been evidence of pulmonary oedema"* following the surgery, including for each case:

I do not have a record of such cases of pulmonary oedema. I mentioned this complication to illustrate the fact that it is usual to make the patient hypervolaemic.

- date
- surgical team and anaesthetic team involved
- hospital concerned
- fluid management plan employed
- how the *"pulmonary oedema"* was diagnosed and treated

(c) Identify the others to whom you refer in *"we were administering fluids to Adam with the express purpose...."*

Myself and the anaesthetic trainee

(35) Answer to Question 2(iv) at p.7:

"I accompanied Dr Savage to speak to Adam's mother. We passed on our concerns on why Adam hadn't woken up at the end of surgery"

(a) State what your *"concerns"* were and explain the basis of them

The concerns were that it could not be explained why Adam did not wake up.

(b) Describe what you said to Adam's mother, including what you told her about your *"concerns on why Adam hadn't woken up at the end of surgery"*

I will have said to Adam's mother that I could not explain why Adam had not woken up.

(c) Identify the others to whom you refer in *"We passed on our concerns"*

Dr Savage

(36) Answer to Question 3(ii) at p.8:

"Fluid Plan: Replace fluid deficit in the first hour and provide ongoing renal losses associated with Adam's native kidneys with a type of fluid low in sodium content (0.18 NaCl/4% Glucose). This fluid, Saline & Glucose mixture is recommended for dehydration in the British National Formulary (BNF) Number 29, March 1995"

(a) **Explain the basis of this statement**

The BNF provided up-to-date information on drugs and fluids, but I was noting that it was 8 years later before the BNF was updated in relation to the effects of ADH.

(37) **Answer to Question 2(iv) at p.7:**

"I worked closely with other medical staff to determine the cause of his death so that his mother could be given as much information as possible. It was also important to investigate the cause of his death so that other patients could benefit from knowledge learned by Adam's tragic death during renal transplantation."

(a) **Identify all those *"other medical staff"* with whom you *"worked closely"* to determine the cause of Adam's death *"so that his mother could be given as much information as possible"***

I cannot remember who. It would have been with the nephrologists and anaesthetists in PICU.

(b) **Describe and explain what that *"work"* involved, including when it was carried out and the matters considered during it as providing an explanation for Adam's death**

I rechecked his medical records and anaesthetic records and also a computer search for research papers.

(c) **Describe and explain what information was given to Adam's mother about his cause of death as a result of that *"work"***

I think Dr Savage did most of the discussion with Adam's mother. I do not know what she was told about the cause of Adam's death.

(d) **Describe and explain what knowledge was learned from Adam's death that might benefit other patients**

To improve my documentation of fluid calculations and administration to children undergoing anaesthesia. Following Adam's death there has been improved reliability for testing of electrolytes in the operating theatre which assists with the monitoring of fluid and electrolyte administration.

(38) **Answer to Question 4 at p.8:**

"I worked with all those involved in the days and weeks following Adam's death to investigate all the possible reasons for that tragic event. This included multiple reviews of all aspects of the anaesthetic and pre-operative management"

(a) **Identify *"all those involved"* with whom you worked to *"investigate all possible reasons"* for Adam's death**

It was with my anaesthesia colleagues when I raised the subject.

(b) **Describe and explain what that investigation involved, including:**

- **when the *"multiple reviews"* were conducted and the identity of those involved**

It was with my anaesthesia colleagues in the weeks following Adam's death.

- **the aspects of Adam's anaesthetic and pre-operative management that were investigated**

It was with respect to fluids, epidurals, CVP and anaesthetic safety

(c) **Describe and explain the matters considered during that investigation as providing an explanation for Adam's death**

It was never fully explained in my view.

(39) **Answer to Question 4 at p.8:**

"During the Coroner's Inquest, clear recommendations were drafted. On the 19th June 1996 I worked in co-operation with Drs. Murnaghan, Savage and Gaston to develop Draft Recommendations for Paediatric surgery (060-018-036). This was shared and discussed with my Paediatric Anaesthetic colleagues, Drs. Crean and McKaigue (060-014-025 – redacted)"

(a) Describe what was discussed with Drs. Crean and McKaigue in relation to the Draft Recommendations that you had worked with Drs. Murnaghan, Savage and Gaston to develop and the result of the discussion(s)

Fluid management in major paediatric surgery.

(b) State when the Draft Recommendations became substantive, describe to whom they were distributed and what criteria was used to determine their dissemination

The draft recommendations of 19.06.1996 (060-018-036) had the agreement of all the paediatric anaesthetists so became substantive from 20.06.1996 (060-014-025). They had been agreed by all the paediatric anaesthetists who were involved in major paediatric surgery so did not require further dissemination.

(40) **Answer to Question 4 at p.8:**

"I have had the opportunity since 1995 to teach and train junior anaesthetic and paediatric trainee doctors in all aspects of fluid management in children undergoing major surgery. I have maintained my professional knowledge of all aspects of such cases by reading widely on the subject of fluid management and passed on such knowledge in formal and informal teaching sessions."

(a) Describe and explain what you taught/trained *"junior anaesthetic and paediatric trainee doctors"* in fluid management and hyponatraemia prior to Adam's death

I do not have records of my teaching but would teach about fluid maintenance rates, fluid types and replacement fluids as contained in Textbooks.

The surgical neonate: Anaesthesia and Intensive Care. Hatch, D Sumner, E, Hellman, J Arnold London : 1994
Pediatric Anesthesia. Gregory , GA Churchill Livingstone London : 1994

Anesthesia and uncommon pediatric diseases. Katz and Steward. W B Saunders London : 1993

Anesthetic management of difficult and routine pediatric patients. Berry , F Churchill Livingstone London : 1990

Practice of paediatric ICU Rogers Williams & Wilkins London : 1987

(b) Describe and explain what if any changes were made to that teaching/training as a result Adam's death and the basis of any such changes

I do not have records of my teaching but there were no differences from the textbook teaching.

(c) Explain the meaning of *"formal and informal teaching sessions"*

Informal means bedside teaching usually with a single trainee. Formal means seminars/tutorials usually with several trainees.

(41) **Answer to Question 4 at p.8:**

"In relation to the Inquiry I have taught many doctors and nurses about the type and volume of fluids to be administered to infants and children with serious life-threatening conditions e.g. shock, dehydration, diabetes, trauma, etc. This teaching follows national and international guidelines."

(a) Describe and explain what you taught *"doctors and nurses about the type and volume of fluids to be administered to infants and children"* in relation to fluid management and hyponatraemia prior to Adam's death

I would teach about fluid maintenance rates, fluid types and replacement fluids as contained in Textbooks.

The surgical neonate: Anaesthesia and Intensive Care. Hatch, D Sumner, E, Hellman, J Arnold London : 1994
Pediatric Anesthesia. Gregory , GA Churchill Livingstone London : 1994

Anesthesia and uncommon pediatric diseases. Katz and Steward. W B Saunders London : 1993

Anesthetic management of difficult and routine pediatric patients. Berry , F Churchill Livingstone London : 1990

Practice of paediatric ICU Rogers Williams & Wilkins London : 1987

(b) Describe the context of that teaching and identify the *"national and international guidelines"* which that teaching followed

I would teach about fluid maintenance rates, fluid types and replacement fluids as contained in Textbooks.

The surgical neonate: Anaesthesia and Intensive Care. Hatch, D Sumner, E, Hellman, J Arnold London : 1994
Pediatric Anesthesia. Gregory , GA Churchill Livingstone London : 1994

Anesthesia and uncommon pediatric diseases. Katz and Steward. W B Saunders London : 1993

Anesthetic management of difficult and routine pediatric patients. Berry , F Churchill Livingstone London : 1990

Practice of paediatric ICU Rogers Williams & Wilkins London : 1987

(c) Describe and explain what if any changes you made to your teaching as a result of Adam's death and the basis of any such changes

I do not have records of my teaching but I do not think there were any changes to the textbook advice

(d) Identify any *"national and international guidelines"* that your teaching currently follows

Current guidelines that I use;
NPSA and NICE Reducing the risk of hyponatraemia when administering intravenous infusions to children.
http://www.nrls.npsa.nhs.uk/resources/?entryid45=59809
Scottish Guideline. http://www.clinicalguidelines.scot.nhs.uk/YOR-DIV-004%20Symptomatic %20 Hyponatraemia%20*approved %20pdf%20new .pdf*

NI Hyponatraemia in Adults Guideline. http://www.gain *ni.org/ Library/ Guidelines/ hyponatraemia _ mainreport.pdf*

Current textbooks that I use;

Advanced Paediatric Life Support: the practical approach, 5th Edition. BMJ Books - Publisher: John Wiley & Sons (Wiley-Blackwell)
Hatch and Sumner's Textbook of Paediatric Anaesthesia. 3rd Edition. 2008. Hodder Arnold Publication
Rogers Textbook of Pediatric Intensive Care 4/e David G. Nichols MD, MBA
Handbook of Paediatric Intensive Care. G Pearson. London: WB Saunders, 2002

(42) 'Other points you wish to make' at p.11:

"It was the agreed intention of the transplant team to ensure that water would be given to replace water, salt to replace salt and blood to replace blood and that sufficient sugar be given to provide Adam's essential metabolic requirements"

(a) Identify the members of the *"transplant team"* who were party to that *"agreed intention"*
Myself and Dr Montague.

(b) Describe when and how that *"agreed intention"* was reached
This was the pre-operative management plan.

II QUERIES ARISING OUT OF YOUR DEPOSITION

With reference to your Deposition to the Coroner taken on 21st June 1996, please provide clarification and/or further information in respect of the following:

(43) ***"I was made aware of the preoperative problems of fluid administration, that he usually received night feeds and that iv fluids could not be given 2 hours prior to surgery so I had permitted clear gastric fluids to be given up to the last possible moment. ... He weighed 20 kgs"*** **(Ref: 011-014-096)**

(a) Explain and describe those *"preoperative problems of fluid administration"* and identify the person(s) who made you aware of them, when and by what means
Dr Montague's phone call apparently informed me that multiple attempts at iv access had failed.

(b) Describe the composition of the *"clear gastric fluids"* which you permitted up to the *"last possible moment"*
Dr Savage states that Dioralyte was given until 05.00 (093-006-017). It contains 60mmol/L sodium, 50 mmol/L chloride, 20 mmol/L Potassium, 10 mmol/L Citrate

(c) Describe and explain the rate at which those *"clear gastric fluids"* were to be given and to whom you communicated that 'permission'
Although I cannot recollect it now I would have given permission for the clear gastric fluids to be given up until the last possible moment (ie 5.00am – 2 hours before surgery). I do not think I specified a rate.

(44) ***"... the donor kidney did not appear well perfused after an initial period of apparently good kidney perfusion"*** **(Ref: 011-014-097)**

(a) State the time at which you considered *"the donor kidney did not appear well perfused"*
This was after the clamps were released around 10.00-10.15am (058-003-005).

(b) **Describe the appearance of the kidney that led you to consider that it was not well perfused and any discussion of it in the theatre**

It was dusky. I do not recollect discussion of this but it would have been discussed with the surgeons.

(45) ***"...and a blood gas at 9.30am confirmed good oxygenation and no sign of acidosis or any indication of problems. In view of the CVP, heart rate and BP I did not consider the fluids to be either excessive or restrictive. Indeed I regarded the fluids to be appropriate and discussed this with other doctors present in the theatre."*** **(Ref: 011-014-097)**

(a) **Identify the *"other doctors present in the theatre"* with whom you discussed Adam's fluids, the nature of those discussions and to what end.**

Dr Montague or his replacement trainee and I discussed how his vital signs were in keeping with the appropriate administration of fluid.

(46) ***"At the end of the case I reversed the neuromuscular block with neostigmine and anticipated the child awakening. When there was no sign of this I examined his pupils and found them to be fixed and dilated. I became extremely concerned that he had suffered brain stem injury"*** **(Ref: 011-014-097)**

(a) **State the time at which you considered that Adam had *"suffered brain stem injury"***

This was after he failed to breathe on his own and had fixed dilated pupils, around 11.00-11.30 (058-003-005).

(47) ***"I had discussed his preoperative fluids with Dr. Savage (Consultant Paediatric Nephrologist) and Mr. Brown (Consultant Paediatric Surgeon)"*** **(Ref: 011-014-098)**

(a) **State when and in what circumstances you learned that Mr. Brown would be involved in Adam's surgery**

This was after my arrival in theatre on Monday am

(b) **Describe and explain what you discussed with Mr. Brown in relation to Adam's preoperative fluids and when**

I cannot remember now this discussion with Mr Brown but I would have been advising him of what had already occurred.

(48) ***"FBP, Coagulation Screen and U&E were all within acceptable limits. Preoperative medication included bicarbonate and calcium supplements."*** **(Ref: 011-014-098)**

(a) **State the time to which the U&E results refer and the basis of your conclusion that it was within *"acceptable limits"***

The U&E results of the sample taken at 9.30 pm on the 26th November 1995 and recorded at 11.00 pm were within normal limits.

(b) **Explain *"the bicarbonate and calcium supplements"* which you prescribed for Adam and the time at which you prescribed that those supplements were to be administered to Adam**

Dr. Savage prescribed bicarbonate and calcium supplements (093-006-015)

(49) *"2. Difficult IV access. The paediatric registrar had attempted on several occasions to erect i.v. fluids to further prevent dehydration prior to surgery. This proved impossible"* (Ref: 011-014-099).

(a) Identify the paediatric registrar who *"had attempted on several occasions to erect i.v. fluids ... prior to surgery"*

I was not told his/her name.

(b) State the period of time over which this paediatric registrar attempted *"on several occasions to erect i.v. fluids ... prior to surgery"*

I was not present but it would appear to have been around 01.30 (from the records).

(c) State whether you were alerted to those attempts to gain IV access, and if so when and by whom were you so informed

I understand it may have been in a telephone conversation with Dr Montague although I do not recollect the call.

(50) *"There are two small increases in the systolic BP at around 10.00a.m. corresponding to two small boluses of dopamine ... The rationale for this was to increase the perfusion pressure (without) fluid challenge) to the donor kidney, which at that stage was not 'looking good' and not producing urine."* (Ref: 011-014-101)

(a) Explain the time which you mean in your reference to *"at that stage"*

This was when the clamps were released on the new kidney around 10.00-10.15am (058-003-005).

(b) Describe the manner in which *"the donor kidney ... was not 'looking good'"*

This was because it was dusky

(51) *"I believe the underlying cause of the cerebral oedema was hyponatraemia (not dilutional) during renal transplant operation"* (Ref: 011-014-108)

(a) Describe and explain how you consider Adam's hyponatraemia might have been caused

I do not know but I did not believe it to have been caused by the process described by Dr Arieff as this involves the ADH effect on the kidney.(059-059-140)

(52) *"In Adam's case it was not practical to carry out electrolyte tests at the commencement of surgery"* (Ref: 011-014-108)

(a) Explain why it was not practical in Adam's case *"to carry out electrolyte tests at the commencement of surgery"*

This would have meant absenting a member of the team at a very busy time.

(b) State in what circumstances it would have been practical to *"carry out electrolyte tests"*

If the CVP line insertion and the epidural had taken less time a U&E sample could have been sent earlier.

(53) *"There was no reason to believe there would have been a change in electrolytes between 11pm and 6.45am"* (Ref: 011-014-108)

(a) Explain the meaning of your statement to the Coroner and the basis for it

As in answer to question 10. I think I expected it to be "stable" in keeping with his usual U&E results eg (058-041-199, 058-041-200,058-041-201) with only one exception (058-041-197). Also he was receiving a common type of enteral hydration and had a high output renal loss reflecting a similar concentration of sodium.

(54) ***"The new kidney did not work leading to a re-assessment of the fluids given. This made us think we have underestimated fluid and we gave a fluid bolus at 9.32"*** **(Ref: 011-014-108)**

(a) Explain what you meant by the *"new kidney did not work"* and the basis upon which you reached that conclusion

It looked dusky indicating that it was not getting sufficient perfusion.

(b) Identify all those included in your reference *"made us think we have underestimated fluid"*

Myself and the anaesthetic trainee.

(c) Describe and explain why the 'new kidney not working' led you to think that you had *"underestimated fluid"* and that *"a fluid bolus"* was therefore appropriate

This extract from my Inquest Deposition is drawn from my answers to a series of questions posed by Miss Higgins. The questions are not recorded. The two sentences quoted do not follow on and therefore must refer to different questions. At 9.32 there was no indication that the kidney might not work (clamps not released until 10.00-10.15) and there is no recording of a fluid bolus being given at 9.32. I believe my answer should be read as "This made us think we had underestimated the fluids so we gave a fluid bolus at 9.30 too". I believe this will have been my answer to a question about fluid replacement which led me to refer to the first unit of blood which was given at 9.30.

(d) State the time at which the donor kidney was attached to a blood supply and ureter

My records indicate the blood supply was attached at 10.00-10.15am (058-003-005). The ureter was implanted after this.

(55) ***"I would not rely on the machine to accurately analyse sodium levels. That is common practice in the RBHSC"*** **(Ref: 011-014-108)**

(a) Describe and explain why you would not rely upon the blood gas machine to accurately analyse sodium levels

When heparin is used the sodium result was unreliable

(b) State what, if anything, has been done about such a *"common practice in the RBHSC"*

Syringes with Heparin crystals are now used and a different analyser.

(c) State how long the *"common practice"* has existed at the RBHSC whereby blood gas machines are not relied upon to *"accurately analyse sodium levels"*

When I became a consultant in February 1991 I became aware of the practice.

(56) ***"We measured the total number of fluids given against those emitted. The bladder being opened did affect my calculations"*** **(Ref: 011-014-108)**

(a) **State your measurements and calculations of i) *"the total number of fluids given"* and ii)*"those emitted"***

The Fluids given and emitted are as recorded in the anaesthetic chart (058-003-005)

(b) **Identify the person(s) who *"measured the total number of fluids given against those emitted."***

I recorded the fluids and documented them on the anaesthetic chart (058-003-005)

(c) **State by what means urine produced by Adam's native kidneys was collected and measured during the surgery on 27th November 1995, and identify who was responsible for collecting and measuring that urine**

The native kidneys did not have their urine collected and measured until the suprapubic catheter was inserted by the surgeon late in the operation. Theatre nursing staff will have connected the catheter to a measuring bag.

(d) **State by what means urine produced by the donor kidney was collected and measured during the surgery on 27th No vember 1995, and identify who was responsible for collecting and measuring that urine**

The donor kidney was catheterised by the surgeon late in the operation and will have been connected to a measuring bag by the theatre nursing staff.

(e) **State the time at which Adam's bladder was opened**

This time is not recorded. It was towards the end of the surgery.

(f) **Describe and explain the effect on your calculations of Adam's *"bladder being opened"*, including showing how that was factored into your fluid management for Adam**

It led to a review of the fluids.

(57) ***"I was aware of the Arieff article [BMJ 1992 paper 'Hyponatraemia and death or permanent brain damage in healthy paper on hyponatraemia'] when it was first published"*** **(Ref: 011-014-108)**

(a) **Explain what difference, if any, Arieff's paper has made to your anaesthetic practice since *"it was first published"***

I was aware of the effect of SIADH in anaesthetised patients prior to Arieff's paper. It was my practice to use balanced salt solutions in anaesthetised patients with intact ADH/renal function with the exception of small infants who needed glucose infusion.

(58) ***"I produce a further statement C5"*** **and** ***"Draft Statement ... having regard to the information contained in the paper by Arieff et al (BMJ 1992) ... in future all patients undergoing major paediatric surgery who have a potential for electrolyte imbalance will be carefully monitored ..."*** **(Ref: 011-014-108)**

(a) **Explain how Arieff's BMJ 1992 paper 'Hyponatraemia and death or permanent brain damage in healthy paper on hyponatraemia' was relied upon to reach the statement in respect of *"patients undergoing major paediatric surgery who have a potential for electrolyte imbalance"***

The draft recommendations of 19.06.1996 (060-018-036) had the agreement of all the paediatric anaesthetists so became substantive from 20.06.1996 (060-014-025). They had been agreed by all the paediatric anaesthetists who were involved in major paediatric surgery so did not require further dissemination.

III QUERIES ARISING OUT OF YOUR PSNI INTERVIEW

With reference to your interview under caution with PSNI which took place on 17th October 2006, please provide clarification and/or further information in respect of the following:

(59) *"My knowledge is there has to be 3 nurses present before an anaesthetic is commenced ... Before an operation commenced. The runner is usually a nursing auxiliary. ... But there would have been 2 trained, 2 trained staff."* **(Ref: 093-038-143)**

(a) Explain the basis for your *"knowledge"* that *"there has to be 3 nurses present before an anaesthetic is commenced"*

This was the procedure. One nurse for the anaesthetist, one as the scrub nurse and a runner

(b) Describe the role and responsibilities of the *"runner"*

It was to assist the scrub nurse and collect equipment.

(60) *"To actually see what's happening in real time with the patient blood doesn't be lost as maybe you can see in the swab count in a very steady manner ... Peaks and troughs ... And the surgeon may take 2 or 3 large swabs into a bleeder and to control haemorrhage ... But those swabs aren't weighed for maybe ... Half an hour ... Later ... The blood it's there to congeal and coagulate"* **(Ref: 093-038-145)**

(a) Explain the implications for your fluid management calculations, in respect of blood replacement, of the delayed weighing of swabs

The anaesthetist must be aware and vigilant of the surgery as it happens. Blood loss can be rapid and the swab may not be taken out of the patient until the bleeding has been controlled. That is why I or the trainee watched the patient's wound.

(b) Describe the basis of your calculations of blood loss for the purposes of replacement, in circumstances where the weighing of the swabs is delayed for half an hour

If the blood loss is rapid then fluid would be given to correct this at the time rather than waiting for the swab to be weighed.

(61) *"I have given anaesthetic where the kidney has not worked"* **(Ref: 093-038-146)**

(a) Identify the date and place of the occasion when you administered *"anaesthetic where the kidney has not worked"*

I cannot remember when this was. It was most likely when I was working as a Fellow in Paediatric Anaesthesia in Toronto, Canada between 1989 and 1990.

(b) Identify the surgeon involved on that occasion and describe the circumstances in which you came to administer the *"anaesthetic where the kidney did not work"*, including the reasons why the kidney did not worked and the outcome

I cannot remember the case in detail or the surgeon involved. I was working abroad as a trainee in paediatric anaesthesia.

(62) *"[I]t became clear that going to other hospitals inviting other people to sit round a table and work through common policies was not ... So I decided to use the web basically ... We already have the (inaudible) ... I mean I have linked up with Altnagelvin and Causeway ... But it's purely a learning ... Environment."* (Ref: 093-038-148 to 149)

(a) State with whom you *"linked up"* at (i) Altnagelvin and (ii) Causeway

Consultant paediatricians and anaesthetists with an interest in paediatrics.

(b) State when you made those links

From 2004 onwards the Tele-links were made and are still ongoing.

(c) State what you discussed during your linkups with Altnagelvin and Causeway

Management of children prior to and during transfer to PICU.

(63) *"I have to give him [Adam] drugs and fluids to ensure that he is delivered safely through the operation ... And in this case that required close consultation with certainly Doctor O'Connor"* (Ref: 093-038-153)

(a) State who, other than Dr. O'Connor, was (or would have been) in *"close consultation"* with you about the drugs to be given to Adam

It was only Dr O'Connor

(b) State when the *"close consultation"* with Dr. O'Connor took place and what it entailed

Dr O'Connor was available on the morning of Adams transplant and was in theatre. I cannot remember how long she was with me.

(64) [PSNI:] *"if you decided to give say Hartman's or the number 18 solution or normal saline or anything would the surgeons have any responsibility in respect of that decision or is that your decision" ... That is a liaison decision there is an element of co-operation ... it is always the case in my experience of transplantation surgery that the surgeon asks for more fluid to be given ... I don't remember any kidney transplant that I haven't been asked to push more fluid"* (Ref: 093-038-158 to 093-038-159)

(a) Explain whether you consider that the surgeon has any responsibility during surgery for the content, volume and rate of fluid given to the patient by the anaesthetist and, if so, identify:

- **what that responsibility is and**
- **the basis and/or source of it**

The surgeon can request that more fluid is given if he wants more perfusion or urine output.

(b) Identify every kidney transplant, prior to Adam's surgery, in which you have *"been asked to push more fluid"*, including providing:

- **date of the kidney transplant**
- **identity of the surgeon(s) concerned**
- **circumstances**
- **outcome**

I cannot provide individual details of these cases but I can recall, in general having to push more fluid in most transplants

(65) *"In good health however his chronic status of congenital nephrotic syndrome did not make him a perfect candidate."* **(Ref: 093-038-162)**

(a) Explain the basis of your assertion that Adam's condition was one of *"congenital nephrotic syndrome"*

His diagnosis was "bilateral dysplastic kidneys with large cysts" as diagnosed by Dr Savage (049-029-075) and "Reflux nephropathy" by Dr O'Connor (058-035-143) not as I suggested.

(66) *"But his complex background and the presence of his native kidneys with this very large output complicated my anaesthetic enormously"* **(Ref: 093-038-162)**

(a) Explain precisely how *"the presence of his native kidneys with this very large output complicated [your] anaesthetic enormously"*

His native kidneys could not concentrate urine and therefore large volumes of dilute urine were lost. This had to be factored into his fluid calculations as described in my deposition.

(67) *"The fact that he was fasting meant that we had to back calculate the food he should have been given to correct the deficit ... And also his chemistry could have been deranged in that time ... They've no record of that, if his chem. ..., if his sodium had been low for instance"* **(Ref: 093-038-163)**

(a) Explain what you mean by *"his chemistry could have been deranged at that time"* including the specific *"time"* to which you refer

This meant his blood sodium, potassium and glucose during the time between 1.30am when the iv access was lost and the start of the anaesthetic.

(b) State whether you factored into your fluid management calculations the possibility of Adam's *"chemistry"* having *"been deranged at that time"* and if so how and on what basis

I had to replace his sodium, water and glucose. I made the assumption that his management of dialysis was as before and did not lead to deranged electrolytes.

(c) Identify to whom you refer in *"They've no record of that"*

When I said "they" I was referring to the hospital notes.

(68) *[PSNI;] "Now who is responsible for the planning of fluids.....Me.....I'm the overall responsible.....But it's discussed with the main team, the nephrology team.....My junior anaesthetist and to some extent the surgeons"* **(Ref: 093-038-168)**

(a) Describe in detail the discussions you had with *"the nephrology team... junior anaesthetist and ... the surgeons"* and identify each individual who was party to these discussions.

I had discussed the fluid planning with Dr. Savage and Dr. Montague however I cannot recollect the particular discussion with the surgeons.

(b) Describe and explain:

- **the purpose of those discussions with: (i) the nephrology team and (ii) the surgeons**
- **the effect, if any, of these discussions on your fluid management plan**

Discussion with Dr. Savage and Dr. Montague was to formulate the fluid management plan, and discussion with the surgeons would be to ensure they were aware what was planned.

(69) *"So during and at the end of each fluid bag....Then they discuss what to put up next."* (Ref: 093-038-170)

(a) Identify to whom you refer in *"Then they* discuss"

I was talking in general terms about the organisation and responsibilities of a team, not specifically about Adam. In Adam's case "they" would have been me and Dr. Montague.

(70) *"....from his previous anaesthetic in Doctor Loan I have in in my report that we knew Adam could tolerate large quantities of sugar 1/5 solution"* (Ref: 093-038-190)

(a) Define *"large quanities"* and identify *"the report"* to which you refer.

I was referring to the fluid that he received in a recent anaesthetic. 300 mls being a large volume. The report I referred to was the Statement I made at the start of the police interview (093-038-125)

(b) Identify the persons to whom you refer when you state *"we knew ..."*

Myself and Dr Montague.

(71) *[PSNI:] "If you want to administer glucose but not use number 18 solution what options would you have had ... Ahm not many ... There weren't many other solutions ... We could have used 5% dextrose ... Which has got no salt there's no sodium ... I wanted, I knew, I knew Adam was losing 30 millimoles per litre of sodium in his urine that had been established ...I knew Adam was losing some sodium ... I wanted to give him a solution that reflected the amount of sodium ... He was normally losing ... That's why I chose fifth normal ... It has the same quantity of sodium that his urine has ... So you were replacing like for like ... Whatever he was losing we were replacing"* (Ref: 093-038-176 to 093-038-177)

(a) State what other solutions were available in the at RBHSC in November 1995

5% glucose, 10% glucose, 0.9% Sodium Chloride, Hartmanns solution.

(72) *"Adam was fed at night, children with nephrotic syndrome suffer poor nutrition poor weight gain and he was actually fed when he was sleeping into his stomach"* (Ref: 093-038-177)

(a) Explain whether you mean that Adam, as a result of nephrotic syndrome, suffered from *"poor nutrition"* and *"poor weight gain"*

From his medical records on 9/11/1995. "Feeds Gastrostomy (button) 3x200 bolus 1500ml O/N ?how many calories - 1540 kcals =77kcal/kg Sucks bread. No feed." (058-035-143)

(b) If you do mean to assert that Adam suffered from *"poor nutrition"* and *"poor weight gain"* and if so state the basis for that assertion and its effect on your fluid management calculations

Because Adam did not take sufficient nutrition during the day. His overnight nutrition given by gastrostomy button ensured weight gain. The effect was that I had to continue to provide glucose to prevent hypoglycaemia.

(c) If you do not mean to assert that Adam suffered from *"poor nutrition"* and *"poor weight"* gain, then explain the relevance of your comment

His overnight nutrition given by gastrostomy button ensured weight gain.

(73) *"So despite having questioned Doctor Savage the night before and gained as much as I could about him ... There was clearly a lot more information to catch up on"* (Ref: 093-038-179)

(a) Describe and explain the *"lot more information to catch up on"* that you regarded as outstanding and its significance to your plans for your management of Adam prior to and during his transplant surgery

This is information I was not given over the phone such as that contained in previous anaesthetic charts, any airway, ventilation or circulatory problems that other anaesthetists had encountered.

(b) State whether you obtained that information (or any part of it) and if so, state when, describe what that information was, identify where you obtained it and explain how it featured in your plans for Adam's management

I could see from previous anaesthetic charts and notes that he had difficulty with iv access but did not have known airway or breathing or circulation problems.

(74) *"But again reading the notes I would have done a lot of the research without any staff being present"* (Ref: 093-038-180)

(a) Describe and explain the *"lot of research"* that you did *"without any staff being present"*, your sources, the information you obtained through those researches and its significance to your plans for your management of Adam prior to and during his transplant surgery

This involved checking his notes, looking for or researching relevant information about his previous anaesthetics

(75) [PSNI]: *"are you familiar with Doctor Gibson's report and the report that I think the technicians ... McLaughlin and Wilson produced are you happy that the equipment they're referring to is the equipment that you were using. Yes"* (Ref: 093-038-181)

(a) Explain the basis upon which you were satisfied that the equipment referred to by Dr. Gibson in her report and by Messrs. McLaughlin and Wilson in their report was the equipment being used during Adam's transplant surgery

The equipment referred to was that present in the operating theatre where the operations on the 3 cases under investigation including Adam Strain's took place.

(76) [PSNI]: *"And before the operation commences Doctor I think you may have mentioned in your statement that you checked the equipment ... Correct"* (Ref: 093-038-183)

(a) State the date and time that you *"checked the equipment"*

27th November 1995 before the start of the operation.

(b) Describe what was involved in your equipment check

Checking the pipes were securely plugged in, backup cyclinders were full, oxygen delivery and FiO2 monitors were attached, patient monitors were in working order, airway equipment and drugs and resuscitation equipment.

(c) Identify all those present whilst you *"checked the equipment"*

Dr Montague was with me.

(d) State whether you recorded the fact of the check and its results, if so state where you recorded it, if not explain why you did not do so

Routine checks were not recorded

(77) *"I'm looking at the section where I did some calculations for the fluid. His body weight was 20 kilograms. His (inaudible) maintenance I've listed 200 mls an hour. And the deficit I've written down here is 300. And his (inaudible) blood volume is 80 mls per kilogram which is 1600 mls. So that would've been the basic fluid calculations. They asked me did the fluids I gave follow my initial plan. And as I've said in this statement we give the first 500 mls of 1/5 normal saline over half an hour. And started the second bag because we felt that we were still. Not that we hadn't fully replaced his deficit and his first hour's maintenance, so the second bag was started at 0730 according to the record and it was given over the following hour and 15 minutes approximately "* (Ref: 093-038-186 to 093-038-187)

(a) Explain the basis of your calculation that Adam's fluid maintenance rate was 200mls an hour

This was based on his overnight maintenance rate 200mls per hour from the plan on the fluid balance page 057-010-013 for 5/N @ 20mls/hr and clear fluids at 180mls/hr.

(b) State what you estimated Adam's glomerular filtration rate (GFR) to be prior to his transplant surgery and the implications of that GFR rate for your fluid management calculations

I did not know Adam's GFR. It is a measurement of the efficiency of the kidney at concentrating and excreting waste products like urea and creatinine. Adam could not concentrate or excrete these products so he required dialysis and passed a large volume of dilute urine.

(c) Describe and explain the basis of your calculation that Adam's *"deficit"* was 300mls

This is from his usual overnight feeds at 150 ml/hr (1500ml over 10 hrs) and his fasting period, 05.00-07.00 am, which is 300 mls.

(d) Explain the basis of your decision to replace Adam's fluid deficit (that you calculated at 300 mls by 500mls) within a 30 minute period

This was to replace the type and volume of fluid that he would have usually required. There was an urgency to replace this deficit and provide sufficient maintenance fluid.

(e) State the evidence and calculations for your statement that *"we hadn't fully replaced his deficit and his first hour's maintenance"*

This was based on my concerns for his deficit (around 300mls) and requirement for a further 150mls in that first hour and to ensure that no potential deficit remained as we began the process of increasing Adam's circulating blood volume (hypervolaemia) in preparation for his kidney transplant.

(f) Identify all those to whom *"They asked me did the fluids I gave follow my initial plan"* refers

"They" refers to the Inquiry.

(g) Identify all of those to whom *"we"* refers

Myself and Dr Montague.

(78) *"His [Adam] body weight was 20 kilograms"* (Ref: 093-038-186)

(a) Identify the source for your claim that Adam's *"body weight was 20 kilograms"*

It was recorded on his Weight Record (058-036-145) and fluid chart (057-010-013, 014)

(79) *"So did my fluids reflect my pre-operative fluid plan yes they did up until a point where at about 9, 0900 the blood loss became quite problematic"* (Ref: 093-038-187)

(a) Explain what precipitated the *"blood loss"* becoming *"quite problematic"*

I had to consider transfusing him with blood because of increasing blood loss.

(b) State whether there was any discussion amongst the surgical team about the *"blood loss"* that had become *"quite problematic"* and if so state what was discussed, who participated in the discussion and any agreed course of action

I cannot remember.

(c) State whether you were asked to take any action in relation to the *"blood loss"* that had become *"quite problematic"* and if so state what you were asked to do, identify who asked you to do it and your response

I considered this an anaesthetic matter and would not have expected and do not remember any request for action.

(80) *"We had planned the type of fluid we were going to give at each stage of the operation. What we couldn't plan for was the quality, was the volume of fluid. Until we got feedback. From the surgical field and from our monitors"* (Ref: 093-038-187 to 093-038-188)

(a) Identify all of those to whom *"we"* refers

Myself and the anaesthetic trainee.

(b) State when the plan for the type of fluids was formulated and describe each *"stage of the operation"*, the time at which you estimated it would be reached and the type of fluid that you planned was to be administered at each stage

The plan for the type of fluids was pre-operative (4 units of packed cells were ordered in advance). The fluids used were based on a continuous assessment of his losses and the calculation of his maintenance and deficit.

(c) Identify the factors that were taken into account when deciding the type of fluid

It was based on the known volume and type of fluids that were usually given and his losses.

(81) *"[PSNI:] But Doctor it appears to me from that the evidence available to you is that Adam could cope with 300 mls of number 18 solution in an hour but how does that equate to 500 mls in half an hour ... Yes ... [PSNI:] There is no comparison ... Well it showed that Adam was not a normal child cause normal children shouldn't cope with 300 mls over an hour ... And so I was confident ... By the previous anaesthetic that Adam was exceptional."* (Ref: 093-038-192 to 093-038-193)

(a) Explain in detail the basis for this statement

I meant that Adams native kidneys were losing exceptional or unusually large volumes of urine.

(82) *"It is common practice to give 20 mls per kilogram body weight of fluid ... Instantly, instantly."* (Ref: 093-038-197)

(a) Explain the basis for the *"common practice"* (to which you make reference) leading to that volume and speed of infusion

I was speaking in general terms, not specifically about Adam. A volume of 20mls/kg of crystalloid, balanced salt solution, is commonly given for hypovolaemia or circulatory shock.

(b) Identify the evidence for how a bolus of 0.18% saline constitutes *"common practice"* for the

resuscitation of ill children

I was speaking in general terms, not specifically about Adam. I had not suggested using a bolus of 0.18NaCl/4%glucose for resuscitation.

(c) Identify by date and occasion instances, prior to Adam's transplant surgery, when you had engaged in that *"common practice"*

I cannot identify individual cases. I do not give a bolus of 0.18NaCl/4%glucose for resuscitation. In Adams case it was given to replace his urine losses and deficit during the fasting period and current hours urine output.

(83) ***"So 400 mls of fluid can be given and is given to a very large number of patients everyday over 5, 10, 15 minutes without and I would say it's saved their lives"*** **(Ref: 093-038-198)**

(a) Explain your evidential basis for this statement

This statement was a general statement. It was recommended in the Advanced Paediatric Life Support Manual. A volume of 20mls/kg of crystalloid, balanced salt solution, is commonly given for hypovolaemia or circulatory shock.

(84) ***"So when I give this anaesthetic to a child who I feel the evidence suggests is already dehydrated who we need to replace the deficit get that maintenance in for this hour and make sure that we're actually ahead of ourselves before the surgeon get going"*** **(Ref: 093-038-198)**

(a) State whether you felt that the *"evidence suggest[ed]"* that Adam was *"already dehydrated"* immediately prior to when you anaesthetised him and if so identify the *"evidence"*

It was because he had ongoing losses of dilute urine as well as maintenance requirements.

(85) ***"So I obviously wrote that down at the start of the anaesthetic but on later retrospection I feel that that's justified as a 400 deficit and I probably looked at that and said look we've given 500 but we're still probably behind lets get the other 500 going but not as fast"*** **(Ref: 093-038-202)**

(a) State exactly when (including so far as you can the date and time) you engaged in the *"later retrospection"* and explain what caused you to engage in the *"later retrospection"*

When the Inquiry requested Statement WS-008/1, to assist the Inquiry in the understanding of Adam's death I undertook a retrospective analysis of the case.

(86) ***"But in fact he was still dry at that stage he was still behind there was no evidence and if it had been the response to out first fluid bolus it would have come down subsequently. So we chose to accept that being in a false position"*** **(Ref: 093-038-205)**

(a) Explain what you mean by Adam *"was still dry"*

I meant by my calculations of his deficit and requirements

(b) Explain the basis for your conclusion that Adam *"was still dry"*, including providing all observations, tests, examinations and assessments which you conducted/engaged in to reach that conclusion

His vital signs, HR, BP and CVP had not responded to the fluids given up to that time. As fluid is infused I would have expected an increase in BP and/or a fall in HR.

(c) Identify all those to whom you refer in *"we chose to accept that being in a false position"*

Myself and Dr Montague

(87) *"CVP on its own is not a reliable indicator of the fluid in the circulation".* [PSNI:] *"And what other parameters would you want ... The heart rate, the blood pressure. The general look at his veins are his veins dilated or shrunken. Does the wound look moist. Or dehydrated, so it's a useful indicator taken in conjunction with the other signs."* (Ref: 093-038-205)

(a) Explain what you mean by *"Does the wound look moist"* and what would constitute *"moist"* for those purposes

I meant if blood was oozing from the blood vessels in the wound or wound edges

(b) Explain how the observation that the wound does or does not *"look moist"* assists in determining circulating blood volume

It allows an assessment of immediate changes to the circulating blood volume before it is detected by weighing swabs.

(88) *"I was unable to get into the vein in the neck. When I got into subclavian it also probably meant that there was obstructions in his (inaudible) veno cavian which is the main vein coming from the neck inside his chest and the tip of the catheter if we went up against this obstruction. They knew there was an obstruction there."* (Ref: 093-038-207 to 093-038-208)

(a) Identify all of those to whom *"they"* refers

Myself and Dr Montague

(b) Explain what you mean by *"there was an obstruction there"*

Previous surgical ligation of the jugular vein from a previous Broviac Central venous line would have caused an obstruction in this vein.

(c) Explain in full the basis of your view that:

- *"there was an obstruction there"*
- *"they knew there was an obstruction there"*

Myself and Dr Montague knew there was a previous Broviac line scar.

(89) *"I think that if the central line is next to the heart ... And is measuring the central venous pressure ... It should be no more than 15, I have seen 20s but they've been in children with severe cardiac disease and the like"* (Ref: 093-038-212)

(a) Identify the paediatric cases where, prior to Adam's transplant surgery, you had seen central venous pressure readings in the *"20s"*

I do not have records of the cases where I have seen this.

(90) [PSNI:] *"what I'm told is in the because the veins are distensible it's impossible if the blood volume is normal or near enough normal it's impossible to get an increased central venous pressure of that magnitude [20] in a child no matter where the catheter is placed ... Well your figure of double is a little subjective. Because what we aim to do is push it to 15 or 16. So we can*

push the CVP 15, 16, 17. (Inaudible) looking for a normally placed. CVP which is next right next to where the blood is returning to the heart. And I have pushed CVPs to 16, 17 at the surgeons (inaudible) team. As a team effort to try and get this kidney working." (Ref: 093-038-213)

(a) Identify all of those to whom *"we"* refers

Myself and Dr Montague

(b) Explain the basis for your approach of pushing the CVP to *"15, 16, 17"*

It was to expand the circulating blood volume (hypervolaemia) in advance of the kidney transplant.

(c) Identify every kidney transplant, prior to Adam's surgery, in which you have *"pushed CVPs to 16, 17"*, including providing:

- date of the kidney transplant
- identity of the surgeon(s) concerned
- circumstances
- outcome

I do not have records of cases which have required CVPs to be increased to these levels.

(91) *"We know that, the information when I had inserted this and the start of the monitor was he was in an abnormal position"* (Ref: 093-038-214)

(a) Identify all of those to whom *"we"* refers

Myself and Dr Montague

(b) State the information which you had that led you to *"know"* that Adam was *"in an abnormal position"*

In the transcript "he" means "the tip of the catheter" not "Adam" himself. I could palpate the tip of the catheter in the neck

(c) Explain how that information allowed you to *"know"* that Adam was *"in an abnormal position"*, including what assistance (if any) you obtained from looking at the monitor

The ability to palpate the tip of the catheter in the neck meant it was in an abnormal position. Looking at the monitor did not assist me in knowing this.

(92) *"-that's why we changed, we checked the zero point twice"* (Ref: 093-038-215)

(a) State the times the *"zero point"* was checked and identify the persons who checked.

Myself or Dr Montague or Mr Shaw checked it. It was zeroed just before 08.00, 09.00, 09.15 and around 10.00 as indicated on the monitor record (058-008-023)

(93) *"I was completely satisfied that I was not measuring the central venous pressure ... I was measuring a dead end road ... That had obstructed itself and therefore was in continuity with the heart"* (Ref: 093-038-215)

(a) Identify the procedures in which you had been involved, prior to Adam's transplant surgery, where central venous pressure readings were obtained from a catheter that was against an

obstruction, including:

- **dates of the procedures**
- **identity of the surgeon(s) involved**
- **circumstances**
- **readings obtained**
- **action taken**
- **outcome**

I cannot recall these individual cases.

(94) *"That is my recollection that it is 139 [Adam's serum sodium on 26th November 1995]"* **(Ref: 093-038-219)**

(a) Identify the source of your information that Adam's serum sodium level was 139mmol/L on 26th November 1995

058-035-144

(95) *"To have done a blood test would have meant absenting a member, a crucial member of my team"* **(Ref: 093-038-222)**

(a) Describe the arrangements that are made, or could have been made, for a member of medical personnel who was not a member of your *"team"* (e.g. someone from the ward) to have *"done a blood test"*

Obtaining the blood test was not considered an urgent priority and it was done in sequence when time permitted. I did not consider I needed to divert one of the team or ask another doctor to do the test.

(b) Explain what each *"member of [your] team"* was doing between 07:00am and 09.30am when you felt you were first in a position to *"spare anybody"* to *"have done a blood test"*

We were all involved in anaesthesia, setting up the CVP line, radial arterial line, epidural, and monitoring the patient up until this time.

(96) *"The blood gas machine. Which would give us approximate haemoglobin. And approximate electrolyte. In those days I'm talking about 1995 the machine's not as straight forward technically it required an anaesthetist. Or a, sometimes I think one of the medical technicians. Would be sent to do a blood test. But obviously I couldn't spare anybody until 9.30. That's the soonest that it would have been safe. To leave Adam. For a member, for a member of staff to be sent away from theatre so it was done as soon as I could justify it"* **(Ref: 093-038-222 to 093-038-223)**

(a) Identify all of those to whom *"we"* refers

There is no "we" in the section quoted however "us" would have been myself and the trainee anaesthetist

(b) Explain why a technician was not asked to use the blood gas machine to measure Adam's electrolyte levels

The technician is involved in the setting up of the CVP line, the radial arterial line and the epidural. The technician may have been the person who used the blood gas analyser in due course.

(c) Explain why the blood gas machines in use in 1995 were *"not as straight forward technically"*

and "... required an anaesthetist. Or a, sometimes I think one of the medical technicians
It used to get blocked with clots if insufficient heparin was used. It would then be unavailable for measuring arterial blood gases in other PICU patients.

(d) **Detail what Dr Montague (the anaesthetist) and your technician were doing from 07:00am (when you induced anaesthesia) such that you *"couldn't spare anybody until 9.30."***
Myself and Dr Montague were inserting an arterial line, epidural and CVP lines. Whilst one of us was concentrating on a task the other was ensuring continuous monitoring of his vital signs and adjusting the anaesthetic. The technician was assisting with these procedures.

(e) **Explain the significance for your fluid management of seeking a test result of Adam's sodium levels at 9:32am**
The haematocrit reading of 18 was the most significant result from this test result. It led to the preparation of a blood transfusion.

(97) ***"Well we know what the salt is with Adam, he's had 4 years of ... losing 200 mls an hour out of his kidneys. We know what the salt content is of his urine. It's been, it's been looked at over a number of years. His urinary salt had been measured not sure if that's the place or somewhere else but we knew that the urinary salt was of the order of 29 I think to 50. So past thirtyish millimoles per litre of sodium in his vein. And we were giving exactly the same (inaudible) that contains 30 millimoles of sodium per litre ... that's his condition (inaudible) nephrotic syndrome, he passed 200 mls an hour for 4 years of dilute urine containing 30 millimoles of sodium"*** **(Ref: 093-038-226 to 093-038-227)**

(a) **Identify all of those to whom *"we"* refers**
Myself and Dr Montague.

(b) **Identify the measurements of Adam's urine sodium concentrations to which you had access prior to his transplant surgery, giving in each case both the result and the date when it was received**
Urine sodium 41 mmol/L recorded on 14.12.1991 (050-018-051), 34 mmol/L recorded on 28.11.1991 (050-018-055), 47 mmol/L recorded on 29.11.1991 (050-018-055), 52 mmol/L recorded on 30.11.1991 (050-018-055), 29 mmol/L recorded on 05.12.1991 (050-018-055)

(c) **Identify the evidence for your claim that Adam *"passed 200 mls an hour for 4 years of dilute urine containing 30 millimoles of sodium"***
It was based on his intake of 200 ml/hr and the fact that his kidneys were passing large volumes of dilute urine.

(d) **Explain to what extent you checked to see whether Adam's urine output on the occasion of his transplant surgery was at what you claim was his 'usual' rate of 200 ml/hr and if so identify when and how you made that check**
No check was considered appropriate.

(98) ***"I had researched his*** **[Adam's]** ***case extremely closely and taken advice from Dr. Savage before we started ... I had anaesthetised him before as a baby in actual fact ... My colleagues had anaesthetised him"*** **(Ref: 093-038-227)**

(a) **Explain what you meant by this statement, including what you *"researched ... extremely***

closely", why and from where

I examined his medical records in relation to previous anaesthetics, trying to identify any potential problems.

(b) Describe what you learned from your 'research', identify the sources of the information and explain how it was factored into the calculations you made for Adam's fluid management during his transplant surgery

I have stated this in my deposition.

(c) State the *"advice [that you took] from Dr. Savage"*, your reason for doing so and how it was factored into the calculations you made for Adam's fluid management during his transplant surgery

Dr Savage gave me a summary of Adam's history and current management in a phone call on Sunday night. I was aware of his need for overnight feeds and fluid replacement and high-output renal failure requiring overnight dialysis.

(d) Explain what you learned from your experience of having *"anaesthetised [Adam] as a baby"*

When Adam was a baby he had sufficient renal function to not to require dialysis. This was a different situation to his transplant surgery.

(e) Identify which of your colleagues had *"anaesthetised [Adam]"* and every occasion on which they had done so, prior to Adam's surgery, including providing:

- **date of the procedure**
- **circumstances**
- **outcome**

Listing of RBHSC Admissions and Surgical Procedures" (Appendix 3) submitted to the Inquiry on 25th August 2010 details the anaesthetists and circumstances of the 18 occasions when Adam was anaesthetised by my colleagues. The outcomes were all satisfactory.

(f) Explain how (if at all) that experience of your colleagues was factored into the calculations you made for Adam's fluid management during his transplant surgery

His most recent anaesthetic by Dr Loan indicated that he could tolerate a large volume of 0.18NaCl/4% Glucose during an operation.

(99) ***"... we had knowledge that his sodium didn't vary"*** **(Ref: 093-038-231)**

(a) State the basis for this statement and identify the persons to whom you refer as *"we"*.

See answer to 10c. I expected it to be "stable" in keeping with his usual U&E results eg (058-041-199, 058-041-200,058-041-201) with only one exception (058-041-197). Also he was receiving a common type of enteral hydration and had a high output renal loss reflecting a similar concentration of sodium. Dr Montague and myself were aware of this.

(100) ***"It was impossible for Adam to get dilutional hyponatraemia as we understand it, impossible, he can't concentrate his urine, I've said this in, to the inquest in 96 and I say it now and the experts fail to recognise I believe, Adam can't get dilutional hyponatraemia and yet the coroner put that as the cause of death"*** **(Ref: 093-038-238)**

(a) Explain what you mean by *"dilutional hyponatraemia as we understand it"* and to whom you

refer by *"we understand it"*

Dilutional Hyponatraemia as described by Arieff is the term given to administration of hypotonic fluids to a patient with increased ADH secretion which causes low volumes (oliguria) of concentrated urine leading to water retention and this excess free water causes the syndrome. I refer to my understanding.

(b) Explain whether your reference to *"Adam can't get dilutional hyponatraemia and yet the coroner put that as the cause of death"*, means that you do not accept Adam's death certificate as accurate

Adam's kidneys were unable to concentrate urine even in the presence of increased ADH secretion so therefore could not retain free water and get dilutional hyponatraemia, the mechanism described by Arieff. This means I felt his death certificate was not accurate.

(101) *"the theory of dilutional hyponatraemia ... And remember it's only a theory ... No one's actually proven it"* (Ref: 093-038-238)

(a) State whether you recognise the condition of *"dilutional hyponatraemia"*

Yes I do recognise Dilutional Hyponatraemia as described by Arieff as in answer 100a. His theory has been substantiated by several Randomised Controlled Trials, recently.

(102) *"[T]he organs contain salt and therefore the salt passes from the high concentration to a low, the basic theory of osmosis"* (Ref: 093-038-240)

(a) Explain the basis for your assertion that *"the salt passes from the high concentration to a low"* concentration

Solvent (fluid) passes through a semi-permeable membrane from a low concentration to a high concentration of solute (salt), not as I had originally stated. This has the effect of reducing the high concentration of salt to a lower concentration. Salt does not pass through a semi-permeable membrane

(103) *"no one knows what Adam's kidneys are capable of the only thing we do know was he passed a minimum amount of urine which was 200mls a day and my knowledge of Adam at this time was that this was a minimum loss and in fact my knowledge of the kidney disease was that there may be an unlimited ... loss here, so the more, I gave him the type of fluid which I knew he was losing and I knew that he had at least 200mls an hour ... but my knowledge was my knowledge was that this could in fact been an unlimited urine output ... No one had established maximum output"* (Ref: 093-038-242)

(a) Explain from your *"knowledge of the kidney disease"* the mechanism by which Adam could have had *"an unlimited urine output"*

His kidneys were cystic dysplastic and had lost the ability to retain water in the tubular system and to concentrate and excrete urea and creatinine. This led to high output renal failure.

(b) Identify from Adam's medical notes and records the evidence for your assertion that Adam could have had *"an unlimited urine output"*

It was assumed from his intake of 200 ml/hr and the fact that his kidneys had the ability to pass large volumes of dilute urine. His urine output is stated as "PU++ ?how much ?1-2 litres"(058-035-143)

(c) Explain how you consider that Adam's *"maximum output"* could be established

I do not know how his maximum output could be measured

(104) *"I would've been aware this time that although I could rely on the ph, the CO2 and the oxygen that the other measurements [including sodium] were unreliable ... I wasn't an expert [in the degree of divergence] except to say that we were continually warned by the medical technicians Doctor, Mr. Tommy Ryan that we weren't to rely on these tests"* (Ref: 093-038-245)

(a) Identify all of those to whom *"we"* refers

Myself and the other paediatric anaesthetists.

(b) State when, where and in what circumstances you were *"continually warned by ... medical technicians ... Mr. Tommy Ryan that [you] weren't to rely on these tests"*

I was warned about it since my appointment as a consultant in February 1991

(c) Identify the other *"medical technicians"* that participated in the *"continual warn[ings]"*

Mr Ryan and Mr Shaw

(d) State whether you brought to the attention of the Clinical Director of Anaesthesia, Theatres and Intensive Care (or anyone else) the fact that you had been *"continually warned by ... medical technicians ... Mr. Tommy Ryan that [you] weren't to rely on these tests"* for serum sodium results, and:

- if you did – state the dates when you did so, identify any documents involved and give the result
- if you did not – explain why not

It was not highlighted as a particular problem because we would send a sample to the Royal Biochemistry Laboratory for accurate U&E tests.

(105) *"I have spoken to Doctor Sumner ... Doctor Savage outside ... The confines of the court ... They both acknowledge that the cause of the papers on dilutional hyponatraemia couldn't have happened Adam and yet in court they said it did"* (Ref: 093-038-251 to Ref: 093-038-252)

(a) State precisely when and where this occurred

It was during a lunch break during the Coroners Inquest.

(b) Describe exactly what was discussed between you, Doctor Sumner and Doctor Savage

I remember mentioning that Adam had high-output renal failure and so could not respond to ADH by concentrating urine and retaining water.

(c) State if any other person(s) was/were a party to this discussion

No one else was present.

(106) *"The technicians tried to give as much information as they could at the time but we were told by the labs not to rely on these tests [blood gases]"* (Ref: 093-038-255)

(a) Identify all of those to whom *"we"* refers

The paediatric anaesthetists.

(b) Identify who told you *"not to rely on these tests"*, when and in what circumstances

Mr Ryan and Mr Shaw.

(107) *"Cause that's a protein, blood protein is low then osmotic fluid can come out of the cells into the circulation"* (Ref: 093-038-256)

(a) Explain the basis for this statement

Albumin contributes to the fluid homeostasis and the maintenance of the circulation. If it is low then fluid can be lost from the circulation into the tissues causing oedema.

(108) *"I was instructed never to rely on that sodium"* (Ref: 093-038-257)

(a) Identify who *"instructed"* you *"never to rely on that sodium"*, when, where and in what circumstances and identify anyone else that was present whilst you were being *"instructed"*

Mr Ryan and Mr Shaw instructed myself and the anaesthetists not to rely on the sodium results when using heparin syringes since my appointment in February 1991.

(b) State whether similar instructions were given generally, to other Anaesthetists and if so (in so far as you can) identify by whom, to whom, when and in what circumstances

Yes all the anaesthetists were instructed the same.

(109) *"Clearly it [measuring electrolytes] was again as I said to the previous answer a priority. But in the list of priorities. Took 4th, 5th, 6th place."* (Ref: 093-038-259)

(a) Explain the importance or otherwise of an anaesthetist's role in monitoring fluid and electrolytes in terms of the duties required in a renal transplant operation

The anaesthetist must continuously monitor all the vital signs and be vigilant for fluid losses and administration as a priority. The anaesthetist must plan for replacing any deficits and provide a hypervolaemic state by increasing the circulating blood volume and providing sufficient blood pressure to perfuse a transplanted kidney. Closely monitoring the patient and not leaving the patient until it is safe to do so is an absolute necessity.

(b) State if the priority level of measuring electrolytes changed over the course of the surgery and if so when and why

As blood is lost and replaced electrolyte measurement becomes more of a priority.

(110) *"And then the surgeons I believe were feeding back to me information that the kidney wasn't working well"* (Ref: 093-038-258)

(a) Identify exactly who was *"feeding back"* to you *"information that the kidney wasn't working well"*

The surgeons, Mr Keane and Mr Brown made me aware that the kidney wasn't working well

(b) State exactly what was said to you in respect of *"information that the kidney wasn't working well"*

I cannot remember what was said but my response was to review the vital signs and the fluids.

(c) State when this information was fed back to you

Following the release of the vascular clamps when the kidney was attached to Adams circulation around 10.00-10.15am (058-003-005).

(d) State what action you took upon receiving this information

My response was to review the vital signs and the fluids.

(111) *"It [the sodium level] became lower, but the information I was getting from all my monitors and from my assessment of the surgical field was that we were okay we were doing well, the volume was there we were giving the right fluid the right quantities, surgical feedback was saying confirming what we'd given."* (Ref: 093-038-259 to 093-038-260)

(a) Identify all of those to whom *"we"* refers

Myself, the anaesthetic trainee and the surgeons, Mr Keane and Mr Brown

(b) State what information you were receiving from the monitors to confirm your assessment that *"we were okay we were doing well"*

The heart rate and blood pressure and the relative increase in the CVP indicated that the blood pressure and circulating blood volume was sufficient to perfuse the new kidney.

(c) Explain your assessment of the *"surgical field"* that enabled you to assess that *"we were okay we were doing well"*

The wound was pink and well perfused and the main blood vessels supplying the kidney were of good diameter.

(d) Explain how you were assessing the distribution of fluid

By looking at the vital signs to ensure the circulating blood volume was increased as intended.

(e) State whether you regarded knowledge of Adam's renal losses to be significant for his fluid management during the transplant procedure and if so explain how you obtained such information

I assessed his renal losses from his fluid allowance.

(f) Explain how the measurement of 49mls, as Adam's total urine volume for the entire period of his surgery, is consistent with your assessment of the performance of his native kidneys

The measurement of 49 mls output from the native kidneys only begins near the end of the operation when the suprapubic bladder catheter is inserted.

(112) *"We can't rely on the 124 [Adam's sodium level recorded at 9:32] That's absolutely clear that we can't rely on that. We know it's a rogue result."* (Ref: 093-038-260)

(a) Identify all of those to whom *"we"* refers

I was speaking in general terms that a sodium on that analyser using a heparin syringe was regarded as unreliable at that time.

(b) Explain the basis for your assertion that the sodium of 124 at 9:32 was a *"rogue result"*

The use of heparin made the sodium result unreliable.

(c) State to whom who were referring when you stated *"we know it's a rogue result"*

I was speaking in general terms indicating that myself and the other anaesthetists knew that heparin syringes produced unreliable sodium results.

(113) *"If this patient was not anaesthetised and [had] a sudden drop in his sodium you would expect there to be symptoms. Some signs of irritability perhaps. Some signs of having a fit. Even under*

anaesthetic we should have seen that. We should have seen a change a sudden change in his heartbeat. His oxygen, his CO2 or his blood pressure and we didn't pick that up at any stage. There was no evidence that a sudden drop had caused a change in the well being." **(Ref: 093-038-261)**

(a) Identify all of those to whom *"we"* refers

Myself and the anaesthetic trainee.

(b) Explain your statement that *"Even under anaesthetic we should have seen that"*

I was indicating that a seizure can produce changes in vital signs, increases or decreases in heart rate or blood pressure or stiffening of his respiratory muscles causing changes in his ventilation. I have seen this in intensive care when a patient is sedated.

(c) Explain the changes in his *"oxygen, his CO2 or his blood pressure"* you would have expected to see in response to a decrease in his serum sodium

A seizure can produce changes in vital signs, increases or decreases in heart rate or blood pressure. As the muscle relaxant wears off there can be stiffening or tonic changes of the respiratory muscles which can cause a change in lung ventilation. I have seen this in intensive care when a patient is sedated.

(114) ***"[W]e took further action to reduce the possibility of dilutional not dilutional hyponatraemia but diluting hyponatraemia"*** **(Ref: 093-038-262)**

(a) Identify all of those to whom *"we"* refers

Myself and the anaesthetic trainee.

(b) Explain the difference between *"dilutional hyponatraemia"* and *"diluting hyponatraemia"* and their effect

The term "diluting hyponatraemia" was introduced during the PSNI interview when Detective Cross suggested that the use of 0.18NaCl/4%Glucose on its own would cause a lowering in the sodium level. I believed he was asking about the diluting effect of intravenous fluid, and sought to differentiate his suggestion from what I had understood to be Dilutional Hyponatraemia as described by Arieff.

(115) ***"Diluting hyponatraemia was at 9.30 seized upon"*** **(Ref: 093-038-263)**

(a) Explain the mechanism by which you claim that Adam developed *"Diluting hyponatraemia"*, which was *"at 9.30 seized upon"*

The sodium level at 09.30 was a result of the use of a heparin syringe and couldn't be relied on.

(116) ***"And my recollection of this case was there was a lot of blood about, my recollection I can't account for Doctor [Keane's], Mr [Keane's]."*** **(Ref: 093-038-266)**

(a) State whether you discussed Adam's blood loss with Mr Patrick Keane

I recollect that I discussed it with Mr Keane

(b) If so, state when and where you discussed it and what you discussed

During the case I recollect that I informed him of the blood loss and that I was administering blood.

(c) If not, explain why you did not discuss Adam's blood loss with Mr Patrick Keane

(117) *"I would have preferred there to be no kidney losses"* (Ref: 093-038-270)

(a) State the extent of the kidney losses and explain how they were measured

I meant I would have preferred Adam not to have had high output renal failure but you have to treat the patient as you find them.

(118) *"I was aware in my deposition that there was a long cold ischemic time ... Which is the amount of time the kidney's been left in ice in the cold box ... I'm not sure I don't take part in the decision ... To use or not to use a particular kidney ... The only element of having a kidney that is non functioning that affects me ... And did it bear, had bearing on this case was the fact that it didn't pink up it didn't become lively easily ... And the impact that that had on me was to reassess my fluids ... Worry that I was still in deficit"* (Ref: 093-038-273)

(a) Explain how the failure of the kidney to *"pink up"* had an impact on your assessment of fluids

It led to a reassessment of his vital signs and fluid administration to ensure that I had corrected his deficit and produced a state of hypervolaemia

(b) Describe the basis of your assertion that *"there was a long cold ischemic time"* and state when you were first aware of it and from whom

I was informed of the long ischaemic time after I arrived in hospital on the Monday morning however I cannot recollect whether I read it on the donor kidney transplant form or if I was told it.

(c) Describe the significance for your pre-operative calculation of Adam's fluids (if any) of *"a long cold ischemic time"*

It meant that I had to proceed without delay to ensure that the transplant would have the best chance of success. This led me to administer the fluids quickly to replace his deficit and begin the process of expanding his circulating blood volume, ie. Hypervolaemia.

(d) State if you discussed this issue with anyone else, and if so, state with whom, when and where and what you discussed

I discussed it with Dr Montague

(119) *"When we were so busy in discussion at the top of the table not to pay much attention to"* (Ref: 093-038-275)

(a) Identify those to whom you refer in *"we were so busy in discussion"*

Myself and the anaesthetic trainee

(b) Describe what was being discussed and state the outcome of the discussion and the basis upon which that outcome was reached

It was about his anaesthetic and fluid management.

(120) *"I would always speak to a family before anaesthetic at some stage ... It may well have been in the anaesthetic room, I believe I spoke to her on the ward ... I can't remember, she may have been at the loo or something ... I made efforts to speak to her, I certainly spoke to her in theatre".* (Ref: 093-038-275)

(a) **Explain your purpose in speaking to the *"family before anaesthetic"***

To find out how the child has been recently and learn about any problems with anaesthetics or in the postoperative period, this adds to the information already known and recorded and to explain the procedures that will take place during the anaesthetic.

(b) **Explain your purpose in making *"efforts to speak to her [Adam's mother]"***

It is my usual practice to visit the child and parents before an anaesthetic.

(c) **State what you said to Adam's mother in the theatre and what (if anything) you learned about Adam from her**

I cannot remember this, it is not recorded.

(121) ***"I think there's documentation that he passed 200 mls of urine per hour"*** **(Ref: 093-038-278)**

(a) **Identify the documentation from which you concluded that Adam *"passed 200 mls of urine per hour"***

I knew that he normally received around 150 ml/hr input overnight which I would have expected to be matched with similar losses. His urine output is stated as "PU++ ?how much ?1-2 litres"(058-035-143)

(122) ***"... other parts of the body were swollen as well as the lungs"*** **(Ref: 093-038-283)**

(a) **Identify the *"other parts of the body [that] were swollen"* and state when you first observed them as *"swollen"***

The face, hands and feet were swollen. I first noticed this when the sterile towels were removed at the end of the operation.

(b) **Explain the reasons for such swelling.**

It was oedema from the fluid replacement following the kidney transplant.

(123) ***"I am still not convinced that hyponatraemia caused his death ... It was certainly present when he died"*** **(Ref: 093-038-285)**

(a) **Describe and explain the process whereby hyponatraemia *"was certainly present when [Adam] died"***

His sodium was 119 around the time of his CT scan that indicated cerebral oedema and brain stem herniation

(124) ***[PSNI:] "You said to him you chose one fifth normal saline because it's isotonic ... Yeah ... [PSNI:] Now my understanding is that that is technical true as it sits in a bottle ... It is ... [PSNI:] But the minute it's infused its effect is hypotonic ... It can become hypotonic but not in every patient it depends on their metabolic condition ... How quickly they burn the glucose basically ... Well under anaesthetic you burn less glucose ... Cause your muscles aren't active, you don't have to breathe ... You don't have to take as much sugar ... out of your fluid ... If you're awake and active like Lucy and Raychel then you're going to burn more of the sugar, under anaesthetic with the body at rest ... Apart from the brain which contains some activity the rest of the body is at rest ... The glucose metabolism is much reduced so its ability to remain isotonic is enhanced ... It shouldn't become hypotonic to the same degree, that's another reason why the isotonic (inaudible)***

dilutional hyponatraemia theory doesn't hold for Adam's case" (Ref: 093-038-286 to 093-038-287)

(a) Explain in detail your assertion that the administration of the 0.18% solution to Adam was isotonic in nature rather than hypotonic

0.18NaCl/4% Glucose is iso-osmolar with respect to plasma and not isotonic as I stated. It has an osmolarity of 284 mosm/L compared to that of plasma 290 mosm/L.

IV ADDITIONAL INFORMATION

(125) Describe in detail the education and training that you received in fluid management (in particular hyponatraemia) and record keeping through the following, providing dates and names of the institutions/bodies:

(a) Undergraduate education

I have no records of my training in fluid management as a medical student at Queen's University, Belfast

(b) Postgraduate education and training

I have no records of my training in fluid management as a anaesthetic trainee in Northern Ireland or in Canada.

(c) Hospital induction programmes

I have no records of my training in fluid management during hospital induction programmes. Generally these were to familiarise doctors with the new departments where they were to work.

(d) Continuous professional development

The courses and conferences where fluid management was discussed.

Paediatric Anaesthetic Travelling Society of Ireland (PATSI). Co Monaghan. June 4-6, 1999
Paediatric Intensive Care Society (PICS) Institute for Child Health. London. 19/10/2001
Paediatric Anaesthetic Travelling Society of Ireland (PATSI). Co Mayo. May 10-12, 2002
Association of Paediatric Anaesthetists (APA). Edinburgh 2004. 12-13/03/2004

(126) Prior to 26th November 1995, describe in detail your experience of children :

(a) With hyponatraemia, including:

- **the estimated total number of such cases, together with the dates and where they took place**
- **the number of the children who were aged less than 6 years old**
- **the nature of your involvement**
- **the outcome for the children**

Prior to 26th November 1995 I cannot estimate the total number of cases or the dates. The numbers were small and these children had good outcomes.

(b) Undergoing anaesthesia, including the estimated total number of children anaesthetised by you personally (with or without supervision)

Prior to 26th November 1995 I would estimate that I anaesthetised 15-20 children per week.

(c) Undergoing renal transplants, including:

- **the number of all such transplants, together with the date of each and where they took place**

- **the number of the children who were aged less than 6 years old**
- **the nature of your involvement**

Prior to 26th November 1995 I do not have records of each renal transplant, nor their ages.

(127) Since 27th November 1995, describe in detail your experience of children :

(a) With hyponatraemia, including:

- **the estimated total number of such cases, together with the dates and where they took place**
- **the number of the children who were aged less than 6 years old**
- **the nature of your involvement**
- **the outcome for the children**

After 27th November 1995 my answer remains the same as to question 126a.

(b) Undergoing anaesthesia, including:

- **the estimated total number of children aged less than 6 years anaesthetised by you personally (with or without supervision)**

After 27th November 1995 I would estimate that I anaesthetised 10-15 children under 6 years old per week.

(c) Undergoing renal transplants, including:

- **the number of all such transplants, together with the date of each and where they took place**
- **the number of the children who were aged less than 6 years old**
- **the number of children who were polyuric**
- **the nature of your involvement**

After 27th November 1995 I do not have records of each renal transplant, nor their ages.

(128) Describe in detail your role in the care and treatment of Adam prior to 26th November 1995, including:

(a) Date of each occasion when you acted as anaesthetist for Adam and the procedure/surgery which Adam was undergoing on each occasion

20.12.91 Trans uretero-ureterostomy left to right (050-008-035,036, 049-013-024)
24.12.91 Laparotomy (050-023-071, 049-009-019,020)
25.02.92 Cystoscopy and pH studies (052-023-046),

(b) The hospital concerned

The Royal Belfast Hospital for Sick Children

(c) The fluid management regime employed on each occasion

20.12.91 Trans uretero-ureterostomy left to right (050-008-035,036) Fluids administered; 5% Dextrose, Hartmanns boluses (x7) and Blood 80 mls. Anaesthetic record (049-013-024)
24.12.91 Laparotomy (050-023-071). Fluids administered; 5% Dextrose and Hartmanns boluses (x5). Anaesthetic record (049-009-019)
25.02.92 Cystoscopy and pH studies (052-023-046). No fluids administered. Anaesthetic record (050-020-058, 059)

(d) The lessons, if any, that you learned from your care and treatment of Adam prior to 26th November 1995

I cannot remember learning specific lessons from these cases.

(e) The lessons, if any, that you learned from Adam's death

See answer 37d; To improve my documentation of fluid calculations and administration to children undergoing anaesthesia. Following Adam's death there has been improved reliability for testing of electrolytes in the operating theatre which assists with the monitoring of fluid and electrolyte administration.

(129) Identify any 'Protocols' and/or 'Guidelines' which governed Adam's renal transplant surgery

Renal Transplantation in Small Children.

(130) Identify precisely on Adam's attached medical notes and records the entries that you made or which were made on your direction and state below:

(a) When each of the identified entries was made

058-003-005, 006, 007, 008 (7.00am - 11.30am 27th November 1995)
058-035-142 (7.45am 28th November 1995)

(b) The source of the information recorded in the entry

Anaesthetic record (27th November 1995)
Clinical record (28th November 1995)

(c) The person who recorded *"vascular anastomosis - 10.30am. 27/11/95"* (Ref: 058-035-134) in Adam's medical notes and when this entry was made

I do not know who made this note.

(131) Provide any further points and comments that you wish to make, together with any documents, in relation to:

(a) The care and treatment of Adam from his admission for the renal transplant surgery on 26th November 1995 to his death on 28th November 1995

(b) Record keeping

(c) Communications with Adam's family about his care and treatment in respect of the renal transplant surgery

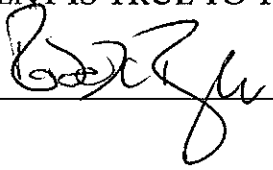
(d) Lessons learned from Adam's death and how that has affected your practice

See answers to 37d and 128 e; To improve my documentation of fluid calculations and administration to children undergoing anaesthesia. Following Adam's death there has been improved reliability for testing of electrolytes in the operating theatre which assists with the monitoring of fluid and electrolyte administration.

(e) Current 'protocols' and procedures

(f) Any other relevant matter

THIS STATEMENT IS TRUE TO THE BEST OF MY KNOWLEDGE AND BELIEF

Signed:  Dated: 16/5/11