CHRONOLOGY OF HOSPITAL MANAGEMENT & GOVERNANCE
ADAM

SCHEDULE 1: Position as at Adam's admission on 27th November 1995

Date	Protocols, Guidance, Circulars & Practices in force	Source/ Reference	Papers & Publications & Orders
1955	H.M.(55)66: 'National Health Service- Reporting of Accidents in Hospitals'	Ministry of Health, July	
1962	NIHA (75/62)- Preservation and Destruction of Hospital Service Records	Ref: WS-251-1, p.3	
1963		Ref: 303-052-715	Coroner's (Practice and Procedure) Rules (Northern Ireland) 1963
October 1983		London: HMSO	NHS Management Inquiry (1983) Report (the Griffiths Report)
1983		Ref: 303-046-522 & School Guidance; Preparing for the QABME process GMC document	Medical Act 1983
1983	HSS (31/83)- Retention and Disposal of Hospital Records (for use in possible litigation).	Ref: WS-251-1, p.3	
4th June 1984		Press Release no.84/173, 4 June	Department of Health & Social Security (1984) Griffiths Report: Health Authorities to Identify Managers
1989		Royal College of Physicians 1989	'Medical Audit- A First Report: What, Why and How'.
1989	Department of Health White Paper: "Working for Patients" and "Working for Patients: Medical Audit Working Paper 6".	Ref: 210-003-014 & Department of Health. London: HMSO (Cm 555) & Ref: 210-003-014 & Department of	

		Health. London: HMSO, 1989	
1989		Hazard Notice 24/89/76	DHSSNI issued a Hazard Notice warning about the use of BGAs
1989		Ref: 210-003-014	'The Report of the Confidential Inquiry into Perioperative Deaths 1989'
1990		Report of the Standing Medical Advisory Committee Department of Health, HMSO 1990	'The Quality of Medical Care'.
1990	Royal College of Surgeons of England- 'Guidelines for Clinicians on Medical Records and Notes' (revised 1994)	Ref: 210-003-028	
1990	A Guide to Consent for Examination or Treatment (as amended in 1992 by the NHS 'Patient Consent to Examination or Treatment Guidelines')	Department of Health, London	
September 1990	Renal Transplantation in Small Children (RBHSC Renal Transplant Protocol)	WS-002/2, p.52	
1991		MacFaul R, Current Paediatrics, 1991;1: 166-173	'How to Audit Children's Services'.
1991			The Health and Personal Social Services (NI) Order 1991
1991		HMSO (Department of Health)	Welfare of Children and Young People in Hospital (1991)
1991/1992			Report of the National Confidential Enquiry into Peri-operative Deaths (1991/1992)
1992		British Paediatric Association, 1992	'Paediatric Medical Audit'

1992			The Royal Group of Hospitals and Dental Hospital Health and Social Services Trust (Establishment) Order (Northern Ireland) 1992
1992	Renal Transplantation Protocol Belfast City Hospital	Ref:WS-002/2, p.58	
1992		Ref: 210-003-035	Clinical Pathology Accreditation (UK) Limited- international standards to evaluate laboratory performance
1992		Kluwer Academic Publishers	Clinical Management of Renal Transplantation: ed. Professor Mary McGeown,[1] including the following sections: ▪ Chap.4: '*Assessment of patient before renal transplantation*' (Dr. James Douglas, Consultant Nephrologist, BCH[2] ▪ Chap.10: 'The cadaveric donor', including *'Consent – approaching the family'* (Dr. Gavin Lavery, Consultant Anaesthetist, Royal[3]) ▪ Chap.13: *'Insertion of the kidney'* (Messrs. *Patrick Keane,*[4] *Senior Registrar* & Robert Kernohan, Consultant transplant Surgeon, BCH) ▪ Chap.14: 'Management of the recipient during operation', including *'Renal Transplant in*

1 This book presents the Belfast City and University Hospital experience in renal transplantation
2 BCH: Belfast City Hospital
3 Royal: Royal Group of Hospitals
4 Mr. Patrick Keane (Consultant Urologist, BCH): See Schedule of Persons for details

			children' (*Dr. John Alexander*,[5] Consultant Anaesthetist, BCH) ▪ Chap.16: 'Nursing care of the patient with a renal transplant' (Professor Mary McGeown, Queens University Belfast & BCH) ▪ Chap.20: 'Early medical complications after renal transplantation', including *'Electrolyte disturbances'* (Dr. Peter McNamee, Consultant Nephrologist, BCH)
March 1992	Northern Ireland Health and Personal Social Services: A Charter for Patients and Clients	Ref: 080-003-080	
9th May 1992		BMJ, Vol.304 Ref: 011-011-074	Arieff et al, 'Hyponatraemia and death or permanent brain damage in healthy children'
1993		Audit Commission 1993	'Children First- a Study of Hospital Services'
1993	UK Central Council for Nursing (UKCC) published its standards for records and record-keeping in April 1993	Ref: 202-002-052	
1993	The Royal College of Pathologists - 'Guidelines for Implementation of Near-Patient testing'	Ref: 210-003-033 & Joint Working Party of the Association of Clinical Biochemists & Royal College of Pathologists. ACB, London. Sept 1993	
1993	Kidney Transplantation in Childhood: A Guide for Families[6]	WS-002/3, p.124	
1993	'Risk Management in the NHS Manual'(1993)	Ref: 210-003-038 & *Risk Management in*	

[5] Dr. John Alexander (Consultant Anaesthetist, BCH): See Schedule of Persons for details
[6] This was the guide in use in November 1995

		the NHS, NHS Executive 1993 reissued 1996. Department of Health London.	
October 1993	Letter from Chief Executive of Health & Personal Social Services Northern Ireland to inter alia the Chief Executives of Trusts & Boards setting out the: *"framework of accountability which will exist between the Management Executive (ME) and HSS trusts in the future"*	Ref: 079-013-306	
1993		Ref: 303-047-562	General Medical Council- "Tomorrow's Doctors".
1993		HMSO (1993) 'Hospital Doctors: Training for the Future'; Report of the Working Group on Specialist Medical Training	Calman Report
21st December 1993		NHS Management Executive EL(93)113	Improving Clinical Effectiveness[7]
1994	Royal College of Anaesthetists, Guide for Purchasers on Paediatric Anaesthesia (1994)		
1994	'Code of Conduct and Accountability'	Ref: 210-003-009 & 'Codes of Conduct and Accountability' – Circular HSS (PDD) 8/1994, Department of Health and Social Services	
1994		Ref: 210-003-038 & NHS Executive 1994.	'EL (94)16 Report of the Independent Inquiry relating to deaths and

[7] The response to that circular was the subject of a Report following a study over April 1994-Julty1997: 'Improving Clinical Effectiveness; The Development of Clinical Guidelines in the West Midlands – Honigsbaum & Ham

			injuries on the Children's ward at Grantham and Kesteven General Hospital during the period February to April 1991' (the "Allitt Inquiry")
July 1994		Ref: 080-001-001	Estate Services Directorate at Management Executive to the Chief Executives of the Health and Social Services Board and the Health and Social Services Trusts- 'Reporting Adverse Incidents and Reactions, & Defective Products Relating to Medical and Non-Medical Equipment & Supplies, Food, Buildings & Plant, and Medicinal Products'
1994		Ref: 210-003-033 & Published by the Association of Anaesthetists of Great Britain and Ireland, Feb 1994	Association of Anaesthetists of Great Britain and Ireland- 'Anaesthetic Related Equipment, Purchase, Maintenance and Replacement'
December 1994		No.8, Nuffield Institute for Health	Bulleting on the Effectiveness of Health Service Interventions for Decision-makers: Implementing Clinical Practice Guidelines: Can guidelines be used to improve clinical practice?
1995	British Association of Paediatric Surgeons – A guide for Purchasers and Providers of Paediatric Surgical Services (revised ed. 1995)		
1995			Review of Renal Services (1995)
1995	General Medical Council- 'Good Medical Practice, Guidelines for Doctors'	Ref: 210-003-016 & Published by the General Medical Council, Oct.	

		1995	
1995		Ref: 305-005-145 p.8 Table 1	Laboratory Rationalisation Project Report of the Systems Option Review
1995	Audit Commission- 'Setting the Records Straight, a study of Hospital Health Records'	Ref: 210-003-027	
March 1995		Ref: 080-004-098	Letter from Chief Executive of Health & Personal Social Services Northern Ireland to inter alia Chief Executives of Trusts & Boards enclosing: Explanatory Booklet setting out the Management Executives response to 'Being Heard' – Wilson Review Committee's Report on NHS complaints procedures
March 1995		Ref: 306-065-001	British Association of Paediatric Surgeons- Working Party Report in March 1995 entitled 'The Provision of Services in the UK for Children and Adolescents with Renal Disease'
September 1995		Ref: 306-064-001 *et seq*	British Paediatric Association, 'Tertiary Services for Children & Young People'
1995	'The Guidelines to Clinical Audit in Surgical Practice' issued in by The Royal College of Surgeons in England	Ref: 210-003-016 & Royal College of Surgeons of England, Jun. 1995	
June 1995		Ref: 210-003-016 & Royal College of Anaesthetists, Jun. 1994	'Clinical Audit and Quality of Practice in Anaesthesia- Royal College of Anaesthetists
6th October 1995	A Guide to Consent for Examination or Treatment, circulated by the Management Executive of the Chief Executive	Ref: INQ-0379-11, p.2 HSS(GHS)2/95, pgs. 4 -23	
1995	Management of Formal &	TP6/95	

	Informal Complaints[8]		
1995		Ref: 080-013-299	HPSS Management Plan 1995/96 to 1997/98 including the following under 'Best Practice' it states: *"Providers need to continue to focus on improvement in standards of practice"* and *"Specifically units should ensure that there is a clear policy on: clinical audit as part of a programme to improve all aspects of service quality, not just clinical outcomes"*.

SCHEDULE 2: From Adam's death on 28th November 1995 to the Inquest Verdict on 21st June 1996

Date & Time	Events in relation to Adam	Source/ Reference	Other Developments
28th November 1995 09:10	Second brain stem test carried out by Dr. David Webb[9] with Dr. Mary O'Connor[10] present. He records that the brain stem death criteria are fulfilled	Ref: 058-004-009; Ref: 058-035-142	
	Adam's mother wishes to discuss organ donation. Coroner advises against organ donation 'in view of medico-legal reasons'[11]	Ref: 058-035-142; Ref: 058-004-009	
?[12]	3 photographs are taken of Adam	Ref: 093-005-007	
09:30	Constable Stephen Tester[13] is	Ref: 011-008-	

8 This was the Trust's policy for complaints at the relevant time
9 Dr. David Webb (Consultant Paediatric Neurologist, RBHSC): See Schedule of Persons for details
10 Dr. Mary O'Connor (Consultant Paediatric Nephrologist, RBHSC): See Schedule of Persons for details
11 Subsequently this decision was reversed
12 Time as yet unknown

	informed of Adam's death. He records that he was made aware of the circumstances surrounding Adam's death by Dr. Maurice Savage[14] and that life had been pronounced extinct at about 09:00 by Dr. David Webb	024[15]	
11:15	Adam's body is identified to Constable Tester by Dr. Maurice Savage in the presence of Adam's mother	Ref: 011-008-024	
11:30	Ventilatory support is withdrawn from Adam with his other's consent and in her presence	Ref: 058-035-142; Ref: 011-015-109	
	Fluids and monitors are discontinued and all lines are removed in accordance with Dr. Maurice Savage's instructions	Ref: 058-035-142; Ref: 011-015-109	
13:00	Nursing observations are discontinued	Ref: 058-038-164	
	A further photograph is taken of Adam	Ref: 093-005-007	
	Note is prepared by Dr. Maurice Savage on Adam, which he copies to Dr George Murnaghan[16] and Dr. Robert Taylor.[17] It provides a summary of his direct involvement and includes: *"His serum electrolytes,[18] haemoglobin and coagulation were satisfactory. H.B. 15.5g/dl, Na 139, K 3.6, Urea 16.8, Ca.2.54, Albumin 40, Prothrobin time 12.3. His chest was clear on examination. B.P. 108/56. He was apyrexial.[19] There were no signs of infection. His night gastrostomy feeds are normally 1.5l of Nutrizon. On anaesthetic advice*	Ref: 059-066-153	

13 Constable Stephen Tester: See Schedule of Persons for details
14 Dr. Maurice Savage (Consultant Paediatric Nephrologist, RBHSC): See Schedule of Persons for details
15 Deposition of Constable Stephen Tester
16 Dr George Murnaghan (Director of Medical Administration at the Royal): See Schedule of Persons for details
17 Dr. Robert Taylor (Consultant Paediatric Anaesthetist, RBHSC): See Schedule of Persons for details
18 For 'serum electrolytes' see: Glossary of Terms
19 For 'apyrexial' see: Glossary of Terms

	this was changed to clear fluid which was stopped two hours pre op. This meant he had 900mls of Dioralyte overnight"		
	Dr. Maurice Savage reports Adam's death to the Coroner[20] as being 'totally unexpected'	Ref: 011-025-125	
	An Autopsy Request form is signed by Dr. Robert Taylor in which he records that Adam arrived in theatre with a 300mls fluid deficit and that there was excessive bleeding throughout the surgery at the end of which Adam was found to have fixed and dilated pupils. He also records: (i) chest x-ray showing pulmonary interstitial oedema;[21] (ii) CT-scan showing gross cerebral oedema[22], – obliteration of the ventricles[23]; (iii) serum sodium falling to 119mmol/l. The clinical diagnosis is recorded as: *"osmotic disequilibrium syndrome"*[24]; (iv) further fluid administration due to the on-going blood loss and the poor vascular supply of the donor kidney. He records the clinical problems in order of their importance as: (i) renal transplant – donor organ in the right iliac fossa[25]; and (ii) cerebral/pulmonary interstitial oedema	WS-012/1, p.19	
??	The Coroner orders a post-mortem		
29th November 1995	Siemens Patient Monitor, Model 1281 is reported faulty (dim display) – this is the CVP monitor that was used in Adam's	Ref: 094-210-1001 & Ref: 094-210-999	

20 Mr. John Leckey (HM Coroner for Greater Belfast): See Schedule of Persons for details
21 For 'pulmonary interstitial oedema' see: Glossary of Terms
22 For 'cerebral oedema' see: Glossary of Terms
23 For 'ventricles' see: Glossary of Terms
24 For 'osmotic disequilibrium syndrome' see: Glossary of Terms
25 For 'right iliac fossa' see: Glossary of Terms

	transplant surgery. It is removed by John McKirgan[26] of Siemens and a 'demo unit' is left in its place		
14:00	Constable Tester identifies Adam's body to Dr. Alison Armour[27]	Ref: 011-008-024	
14.40	Post-mortem examination is carried out by Dr. Alison Armour who reports her principal findings to the Coroner as cerebral oedema[28] and states that a completed report will follow [after the examination of the brain following 'fixing of the brain'[29]]. Histological slides are taken by Dr. Alison Armour from (a) lungs (b) larynx (c) liver (d) kidney (e) transplanted kidney (f) spleen (g) lymph nodes[30] (h) brain (i) spinal cord	Ref: 094-114-321 Ref: 011-010-035	
	Dr. Alison Armour telephones the Coroner to say that she is 'mystified' as to why Adam had died and the Coroner records that conversation as: *"He[sic] findings at autopsy were the grossest cerebral oedema she had ever seen. She said the brain was pressing right up to the dura"*. Following the Coroner's query over 'hypoxia-anoxia'[31], Dr. Alison Armour agreed that there might be an anaesthetic problem ie: *"… it could either be something to do with the anaesthesia or the anaesthetic equipment … [she] had also discussed the case with the anaesthetist Dr. Bob Taylor. Both she and he were mystified about what*	Ref: 011-025-125	

26 Mr. John McKirgan (Siemens): See Schedule of Persons for details
27 Dr. Alison Armour (Senior Registrar State Pathologist's Dept): See Schedule of Persons for details
28 For 'cerebral oedema' see: Glossary of Terms
29 For 'fixing of the brain' see: Glossary of Terms
30 For 'lymph nodes' see: Glossary of Terms
31 For 'hypoxia-anoxia' see: Glossary of Terms

	had happened"		
30th November 1995	The Coroner notifies Dr. George Murnaghan that he would be holding an Inquest and seeking an independent medical/ anaesthetic report from Dr. John Alexander		
	The Coroner writes to Dr. John Alexander asking him to prepare an anaesthetic report on Adam's case for use at the Inquest. He states that Dr. Alison Armour informed him that she found gross cerebral oedema, the worst she had ever seen in an autopsy on a child. He identified the clinicians involved as Dr. Robert Taylor and Messrs. Stephen Brown and Patrick Keane. He also stated: *"… the child was healthy and considered to be an ideal candidate for transplant surgery. No complications were anticipated."*	Ref: 011-018-116	
	The Coroner writes to Dr. George Murnaghan confirming that Dr. John Alexander had agreed to provide an anaesthetic report for the Inquest and seeking statements from the clinicians involved as soon as possible. It also stated: *"it would be useful to have a statement from the technician responsible for the equipment in theatre confirming that it was functioning properly. The statement should cover the frequency of checks and whether such checks were carried out before and after surgery in this instance"*	Ref: 059-073-166	
	The Coroner writes to Mrs. Susan Young[32] seeking a statement from: *"Mr. Keane fully detailing his part*	Ref: 011-020-119	

[32] Mrs. Susan Young (Complaint's Officer, BCH): See Schedule of Persons for details

	in the surgery and commenting as to whether it progressed uneventfully or otherwise"		
	Letter from Dr. Robert Taylor to Dr. George Murnaghan explaining his position, including: *"The pulse rate, CVP and arterial blood pressure gave me no cause for concern throughout the case, and a blood gas at 09.30am 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: 059-067-155	
2nd December 1995	Siemens Patient Monitor, Model 1281 is returned to the Department by John McKirgan where it is left 'on test'	Ref: 094-210-1000 & Ref: 094-210-999	
	Dr. Alison Armour telephoned the Coroner to say that *"she was becoming ever more convinced that there was a question mark against the equipment"*	Ref: 011-025-125	
2nd December 1995	Dr Fiona Gibson visits the operating theatre suite of the RBHSC at the request of Drs George Murnaghan and Joe Gaston to discuss with Dr Robert Taylor three patients (including Adam Strain) whose post-mortem examination had been brought to the attention of the Coroner. She was accompanied by Mr. John Wilson[33] and Mr. Brian McLaughlin[34], both Senior Technical officers, on the site who carried out checks into the ventilators and other equipment in the theatre.	Ref: 059-065-132	
December	The report of Messrs. Wilson &	Ref: 011-028-147	

[33] Mr. John Wilson (Medical Technical Officer, RBHSC): See Schedule of Persons for details
[34] Mr. Brian McLaughlin (Medical Technical Officer, RBHSC): See Schedule of Persons for details

1995	McLaughlin (signed by John Wilson only) stated that: *"Siemens Patient Monitor, Model 1281, Serial No. (This monitor is currently out for repair – new display screen is being fitted and a loan monitor is in use) …* *The Anaesthetist using the machine is also expected to sign the log before commencing the list but this does not happen on most occasions. A reason for this omission should be requested"* and referred to the*:* *"protocols and monitoring procedures set up within the RBHSC's Theatres"* Brian McLaughlin confirmed that the Siemens monitor that was present was functioning within specification. However, John Wilson "*cannot confirm that the Siemens Patient Monitor [he] tested was the specific monitor used in any specific operation*." Brian McLaughlin also states this, though he says: "*These monitors are not easily moved and are not routinely replaced unless they are defective. Therefore I would say from my experience it is very likely the monitor which we examined on 2nd December 1995 was the monitor used in theatre on 27th November 1995 unless records show that a monitor was removed from theatre RBHSC after 27th November 1995 and before 2nd December 1995*". In addition, there was "*a very remote possibility*" of a gas mismatch.	Ref: 093-028-076 & Ref: 093-027-072	
3rd December 1995	Meeting of the Coroner, Dr. George Murnaghan, Dr. Joe Gaston[35] and Dr. Samuel Lyons[36] at which Dr. Lyons suggested that it was important to have another paediatric anaesthetic	Ref: 011-027-128 & Ref: 093-024-066	

35 Dr. Joseph Gaston (Director of Anaesthetics, Theatres & Intensive Care, Royal): See Schedule of Persons for details

36 Dr. Samuel Lyons (Consultant Cardiac Anaesthetist, Royal): See Schedule of Persons for details

	opinion apart from Dr. John Alexander as he did not have extensive paediatric experience Dr. Joe Gaston's opinion at the time was that "*the learning from this case was primarily in paediatrics, however it was very limited in general anaesthetics due to the unique nature of Adam's case*" and that "*in routine cases in general anaesthetics, Consultant Anaesthetists in the Royal Hospitals should have been able to prevent the development of hyponatraemia*"	Ref: 093-023-065; Ref:093-024-066 & Ref: 093-025-068	
4th December 1995	Report of Dr Fiona Gibson,[37] which states: "*The technical checks demonstrated a high degree of vigilance in this area, found nothing at fault in relation to the cases in question but identified a problem relating to pin indexing which the whole hospital will now address*" and "*The Protocols for monitoring, anaesthetic set-up and drug administration in this area are among the best on the Royal Hospitals site*" Dr Gibson acknowledges Wilson and McLaughlin's finding of a possible pin problem, but states "*having examined the anaesthetic record that there was no mismatch of gases during the operation.*"	Ref: 011-005-017 Ref: 093-026-069	It has since been confirmed by the Trust that it is their belief that "*the Protocols referred to by Dr Gibson did not exist in written form*". (INQ-0346-11)
6th December 1995	Letter from PSNI to the Coroner attaching Form 19 in respect of Adam's death, with the request that he "*inform this office if an inquest is necessary in order that an inquest file may be prepared*"	Ref: 011-022-121 & Ref: 011-022-122	
	Memo from Dr George Murnaghan to Drs. Savage, Taylor, Gaston and Webb and to Messrs. Brown and Wilson – advising that the Coroner is seeking statements from the clinicians involved as soon as	Ref: 059-071-164	

[37] Dr. Fiona Gibson (Consultant Anaesthetist, Royal): See Schedule of Persons for details

	possible. It also referred to the Coroner's request for: *"a detailed statement from the anaesthetic technical staff about the equipment used during the surgery and anaesthesia"* and stated *"This has been arranged"*		
	Siemens Patient Monitor, Model 1281 is returned to service from having been in the Department 'on test'	Ref: 094-210-1000 & Ref: 094-210-999	
7th December 1995	Dr. Armour also showed certain, unidentified, histology *"slides etc"* to Dr. O'Hara[38] and Dr. Bharucha[39]	Ref: 011-025-125	
8th December 1995	Letter from Dr. Alison Armour to Professor Crane[40] and copied to the Coroner, Dr. George Murnaghan, Mr. Calvin Spence of the BMA and the Medical Protection Society. She explained that she had dealt with Adam's case and was: *"… willing to attend any meeting about this case, including a meeting with clinicians, administrative staff, HM Coroner and whoever else wishes to attend. As I was the pathologist who carried out the autopsy I feel my opinion on the case is relevant to such a meeting and as such the case could be discussed in full"[sic]*	Ref: 011-023-123	
	Following discussions with Dr. Alison Armour and Dr. George Murnaghan (over the period 1st December to 8th December 1995), the Coroner informed Dr. George Murnaghan that it: "*appeared imperative that the equipment was now independently examined*".	Ref: 011-025-125	
	Dr. Murnaghan telephones the	Ref: 011-025-126	

38 Dr. Denis O'Hara (Consultant Paediatric Pathologist at the Royal – involved in Lucy's case): See Schedule of Persons for details

39 Dr. Bharucha (Consultant Haematologist at Belfast City Hospital): See Schedule of Persons for details

40 Professor Jack Crane (State Pathologist): See Schedule of Persons for details

	Coroner from Dr. O'Hara's office and there is a conversation between the Coroner and Dr. O'Hara, following which it is agreed that the equipment should be independently examined.		
11th December 1995	Dr. Fiona Gibson sends her report to Dr. George Murnaghan apologising for him not receiving the report last week: *"Please find it enclosed – I hope it is appropriate"*	Ref: 059-065-151	
December 1995	Letter from Mr. Patrick Keane to Susan Young in which he very briefly describes the progress of Adam's surgery. He acknowledged the surgery was technically difficult and stated: *"the kidney was successfully put into to the child and perfused quite well initially and started to produce urine. At the end of the procedure it was obvious that the kidney was not perfusing as well as it had initially done but this is by no means unusual in renal transplantation. The whole operating procedure … about 3 hours. I was informed later on that day that the child had severe cerebral oedema and that he was probably brain dead. In summary, therefore, the operation was difficult but a successful result was achieved at the end of the procedure"*	Ref: 059-056-133	
? December 1995	Coroner telephones Dr. Edward Sumner[41] who agreed to provide an opinion for the Inquest	Ref: 011-027-128	
13th December 1995	Letter from the Coroner to Dr. Alison Armour advising her of his meeting on 3rd December 1995 with Drs. Murnaghan, Gaston and Lyons during which they expressed the view that *"the death had nothing to do with anaesthetics"* and agreed that it is *"an immensely complex case"*. The letter also states that Drs. Gaston and	Ref: 011-027-128 Ref: 093-024 Ref: 094-235-1105	

41 Dr. Edward Sumner (Consultant Paediatric Anaesthetist, Great Ormond Street): See Schedule of Persons for details

	Lyons felt there was a need for the opinion of a Paediatric Anaesthetist and that Dr. Edward Sumner had agreed to provide an opinion. He also states that he had the impression from something said by Dr. Denis O'Hara that the findings of *'gross cerebral oedema'* could be explained by the time Adam was on the ventilator. The letter concludes by passing on Dr. Edward Sumner's request that: *"he be sent copies of all the notes – everything you have"*		
14th December 1995	Letter from Dr. David Webb to Dr George Murnaghan describing his involvement with Adam from 7.30pm on 27th November 1995. He stated that his examination at that time indicated brain stem death: *"I noted he had severe extensive bilateral fundal haemorrahages suggestive of acute raised intercranial pressure. I reviewed his CT scan which showed diffused generalised cerebral oedema with obliteration of the basal cisterns fulfilling the radiological criteria for coning …* *My impression was that he had suffered severe acute cerebral oedema which was likely to have occurred on the basis of osmotic disequilibrium causing a sudden fluid shift"*	Ref: 059-061-147	
15th December 1995	The undated 'Report on Equipment Used During Untoward Incidents in the Operating Theatres, RBHSC' of Messrs. Wilson & McLaughlin (signed by John Wilson only) is received by the Coroner from Dr. George Murnaghan. It states that: *"Siemens Patient Monitor, Model 1281, Serial No. (This monitor is currently out for repair – new display screen is being fitted and a*	Ref: 011-028-147	

	loan monitor is in use) … *The Anaesthetist using the machine is also expected to sign the log before commencing the list but this does not happen on most occasions. A reason for this omission should be requested"* and referred to the*:* *"protocols and monitoring procedures set up within the RBHSC's Theatres"* Brian McLaughlin confirmed that the Siemens monitor that was present was functioning within specification. However, John Wilson "*cannot confirm that the Siemens Patient Monitor [he] tested was the specific monitor used in any specific operation*." [In fact it was not the correct equipment] Brian McLaughlin also states that, though he says: "*These monitors are not easily moved and are not routinely replaced unless they are defective. Therefore I would say from my experience it is very likely the monitor which we examined on 2nd December 1995 was the monitor used in theatre on 27th November 1995 unless records show that a monitor was removed from theatre RBHSC after 27th November 1995 and before 2nd December 1995*". In addition, there was "*a very remote possibility*" of a gas mismatch.	Ref: 093-028-076 & Ref: 093-027-072	
20th December 1995	Letter from Stephen Brown[42] to Dr George Murnaghan briefly describing his prior involvement with Adam in 1991 and then the transplant surgery, which he described as "*technically difficult*". He also said that : *"at no stage during the operation was I conscious of any problem with his general condition"* and that *"The profusion of the kidney was*	Ref: 059-060-146	

42 Mr. Stephen Brown (Consultant Paediatric Surgeon, RBHSC): See Schedule of Persons for details

	satisfactory although at no stage did it produce any urine".		
	Letter from Dr. Alison Armour to Dr. Edward Sumner, enclosing: (i) original hospital notes [but not the full 10 files]; (ii) 2 reports from Dr. Robert Taylor as the Consultant Anaesthetist involved; (iii) a report from Dr. Maurice Savage as Adam's Consultant Paediatric Nephrologist; and (iv) equipment check report of Messrs. Wilson and McLaughlin. She also summarised the main features of the case including that: (i) Adam was fed via a gastrostomy button which included a night feed of 1,500mls; (ii) the operation produced a little more bleeding than expected and technically was a little more difficult because Adam was well nourished (over weight?); (iii) Adam did not wake up and an urgent CT scan showed gross cerebral oedema with the brain bulging through the dura	Ref: 011-028-130	
22nd December 1995	Letter from Dr. Alison Armour to Professor Jeremy Berry[43], enclosing: (i) Adam's notes; (ii) report of Consultant Anaesthetist (Dr. Edward Sumner); (iii) report of Consultant Paediatric Nephrologist (Dr. Maurice Savage); (iv) equipment check report of Messrs. Wilson and McLaughlin; (v) histological slides The histological slides that were taken from (a) lungs (b) larynx (c) liver (d) kidney (e) transplanted kidney (f) spleen (g) lymph nodes[44] are also provided to Professor Berry	Ref: 011-029-151	

43 Professor Jeremy Berry (Consultant Paediatric Pathologist & Emeritus Professor of Paediatric Pathology, University of Bristol): See Schedule of Persons for details

44 For 'lymph nodes' see: Glossary of Terms

	Dr. Armour summarised the main features of the case including that: (i) Adam was fed via a gastrostomy button which included a night feed of 1,500mls; (ii) the operation produced a little more bleeding than expected and technically was a little more difficult because Adam was well nourished (over weight?); (iii) Adam did not wake up and an urgent CT scan showed gross cerebral oedema (weight of unfixed brain '1,320gms'). Professor Jeremy Berry is asked him to look at the slides and provide the Coroner with his expert opinion.		
3rd January 1996	Letter from the Coroner to Dr. Edward Sumner referring to the letter from Dr. Alison Armour and confirming that he wished him to provide a Report for Adam's Inquest	Ref: 011-031-163	
	Letter from the Coroner to Professor Berry referring to the letter from Dr. Alison Armour and confirming that he wished him to provide a Report for Adam's Inquest	Ref: 011-032-164	
	Letter from Dr. Alexander to the Coroner enclosing his Report on Adam. He claims that there is *'very little available information concerning dilutional hyponatraemia (low serum sodium) in children)'*. He refers to Arrieff's paper: 'Hyponatraemia and death or permanent brain damage in healthy children' referring to how: *"… generally healthy children with symptomatic hyponatraemia (101-123mmol/l) can abruptly develop respiratory arrest and either die or develop permanent brain damage".* He summarises his opinion as:	Ref: 011-030-153	

	"The complex metabolic and fluid requirements of this child having major surgery led to the administration of a large volume of hypotonic (0.18%) saline which produced a dilutional hyponatraemia and subsequent cerebral oedema … Dr. Taylor is to be commended on the detailed notes and records he kept throughout the anaesthetic".		
4th January 1996	Meeting between Ms. Strain (Adam's mother) and the Coroner during which she informs him that, amongst other things, there are 10 files of medical notes for Adam and she queries whether they have all been made available to the experts	Ref: 011-033-165	
	Coroner speaks to Dr. Alison Armour who states that she had not sent all 10 files to the experts due to the large number. The Coroner suggests that she write to the experts advising of the files and stating that they could be accessed through Dr. George Murnaghan, which she agreed to do	Ref: 011-033-165	
5th January 1996	The Coroner sends Dr. John Alexander's report to Ms. Strain	Ref: 011-034-166	
	The Coroner sends Dr. John Alexander's report to Dr. Alison Armour	Ref: 011-034-167	
	The Coroner sends Dr. John Alexander's report to Dr. George Murnaghan, passing on Ms. Strain's query as to whether Dr. Maurice Savage would help explain the expert reports to her	Ref: 011-034-168	
9th January 1996	The Coroner speaks to Dr. Maurice Savage who agrees to interpret the expert medical reports for Adam's mother	Ref: 011-039-171	
10th January 1996		NHS Executive (1996)	Promoting Clinical Effectiveness: A framework for action in

			and through the NHS
12th January 1996	Adam's brain is cut following fixing. Dr. Alison Armour takes blocks from the brain: (a) Right frontal white matter[45], (b) left cingulated gyrus[46], (c) left basal ganglia[47], (d) right and left hippocampus[48], (e) left occipital lobe[49], (f) cerebellum[50], (g) pons in toto[51], (h) thalamus[52]. The brain was photographed sequentially. Blocks were taken from the cervical cord[53] as follows: (a) cervical, (b) thoracic[54], (c) lumbar[55]. Dr. Alison Armour states in her Report on Autopsy that the slides from the brain and spinal cord were shown to Dr. Meenakshi Mirakhur[56] for a second opinion	Ref: 011-010-039	
22nd January 1996	Expert Report on Adam from Dr Edward Sumner (Consultant Paediatric Anaesthetist at Great Ormond Street) engaged by the Coroner. He concluded that: *"I believe that on the balance of probabilities Adam's gross cerebral oedema was caused by the acute onset of hyponatraemia (see reference) from the excess administration of fluids containing only very small amounts of sodium (dextrose-saline and plasma) …"*	Ref: 059-054-109	
26th January	Letter from Corner to Dr. Edward Sumner enclosing a copy of Dr.	Ref: 011-044-177	

45 For 'frontal white matter' see: Glossary of Terms
46 For 'cingulated gyrus' see: Glossary of Terms
47 For 'basel ganglia' see: Glossary of Terms
48 For 'hippocampus' see: Glossary of Terms
49 For 'occipital lobe' see: Glossary of Terms
50 For 'cerebellum' see: Glossary of Terms
51 For 'pons in toto' see: Glossary of Terms
52 For 'thalamus' see: Glossary of Terms
53 For 'cervical cord" see: Glossary of Terms
54 For 'thoracic" see: Glossary of Terms
55 For 'lumbar' see: Glossary of Terms
56 Dr. Meenakshi Mirakhur (Consultant Neuropathologist, Royal): See Schedule of Persons for details

1996	John Alexander's report and commenting: *"Dr. Alexander would not claim to have any significant paediatric experience. What is interesting is that his view as to the cause of death is essentially the same as your own … he refers to the same article from the BMJ as you do"*		
	Coroner sends Dr. Edward Sumner's report to Dr. George Murnaghan, together with the article to which it refers	Ref: 011-045-178	
	Coroner sends Dr. Edward Sumner's report to Dr. John Alexander, together with the article to which it refers	Ref: 011-046-179	
	Coroner sends Dr. Edward Sumner's report to Ms. Strain	Ref: 011-047-180	
	Coroner sends Dr. Edward Sumner's Report to Dr. Alison Armour Alexander, together with the article to which it refers	Ref: 011-048-181	
2nd February 1996	Note from Dr Robert Taylor to Dr George Murnaghan commenting on Dr Sumner's Report and criticising his reliance on Arieff's 1992 BMJ paper as seriously flawed since Adam's kidneys were polyuric and, therefore, would not respond to ADH to cause water retention. He summed up the position as: *"Apparently then the whole discussion of Adam's management comes down to the fluids given ie type and quantity. I obviously agree with the two experts that for a healthy normal child such fluids* ***may be excessive.*** *However, both have failed to comprehend the physiological differences in this case and have used dubious scientific argument in an attempt to explain cerebral oedema. In Adam's case, where the urine output of his native kidneys had to be maintained, deficits*	Ref: 059-053-108	

	had to be replaced and extra fluids had to be given to provide the donor organ with adequate function, the type and volume of fluids were appropriate."		
7th February 1996	Dr. George Murnaghan faxes Dr Robert Taylor's note of 2nd February 1996 to Dr Alison Armour: *"on the understanding that the contents are for your personal information and as a background briefing, **in order to assist in coming to your conclusions in this difficult matter.**"*	Ref: 059-052-107	
12th February 1996		Ref: 080-007-220 BP3050/95	Letter from Chief Executive of Health & Personal Social Services Northern Ireland to inter alia Chief Executives of Trusts & Boards providing: 'Guidance for staff on relations with the public and the media'
25th March 1996	Letter from Professor Jeremy Berry to the Coroner enclosing his Report with the comment: *"I am unable to throw any light on the cause of this child's death. I suspect the answer lies in precise details of his clinical management and the examination of his brain … I doubt this kidney would ever have functioned"*	Ref: 011-053-187	
27th March 1996	Letter from the Coroner to Ms. Strain enclosing Professor Peter Berry's Report	Ref: 011-055-190	
	Letter from the Coroner to Dr. Murnaghan enclosing Professor Peter Berry's Report	Ref: 011-056-191	
22nd April 1996	Letter from the Coroner to Dr. John Alexander enclosing a copy of the post-mortem report on Adam	Ref: 011-060-195	

	Letter from the Coroner to Ms. Strain enclosing a copy of the post-mortem report on Adam	Ref: 011-061-196	
	Letter from the Coroner to Dr. George Murnaghan enclosing a copy of the post-mortem report on Adam	Ref: 011-062-197	
24th April 1996	Dr Alison Armour's Report on Autopsy, which concluded that the cause of Adam's death was: *"1(a) Cerebral Oedema due to (b) dilutional hyponatraemia and impaired cerebral perfusion during renal transplant operation for chronic renal failure"* *(Emphasis added)* The Report also stated: *"It is known that that a condition called dilutional hyponatraemia can cause rapid and gross cerebral oedema. There is no doubt in this case that the sodium was low during the operation. A study revealed that in children undergoing operations there was a substantial extra renal loss of electrolytes and with a minimal positive balance of hypotonic fluid could lead to fatal hyponatraemia. This study however must be taken in context as it refers to healthy children undergoing operations like tonsillectomies. Thus they had normally functioning kidneys which was not the situation in this case"*	Ref: 011-010-034	
25th April 1996	Letter from Francis Hanna & Company (Solicitors for Adam's mother) to the Royal indicating a potential claim and seeking his medical notes and records	Ref: 060-022a-042	
1st May 1996	Letter from Mr. Patrick Keane to Dr. George Murnaghan correcting the figure for blood loss given in the Report on Autopsy as 1500cc, on the basis that it would have constituted almost Adam's entire blood	Ref: 059-036-070	

	volume and would have been a massive loss. He stated that it should have been 1500cc of fluid loss *"which contained blood, peritoneal fluid and urine"*		
8th May 1996	Letter from Dr. Robert Taylor to Dr. George Murnaghan criticising the Report on Autopsy on an number of grounds, including: (i) the statement that *"most of the … fluids given … were … sodium chloride 38mmol/L"* as factually incorrect and prejudicial; (ii) the suggestion that there was any impaired cerebral perfusion on the basis of a lack of evidence since intracranial pressure was not monitored; (iii) the lack of any *"premorbid nor postmorbid evidence that excessive volumes of fluid were administered which produced dilutional hyponatraemia"* *"I believe it is unacceptable to speculate on the cause of Adam's death without direct post-mortem evidence and by misrepresenting the quantities and types of fluids given"*	Ref: 059-036-072	
9th May 1996	Letter from Brangam & Bagnall & Co to Dr. George Murnaghan seeking further information from the clinicians as to: *"strengths and weaknesses (if any) of the care provided for Adam"*	Ref: 060-022-041	
13th May 1996	Letter from Mr. Patrick Keane to Dr. George Murnaghan in response to a request for a letter on *"strengths and weaknesses in Adam's case"*. He stated: *"As far as I was concerned the Anaesthetic on a very difficult patient went ahead without any problems. The surgery whilst difficult was finally completed in a satisfactory manner"*	Ref: 059-034-067	
28th May 1996	Letter from Ms. Strain to the Coroner pointing out an error in Dr. Alison Armour's post-	Ref: 011-076-211	

	mortem Report: *"Adam was only fed 600mls during the day not 900mls … he was fed 2100mls in total per day, which was less than he received in his 5 hours of surgery"*		
29th May 1996	Letter from Coroner to Dr. Alison Armour enclosing a letter dated 28th May 1996 from Adam's mother pointing out an error in the Report on Autopsy in that: *"Adam was only fed 600mls during the day not 900mls as stated by Dr Armour"* and that *"he was fed 2100mls in total per day, which was less than he received in his five hours of surgery"*	Ref: 011-077-212 & Ref: 011-076-211	
30th May 1996	Letter from Brangam Bagnall & Co to Dr. George Murnaghan advising that the matter is likely to proceed to litigation and referring to having: *"identified a number of issues which are likely to be capable of creating difficulties for us at the Inquest"* and the fact that *"the clinicians, and in particular, Dr. Taylor will be closely examined in relation to the issues flagged up by Dr. Sumner"*. Also: *"The essential issue of course relates to the fluids which were given to the child, and I know that with retrospect, Mr Savage feels the child may have received excessive fluids"*	Ref: 059-020-046	
30th May 1996	Letter from Dr. George Murnaghan to Brangam Bagnall & Co: (i) advising that he will be having further discussions with Dr. Robert Taylor about the *"various potential problems that may arise at Inquest"*; (ii) that he will probably consult with Dr. Joe Gaston also; and (iii) suggesting a further meeting with Drs. Taylor and Savage	Ref: 059-027-058	
3rd June 1996	Reply from Dr. Alison Armour to the letter of 29th May 1996 from	Ref: 011-079-214	

	the Coroner stating: *"The figures regarding Adam's fluid management were provided by the medical staff involved in his care. My opinion on the cause of death stays the same regardless of whether he received 600mls or 900mls of fluid. It is not just the volume of fluid he received but the type. The fact that his sodium level was low intra-operatively is the critical point"*		
5th June 1996	Letter from the Coroner to Ms. Strain enclosing the response of 3rd June 1996 from Dr. Alison Armour	Ref: 011-080-215	
??	Note from Dr. Robert Taylor to Mr. George Brangam of Brangam Bagnall & Co dealing with Adam's fluid administration and explaining: *"Adam's kidneys had lost the ability to concentrate urine (polyuria) so they were unresponsive to ADH (anti-diuretic hormone). Therefore the dilutional hyponatraemia discussed in the paper by Arieff could not have occurred in this case … After the transplanted kidney failed to function I was very concerned that despite my best calculations and estimate of the losses I had not given sufficient fluid!"*	Ref: 059-004-007	
7th June 1996	Letter from Brangam Bagnall & Co to Dr. George Murnaghan dealing with areas of concern and the *"veiled criticisms"* in Dr. Edward Sumner's Report. He made it clear that the target of the Coroner's interest was likely to be on Adam's anaesthetic management. He sought assistance from Dr. Taylor on a number of matters, including: *"… instructions … from Dr. Taylor and if he has any difficulties in relation to accepting that cause of death [from the Report on Autopsy], then perhaps he would let me have a*	Ref: 059-014-038	

	note of same"		
	Memorandum from Dr. George Murnaghan to Drs. Robert Taylor, Maurice Savage and Joe Gaston: (i) providing a copy of the letter dated 7th June 1996 from Brangam Bagnall & Co; (ii) making arrangements for a response; (iii) also making arrangements for Dr. Robert Taylor to conduct a viewing for the *"two Georges"* [Mr. George Brangam and Dr. George Murnaghan] of the operating theatre to view the monitoring equipment and associated tubings etc	Ref: 059-009-027	
	Note from Dr. Robert Taylor to Mr. George Brangam of Brangam Bagnall & Co dealing with Dr. Edward Sumner's comments on thiopentone and steroids for 'brain protection' and conceding that they have a dubious role in brain protection whilst also acknowledging that he did not administer them for that reason	Ref: 059-009-028	
10th June 1996	Letter from Dr. Maurice Savage to Dr. George Murnaghan commenting on Dr. Edward Sumner's Report, advising that: (i) Adam received 2100mls per day which was administered during the day in 2 boluses of 300mls each with the balance of 1500mls being by continuous gastrostomy infusion over the night; (ii) Adam had an overnight deficit of some 600mls to be made up at a rate that depended upon the speed with which one wanted to 'catch up'; (iii) claiming that it would have been possible to check Adam's electrolytes was venous access was achieved in theatre.	Ref: 059-003-005	
18th June 1996	Adam's Inquest – commencement of the evidence	Ref: 011-016-114	

	Inquest into Adam's death opened and evidence from Constable Tester, Ms. Strain, Dr. Alison Armour, Dr. Edward Sumner, Dr. John Alexander, Mr. Patrick Keane Inquest adjourns to 21st June 1996	Ref: 011-008-024, Ref: 011-009-025, Ref: 011-010-030, Ref: 011-011-042, Ref: 011-012-079, Ref: 011-013-093	
19th June 1996	Draft Statement for the Royal prepared by Dr. Joe Gaston, refers to the Arieff paper and *"a number of renal transplants complicated by hyponatraemia leading to death in 10 (reported May 1996)"* In the light of that the draft Statement makes *"recommendations for the prevention and management of hyponatraemia arising during paediatric surgery"*: *1. Major surgery in patients with a potential for electrolyte imbalance should have a full blood picture (which includes haematocrit value) and an electrolyte measurement performed 2 hourly or more frequently if indicated by the patient's clinical condition.* *2. A serum sodium value of less than 128mmol/L indicates that hyponatraemia is present and requires intervention by the anaesthetist. A value of 123mmol/L or less indicates the onset of profound hyponatraemia and must be managed immediately.* *3. The operating theatre must have access to timely reports of the full blood picture and electrolytes to allow rapid intervention by the anaesthetist, when indicated" (Emphasis added)* A subsequent version of the Draft Statement (finalised in consultation with Consultant Anaesthetists Dr. Robert Taylor, Dr. McKaigue[57] and with the	Ref: 060-018-036 Ref: 060-014-025	DLS have confirmed the following by a letter to the Inquiry (Ref: INQ-0228-10): 1. Recommendations were drawn up for the prevention and management of hyponatraemia by those anaesthetists who would be involved in major paediatric surgical procedures. 2. The recommendations at Ref: 060-018-036 may be considered substantive in that they were drawn up by the only anaesthetists in NI who were performing such work. 3. There would have been no necessity or requirement to circulate the recommendations outside RBHSC or the Royal Hospitals Trust and the Trust did not do so.

[57] Dr. Seamus McKaigue (Consultant Paediatric Anaesthetist, Royal): See Schedule of Persons for details

	subsequent approval of Dr P Crean[58]) is faxed by Dr. George Murnaghan to Brangam Bagnall & Co.[59] It refers to the: *"rare circumstances encountered in the Adam Strain case, and having regard to the information contained in the paper by Arieff et al (BMJ 1992) and additionally having regard to information which has recently come to notice that perhaps there may have been nine other cases in the United Kingdom involving hyponatraemia which led to death in patients undergoing renal transplantation"*[60] It also states: *"that the future management of patients undergoing paediatric surgery will be carefully monitored and re-appraised having regard to this information which is now available.* *In particular all patients undergoing major surgery who have a potential for electrolyte imbalance will be carefully monitored according to their clinical needs and where necessary intensive monitoring intensive monitoring of the electrolyte values will be undertaken. Furthermore, the now known complications of hyponatraemia in some of these cases will continue to be assessed in each patient, and all anaesthetic staff will be made aware of these particular phenomenon and advised to act appropriately.* *The Trust will continue to use its best endeavours to ensure that operating theatres are afforded access to full laboratory facilities to achieve timely receipt of reports on full blood pictures and electrolyte values*		

58 Dr Peter Crean (Consultant Paediatric Anaesthetist, Royal): See Schedule of Persons for details

59 At that time Brangam Bagnall & Co were acting for the Royal in the clinical negligence claim by Adam's family

60 The source of this information is the Deposition of Dr Maurice Savage (Ref: 011-015-113), who claims that he has *"discovered"* it but that the cases have not been published but told to him *"verbally"*.

	thereby assisting rapid anaesthetic intervention when indicated"		
20th June 1996	A 'marked up' in manuscript[61] further revised version of the draft Statement is faxed back from Brangam Bagnall & Co to Dr. George Murnaghan, which states: *"that ~~the~~ in future management of patients undergoing major paediatric surgery with potential electrolyte imbalance will be carefully monitored and re-appraised having regard to this information which is now available.* *~~In particular~~ all patients undergoing major paediatric surgery who have a potential for electrolyte imbalance will be carefully monitored according to their clinical needs and where necessary intensive monitoring intensive monitoring of the electrolyte values will be undertaken. Furthermore, the now known complications of hyponatraemia in some of these cases will continue to be assessed in each patient, and all anaesthetic staff will be made aware of these particular phenomen~~ona* *and advised to act appropriately.* *The Trust will continue to use its best endeavours to ensure that operating theatres are afforded access to full laboratory facilities to achieve timely receipt of reports on full blood picture~~s~~ and electrolyte values thereby assisting rapid anaesthetic intervention when indicated"*	Ref: 060-019-037 & Ref: 060-019-038	
	Letter from Dr. Sumner to the Coroner advising of a paper submitted for publication of 'Paediatric Anaesthesia' on a case on dilutional hyponatraemia, which he intended to publish and have Professor Arieff write an editorial: *"The Journal has a wide readership worldwide so should go some way towards enlightening*	Ref: 011-082-217	

[61] The deletions are shown struck through and the additions are shown as underlined

	people on this rare (?) occurrence"		
21st June 1996	A final version of the draft Statement is faxed at 13:06 from Brangam Bagnall & Co to Dr. George Murnaghan, which states: *"In the light of the rare circumstances encountered in the Adam Strain case, and having regard to the information contained in the paper by Arieff et al (BMJ 1992) and additionally having regard to information which has recently come to notice that perhaps there may have been nine other cases in the United Kingdom involving hyponatraemia which led to death in patients undergoing renal transplantation, the Royal Hospitals Trust wish to make it known that:* *in future all patients undergoing major paediatric surgery who have a potential for electrolyte imbalance will be carefully monitored according to their clinical needs, and where necessary, intensive monitoring intensive monitoring of their electrolyte values will be undertaken. Furthermore, the now known complications of hyponatraemia in some of these cases will continue to be assessed in each patient, and all anaesthetic staff will be made aware of these particular phenomena and advised to act appropriately.* *The Trust will continue to use its best endeavours to ensure that operating theatres are afforded access to full laboratory facilities to achieve timely receipt of reports on full blood pictures and electrolyte values thereby assisting rapid anaesthetic intervention when indicated"*	Ref: 059-008-024 & Ref: 059-008-025	DLS have confirmed the following by a letter to the Inquiry (Ref: INQ-0228-10): 1. This draft statement was prepared as a laymen's version of the recommendations at Ref: 061-018-036 by the Trust's management in conjunction with the Trust's solicitor. 2. Its last version on file remains labelled draft and its sole purpose was to inform the media. It was forwarded to the Trust's Director of Corporate Affairs on 21.06.95 in anticipation of media interest at the conclusion of the Inquest.
	Adam's Inquest – continuation of the evidence: Evidence from Dr. Taylor and Dr. Savage. During his evidence Dr. Robert Taylor produced a further statement identified as 'C5', which is identical to the draft	Ref: 011-014-096 & Ref: 011-015-109 Ref: 011-014-107a for 'C5'	.

	statement faxed by Brangam Bagnall & Co to Dr George Murnaghan on 21st June 1996[62]		
	Verdict on Inquest: *"Cause of death:* *I(A) Cerebral Oedema* *due to* *(B) Dilutional hyponatraemia and impaired cerebral perfusion during renal transplant operation for chronic renal failure (congenital obstructive uropathy)* *Findings:* *The onset of cerebral oedema was caused by the acute onset of hyponatraemia from the excess administration of fluids containing only small amounts of sodium and this was exacerbated by blood loss and possibly the overnight dialysis and the obstruction of the venous drainage to the head"*	Ref: 011-016-114	

SCHEDULE 3: From the Inquest Verdict on 21st June 1996 to November 1998

Date & Time	Events in relation to Adam	Source/ Reference	Other Developments
21st June 1996	Dr. George Murnaghan noted that: *"Other issues identified which relate to structure and process of paed renal transplant services – agreed with IWC [Dr. Ian Carson[63]] that should deal with this as a RM [risk management] issue & arrange a seminar*	Ref: 059-001-001	

62 See Ref: 059-008-024 (for fax sheet) & Ref: 059-008-025 (for the draft statement) NB Dr George Murnaghan's Inquiry Witness Statement goes further than that Draft Statement: *"This statement indicated that all paediatric anaesthetic staff within the Trust would be made aware of the particular phenomena associated with electrolyte imbalance, the need for careful monitoring and in particular the monitoring of their electrolyte balance"* (Ref: 018)

63 Dr. Ian Carson (Medical Director, Royal): See Schedule of Persons for details

	with HM Mulholland/E Hicks,[64] JG Gaston/RH Taylor, M Savage/M O'Connor, IWC & GAM [Dr. George Murnaghan] present asap"		
22nd June 1996	Report in the 'Belfast Telegraph' which states: *"In a statement the Trust said it is taking action in the light of the rare circumstances encountered in Adam's case and because of new information.* *In future all patients undergoing paediatric surgery who potentially have an imbalance in salt levels will be carefully checked. The Trust said that where necessary intensive monitoring will be undertaken and all anaesthetists will be made aware of the possible complications"*	Ref: 069A-102-423	
26th June 1996	Letter from the Coroner to Dr. Alison Armour enclosing the letter from Dr. Edward Sumner of 20th June 1996	Ref: 011-085-220 & Ref: 011-082-217	
	Adam's death is registered following receipt of the certificate from the Coroner. It records the cause of death as: 1(a) cerebral oedema; (b) dilutional hyponatraemia and impaired cerebral perfusion during renal transplant operation for chronic renal failure (congenital obstructive uropathy)	Ref: 070-001-001	
2nd July 1996	Letter from Brangam Bagnall & Co to Dr.	Ref: 060-020-039	

64 Dr. Elaine Hicks (Consultant Paediatric Neurologist, RBHSC): See Schedule of Persons for details

	George Murnaghan referring to the sterling help of Dr Joe Gaston and commenting: *"it is not without note that the Coroner did not issue a recommendation in this case, which I believe was in large part due to the fact that the Deponents gave their evidence in a fair, objective and professional manner and at the same time were alert and aware of those issues which might cause an erosion of public confidence.* *… as you know the threat of litigation has already been mooted and I believe we need to meet to* ***discuss the way in which the Trust intends to meet that challenge****."*		
10th July 1996	Letter from Dr Sumner to the Coroner enclosing a copy of the paper on dilutional hyponatraemia that he had accepted for publication in 'Paediatric Anaesthesia' (referred to in his letter of 20th June 1996, Ref: 011-082-217) and advising that Professor Arieff had agreed to write the editorial	Ref: 011-088-223	
September 1996	Dr. Maurice Savage and Dr. Mary O'Connor produce revised 'RBHSC Renal Transplant Guidelines' to state that: (i) U&E should be repeated at the time of going to theatre; (ii) electrolytes to be checked 2 hourly in theatre; (iii) normal saline, plasma or blood (as appropriate) to	Ref: WS-0021/1, p.5	

	be used in theatre to raise CVP[65] to 8-10 mmHg prior to releasing vascular clamps[66] [to perfuse[67] the kidney]		
23rd October 1996	***Claire dies at RBHSC***		
13th November 1996		Ref: 080-009-233	Letter to CMO (Sir Kenneth Calman) providing the agreement of: (i) British Association of Medical Managers, (ii) Central Consultants and Specialist Committee of the BMA, (iii) National Association of Health Authorities & Trusts, (iv) NHS Trust Federation on the implementation of: *"Maintaining Medical Excellence"*, including that the job description of the Medical Director should include responsibility for: *"ensuring that procedures are put in place and made known to all doctors employed by the trust … for reporting a*

65 For 'CVP – central venous pressure': see Glossary of Terms
66 For 'vascular clamps': see Glossary of Terms
67 For 'perfusing the kidney': see Glossary of Terms

			colleague doctor … when they have concerns that their conduct, performance or health might be a threat to patients [and] investigating and taking appropriate action"
10th December 1996	Anaesthetic record keeping in Adam's case reviewed at an Anaesthetics Directorate Clinical Audit meeting in which it is recorded that *"Two problems were identified – Inadequate Records and no records at all … Common areas of inadequate information were to be found in … Drug and Fluid administration"* Also a handout titled 'Anaesthetic Record Set' – Suggestions as to a reasonable content was given to everyone.	Ref: 078-015-098 (1996) Published by Association of Anaesthetists of Great Britain & Ireland	
10th January 1997		Ref: 080-009-232 HSS(MD)3/97	Letter from the CMO (Dr. Henrietta Campbell) to Chief Executives of Trusts and Medical Directors asking them to put into effect the agreement in the letter of 13th November 1996 to Sir Kenneth Calman
19th March 1997	Letter from Brangam Bagnall & Co to Dr George Murnaghan stating in relation to Adam that: *"I believe from a liability point of view, this case [Adam's] cannot be*	Ref: 060-016-031	

	defended"		
8th April 1997	Litigation brought by Adam's mother in respect of his death is settled without admission of liability and with the inclusion of a confidentiality clause	Ref: 060-015-028	
9th May 1997	Memorandum of Dr George Murnaghan to Drs. Savage, Webb and Taylor and Messrs. Keane and Brown advising them that Adam's case had settled but that: *"From a liability position the case could not be defended"*	Ref: 060-010-015	
May 1997		Ref: 301-138-001	Alison Armour's article is published in the Journal of Clinical Pathology: 'Dilutional hyponatraemia: a cause of massive fatal intraoperative cerebral oedema in a child undergoing renal transplantation' [ie Adam] 'Paediatric Medical Guidelines'with contributions from Doctors O'Connor, Savage, Webb, Hicks
1997	Trust receives accreditation from King's Fund Organisational Audit	Ref: 305-001-001	
1997		Ref: 210-003-008 & Department of Health, Dec. 1997. London: The Stationary Office as ISBN 0 10 1380720	White Paper on Health, 'The New NHS Modern and Dependable' (DoH 1997)

1998			British Transplant Society-'Towards Standards for Organ and Tissue Transplantation in the United Kingdom'
30th April 1998		Department of Health & Social Services	'Fit for the Future' – Consultation paper about the future of the health and personal social services in Northern Ireland
November 1998		British Transplantation Society	'Towards Standards for Organ and Tissue Transplantation in the United Kingdom' – providing 'best practice'[68]
1999		Ref: 210-003-009 & Department of Health, Feb 1999 HSC 1999/033	'A First Class Service: Quality in the new NHS' (DoH 1999)
2000		Ref: 210-003-038	'An Organisation with a Memory' (DoH June 2000)
2001		Ref: WS-002-3 p.47	Creation of the Northern Ireland Regional Paediatric Fluid Therapy Working Group
2002		Ref: 209-001-008	Royal College of Pathologists-Guidelines on Autopsy Practice
2003		Ref: The Ulster Medical Journal, Volume 72, No.2, pp. 69-72, November 2003	'Prevention of hyponatraemia in children receiving fluid therapy' and is published in the Ulster Medical Journal
2006		www.ncepod.org.uk/2006.htm	National

[68] This was followed, in Northern Ireland by the Renal Services Review 2002 commissioned by the Department of Health, Social Services & Public Safety

			Confidential Enquiry into Patient Outcome and Death (NCEPOD- 'The Coroner's Autopsy: Do We Deserve Better?'