Witness Statement Ref. No. 240/1

NAME OF CHILD: Raychel Ferguson

Name: George Foster

Title: M.D.,F.R.C.S. Consultant General, Colorectal and General Paediatric Surgeon.

Present position and institution:

Consultant General, Colorectal and Paediatric Surgeon, Grosvenor Nuffield Hospital, Chester 1983 – present

Honorary Clinical Lecturer in Surgery 1983 – present

Previous position and institution:

Consultant General, Colorectal and Paediatric Surgeon, Countess of Chester Hospital, Chester 1983 – 2011

Lecturer in Surgery, University of Nottingham 1976 – 1983

Membership of Advisory Panels and Committees:

Clinical Director of Surgery 1989 – 1996

Chairman Mersey Region Colorectal Cancer Network 1998 – 2005

Member of Council Association of Coloproctology of Great Britain and Ireland 1996 – 2011

Chairman, Countess of Chester Hospital Medical Staff Committee 2004 – 2010

Board Member. Federation of Independent Provider Organisations 2004-2010

Clinical Assessor for Independent Review Panels, Eastern Health and Social Services Board Northern Ireland 2003 – present

Previous Statements, Depositions and Reports:

N/A

OFFICIAL USE:
List of reports attached:

Ref:	Date:	

Particular areas of interest:

GRADUATE AND POST GRADUATE EDUCATION:

- Lecturer in Anatomy, Liverpool 1969 – 1972
- Lecturer in Surgery, University of Nottingham 1976 – 1983
- Honorary Clinical Lecturer in Surgery, University of Liverpool 1983 – present
- A career long interest in education of students and junior doctors
- Surgical Tutor Royal College of Surgeons of England 1996 – 2001
- Supervisor for Consultant Retraining 2005 – 2006
- Lead Paediatric Surgeon, Countess of Chester Hospital 1983 – 2011
- Regular dedicated children's list and training of junior surgeon in general paediatric surgery

RESEARCH INTERESTS

- MD Thesis 1973; Neuroanatomy/Neurophysiology
- Neuroanatomy of the midbrain
- Gastrointestinal Motility
- Gastrointestinal Reflux Disease
- Clinical Audit in Coloproctology
- The Surgery of Rectal Cancer
- Regular publications, abstracts and presentations at international meetings on all above topics

MEDICOLEGAL INTERESTS

- Founder Member Expert Witness Institute

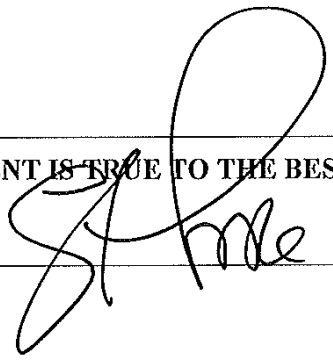
- Approximately 40 medicolegal reports per annum for GMC, Defence, Claimants and Hospital Boards

OTHER

-
- Executive Trustee and Treasurer of Bowel Disease Research Foundation of Great Britain and Ireland

- Since 2007 the BDRF has raised in excess of £1.3 million and grants totaling almost £1,000,000 have been awarded to research units in the UK and Ireland for research into all aspects of bowel disease

THIS STATEMENT IS TRUE TO THE BEST OF MY KNOWLEDGE AND BELIEF

Signed:  **Dated:** 2/4/2012

PRIVATE AND CONFIDENTIAL

AN ANALYSIS OF THE SURGICAL CARE OF RAYCHEL FERGUSON AT ALTNAGELVIN HOSPITAL from JUNE 7th to JUNE 10th 2001

Prepared by:

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Consultant General Surgeon with an interest in General Paediatric Surgery
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Honorary Clinical Lecturer in Surgery
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At the request of:

The Inquiry into Hyponatraemia Related Deaths
Arthur House
41, Arthur St.
Belfast
BT1 4GB

1. INTRODUCTION

As a consultant general surgeon with a career long interest in general childrens surgery I have been asked by the Northern Ireland Public Enquiry into Hyponatraemia Related Deaths to examine surgical care provided to Raychel Ferguson who died aged 9 on the June 10th 2001 forty eight hours after an appendicectomy operation.

2. OVERVIEW

The Inquiry was established in November 2004 to examine events surrounding the deaths of a number of children in Northern Ireland from hyponatraemia with subsequent cerebral oedema leading to brain stem death. My brief as a General Surgeon with an interest in General Children's' Surgery is to examine the circumstances surrounding the admission of Raychel Ferguson (DOB: 4th February 1992), to the Altnagelvin Area Hospital at Londonderry, a subsequent appendicectomy, postoperative observations and aftercare. Twenty eight hours after surgery Raychel suffered a major fit and was found to be severely hyponatraemic with a serum sodium of 118 mmol/l. This led to cerebral oedema and compression of the brain stem. Raychel was transferred to the Royal Belfast Hospital for Sick Children where brain stem testing confirmed her to be brain dead. After a short interval ventilatory support was discontinued.

3. DOCUMENTATION

I have been sent comprehensive well paginated indexed documents relating to:

i Hospital care at the Altnagelvin Area Hospital, Londonderry (file 20).

ii Hospital care at the Royal Belfast Hospital for Sick Children (file 63).

iii Witness statements in detail comprising early statements from key individuals, Statements provided for Her Majesty's Coroner for Greater Belfast and a major file (WS-) which bring together all important witness statements for use by the Inquiry. It is to this file that I will largely refer: - when I necessarily refer to statements from other sources I will try to make this clear. Whilst I will refer to witness statements in different sections I will in a separate section bring together my views on all the witness statements.

iv All of the Coroner's papers relating to an Inquest opened on April 5th 2003 (file 12), this contains important witness depositions, copies of clinical files, autopsy related documents and an expert report submitted by Dr Edward Sumner (012-001-002). I will also be referring to the Coroner's verdict (012-001-139).

v. The death of Raychel Ferguson and two other children (Adam Strain and Lucy Crawford) were subsequently investigated in detail by the police service for Northern Ireland (PSNI): (Files 95 and 98).

4. SUMMARY OF CASE OF RAYCHEL FERGUSON

On the afternoon of June 7th 2001 Raychel Ferguson complained to her mother of abdominal pain. She was taken to the Accident and Emergency Department of the Altnagelvin Area Hospital at around 21.00. She was seen by an SHO in Accident and Emergency and a provisional diagnosis of appendicitis was made. Analgesia was given. This diagnosis was confirmed by an SHO in surgery and an appendicectomy operation arranged: this was performed at 23.30. The appendix was later shown to be histologically normal. On the following day (June 8th 2001) Raychel vomited throughout the day. Her fluid requirements were met by the use of intravenous 1/5 normal saline (solution 18) no bloods were done and after the morning ward round she was seen during the day by junior house officers in general surgery. On the evening of the 8th June 2001 she complained of a headache and was noted by numerous witnesses to be listless and unresponsive to conversation.

In the early hours of the 9th June Raychel suffered a major fit. She was immediately treated for this. Blood tests revealed a seriously low sodium level (118meq/l). In spite of attempts at resuscitation Raychel stopped breathing and showed early evidence of serious brain damage.

Raychel was transferred to the Royal Belfast Hospital for Sick Children for brain stem testing which confirmed loss of all brain function. After consultation with Raychel's parents the intensive ventilatory support was terminated and Raychel was certified dead at 12.09 on the 10th June 2001.

5. CLINICAL EVENTS UP TO TIME OF APPENDICECTOMY ON JUNE 7TH 2001

This section contains details of events and my comments. They will be amplified in further detail specific sections of this report.

5.1 In her statement to the Coroner (012-025-135) Marie Ferguson reported that after returning from school on the afternoon of the 7th June 2001 and playing outside for a short time Raychel complained of 'hunger pains'. She ate a normal meal at 16.45. Later when she reported continued pain her mother took her to the Accident and Emergency Department of the Altnagelvin Area Hospital (AAH). An A&E sheet (020-006-010) records an examination by a Doctor B Kelly (presumably SHO in A&E) at 20.05. Her temperature and blood pressure were noted to be normal. Pain and nausea since 16.30 were recorded and Raychel was noted to be tender with guarding and rebound over the area of the appendix in the right iliac fossa. It should be noted that Raychel also reported pain on urination and this was clearly written in the notes.

Blood tests were organised. A urine test revealed one+ of protein and is recorded on an observation sheet for June 7th (020-016-031). It is clearly recorded in a note timed at 8pm that Raychel was complaining of pain on urination.

Dr B Kelly wrote in the diagnosis box of the A&E sheet 'appendicitis? ' and made a surgical referral. He then prescribed cyclomorphine 2mgs intravenously, this was

administered at 20.20. This was only 15 minutes after the A and E sheet was completed and must have been before blood test results were available.

Unfortunately the Inquiry is not in possession of any witness statement or deposition of any kind from Dr B Kelly. It would be advisable to have sight of his CV if possible.

5.2 Raychel was seen by a surgical SHO (Dr Ragai Reda Makar). He made an untimed note (020-007-011). The history was once again reported. In a statement dated 16th January 2002 Dr Makar confirmed that this was after the cyclomorphine had been given intravenously (098-009-021).

Raychel was noted to be tender in the right iliac fossa and the diagnosis of appendicitis was confirmed. Arrangements were made for surgery later in the evening and a consent form was signed by Marie Ferguson. An intravenous cannula was placed and Raychel was transferred to paediatric ward 6 (a mixed 43 bed ward containing medical and surgical paediatric patients).

Blood tests showed no abnormality (in particular the white cell count and serum sodium were normal). A repeat urine test performed at 23.19 prior to surgery showed proteinuria++ (020-015-030).

I am not aware that Dr Makar discussed the case with any senior colleague; either an SPR or consultant.

5.3 COMMENT

I have a number of serious concerns regarding the decision to perform an appendicectomy on a 9 year old girl after hours.

i There was a very short history of symptoms. There were no signs of inflammation on blood testing, no temperature or rise in pulse rate.

ii When Dr Makar saw Raychel the administration of intravenous morphine would, I believe, have compromised his ability to take an accurate and adequate history and to interpret findings on examination. It is standard surgical teaching that unless symptoms are very severe analgesia should be deferred until a patient is seen by a surgeon (ideally the one who would operate). In this case a powerful intravenous analgesic was prescribed by an SHO in A&E before the child was seen by the on call surgeon. This is much to be regretted.

iii Raychel complained of urinary symptoms and protein was noted in an Accident and Emergency urine test and a further urine test repeated later prior to surgery. Proteinuria is an indication of renal disease or infection and in this situation a urine sample (at least one) should have been sent for culture and microscopy before any final decision to operate was made. The history of pain on urination and the finding of proteinuria should have alerted Dr Makar to an alternative diagnosis to appendicitis. It was his responsibility to ensure that urine cultures and microscopy were done. If he was uncertain he should have sought senior help. That this was not done is evidence of less than reasonable practice.

iv Surgery in children at night should be carried out by a senior operator. When the National Confidential Enquiry into Perioperative Deaths (NCEPOD) published a survey into the deaths of children after surgery[1,2,] this was emphasised.

I quote the 1989 Report pp15; 6[1;] "*Consultant supervision of trainees needs to be kept under scrutiny. No trainee should undertake any anaesthetic or surgical operation on a child without consultation with their consultant*"

The surgical staff at AAH should certainly have been aware of this: it was standard general paediatric surgical and anaesthetic practice in 2001.

v In this case a decision to operate on a nine year old was made by an SHO on tenuous grounds. An abnormal urine sample was ignored. If a specialist registrar was on call Dr Makar did not discuss the case with him. If no SpR was on call he should have discussed the case with the consultant on call (Mr Gilliland) under whom Raychel had been admitted. As it was, Mr Gilliland did not know that Raychel was his patient until the 11th June. On the evening of June 10th (Sunday) he was told by a colleague of the death of a child after appendix surgery but they did not think Raychel had been under his care. It is of concern that Mr Gilliland clearly did not know details of his patients admitted on 7th. This suggests serious vertical communication problems at the Altnagelvin Hospital. It is important that the Inquiry team endeavour to obtain a copy of the surgical rota at the AAH for the week beginning June 4th 2001.

In my practice in 2001 I would have expected to have been consulted about a case like this. I would certainly have advised conservatism through the night of the 7th June and would personally have examined Raychel the following morning. Any further investigations could then have been performed. This I believe would have been the decision of any reputable general surgeon with an interest in general childrens surgery.

vi NCEPOD in a further report (Who operates when: 1997)[3] recommended that in emergency situations out of hours surgery should be avoided if possible unless the situation was extremely urgent. A survey of all emergency procedures carried out in 355 Hospitals (including 20 from Northern Ireland) had shown that the majority of emergency procedures did not require surgery at night; they, in fact, benefited from overnight observation and senior review. NCEPOD considered that too many emergency procedures were being carried out at night by unsupervised juniors; this compromised patent safety and the quality of training of junior surgeons NCEPOD concluded that 24 hour emergency operating rooms should, therefore, be provided in all reputable hospitals. This would ensure that emergency operations (such as an appendicectomy) could be performed at 09.00am or earlier by suitably qualified operators supervising and training those more junior. This effectively means that in the case of Raychel Ferguson an appendicectomy if thought necessary could have been performed early on the 8th after a sensible period of observation and repeat blood and urine tests. Without a 24 hour emergency theatre such cases might require a wait through the working day until a free theatre became available.

I do not know if a 24 hour emergency theatre existed in the AAH in 2001. The Inquiry team should endeavour to obtain this information.

The role played by the NCEPOD recommendations in the 1990's in advancing surgical standards cannot be overemphasised and was well understood by all surgical specialists.

It goes without saying that this case should have been reported to NCEPOD. All Hospitals in 2001 would have had a nominated NCEPOD "reporter", often a pathologist or the Clinical Director of Surgery. This was a death which was a clinical incident; precisely the sort of event which required recording by NCEPOD. They might then, of course, have been able to cross reference this death with others due to similar causes in both children and adults.

vii I believe that a consultation with a senior surgeon should have taken place on the evening of the 7th June 2001. If this had been the case I believe the operation would have been deferred, observations maintained and further tests done the following morning. It should be recalled that the appendix when it was removed was histologically normal. The naked eye appearances in theatre of mild congestion are subjective and do not indicate a pathological process.

To conclude this section I believe that the decision to operate here was made by a junior surgeon without good evidence and without consultation. On balance I cannot help but conclude that this operation was unnecessary and if deferred would likely have never been performed.

6. APPENDICECTOMY

A consent form for surgery was signed by Raychel's mother Marie Ferguson (020-008-015).

6.1 An anaesthetic record sheet confirms the anaesthetists as Dr Vijay Gund and Dr Clare Jamison although the latter left theatre before the operation was completed. Both were SHO's, presumably Dr Jamison was the more senior. Both of these practitioners provided statements to the Coroner (012-003 and 012-034). They confirm that the appendicectomy commenced at 23.30 and lasted for just over one hour. The anaesthetic record contains a retrospective note made on the 13th June 2001 and countersigned by Dr G Nesbitt (clinical director of anaesthesia with a special interest in paediatrics; (095-010-030, 064-002-008) and Dr Jamison. This confirms that in theatre 200mls of Hartmann's solution was administered intravenously. At the conclusion of the operation the remainder of the litre bag was removed and the fluid discarded. A further anaesthetic record sheet (020-009-017) records the patient's history and further details. There is a comment regarding prolonged postoperative sedation due to opiate administration. This I take to mean that before Raychel could have left the recovery area she needed to be seen to be recovering from this. It should be born in mind that cyclomorphine had been given preoperatively, a rather unusual feature in a straightforward appendix case*. It should be noted that a well known side effect of opiate administration is vomiting*

6.2 A hand written operation note by Dr Makar (020-010-018) records the surgery.

The appendix was noted to be 'mildly congested, there was an intraluminal faecolith. The peritoneal cavity was "clean". The terminal ileum was noted to be normal. Three

feet of the terminal ileum was examined and no Meckel's diverticulum seen (see section 24.2).

A standard appendicectomy and wound closure was performed.

Postoperative instructions were given for an antibiotic Metronidazole initially intravenously and later orally or by suppository (020-010=018).

The operating surgeon throughout was Dr Makar and his assistant and scrub nurse Staff Nurse Ayton. A recovery area record chart completed by Staff Nurse McGrath confirmed the intention to recommence an intravenous infusion on the ward (020-014-022).

6.3 COMMENT

From the details in the operation note the appendix removal was properly performed from a technical point of view. Whilst there is no evidence that Dr Makar discussed the case with a senior colleague there is also no information available as to any discussion that Drs Gund and Jamison may have had with a more senior anaesthetist preoperatively. This of course would have been necessary to satisfy the NCEPOD recommendations made in 1989 (5.4.iv).

A mildly congested appendix in an expression often used when the appendix is in fact normal. It should be recalled that the final histology report confirmed an entirely normal appendix. The appendix contained hard faecal material (a faecolith) these are often noted in inflammation of the appendix as they obstruct the lumen, they are however also very frequently seen when the appendix is entirely normal as was the case here. An appendix containing a faecolith is often noted at an operation performed for other reasons and would not be in any way a reason for an incidental appendicectomy.

6.4 The recommendation for multiple doses of a prophylactic antibiotic suggests muddled thinking on the part of the surgeon. It had been very well shown prior to 2001 that a single intravenous dose of Metronidazole (or a suppository) was all that is required for wound infection prophylaxis at the time of appendicectomy. The only indication for repeated doses would have been in the case of a perforated appendix with peritoneal contamination. This suggests that Dr Makar may not have been up to date with standard practice after appendicectomy.

6.5 I repeat my concerns regarding the unsupervised performance of this operation out of hours by a junior surgeon and anaesthetist. Any symptoms were by no means severe, blood tests were normal and unexplained proteinuria had been detected on two occasions.

7. POSTOPERATIVE EVENTS UP TO A FIT OCCURRING IN THE EARLY HOURS OF THE 9TH JUNE 2001

7.1 The only note in the clinical file prior to the fit is an untimed three line record made by a Dr M H Zafar (the surgical SHO on call on the 8th June). It states: *'Post appendicectomy free of pain, apyrexial, continue observations'*.

Dr Zafar confirmed this in a statement dated 3th April 2002 (098-15A-035).

Dr Makar also reports in his statement (098-009A-021B) that he met Raychel's father on the ward at approximately 09.00 on the 8th June. He explained the operative findings. He then stated that he had no further involvement in her management.

The next note is urgently made at 03.15 on the 9th June by Dr Jeremy Johnson paediatric SHO who had been summoned urgently when Raychel suffered a fit. He was carrying out duties on the ward and was readily available.

7.2 COMMENT

Clearly there was no senior ward round on the morning of the 8th June by anyone above SHO level. Dr Zafar does not tell us what his 'continued observations' should be although there is no doubt that on the morning June 8th Raychel would have been well and there would have been little cause for concern. It should be remembered, however, that Dr Zafar was commencing a 24 hour on call period for all surgical admissions and would have had little time to look at the details of her case. There is no evidence, for instance, that he noted or had brought to his attention the abnormal urine tests.

There is no question that after a 24 hour duty period (usually 8am to 8am) a round of patients admitted should be made by at least an SpR reporting to the Consultant or, ideally by the Consultant himself; this has been my practice throughout a 28 year career as a Consultant. Such a "post take" round is essential in the training of junior surgeons and medical students and an important part of the day. Continuity of care is only assured if the post take round is carried out by team under which the patients had been admitted

If a senior ward round had taken place on the morning of June 8th I have no doubt that the reasoning behind an operation at 23.30 would have been queried. The abnormal urine test would have been noted and further investigations performed. Raychel would not merely have been seen as a straightforward postoperative appendix and more care might have been taken with postoperative observations

The tragic events surrounding the case of Raychel have since led to a change in practice at AAH (Mr Gilliland statement WS044/1) to a system ensuring continuity of care and senior ward rounds.

7.3 Ward 6 was in June 2001 a general paediatric ward of 43 beds. 23 of these were occupied on June 8th (according to a note recording an answer given by Sister Millar at the inquest (064-002-018)). The practice in the ward at that time was for paediatric patients to be looked after by the paediatric staff and surgical patients by surgical staff. The first level doctor to be consulted about surgical patients was routinely a junior house officer. It is likely that at that time during the first preregistration house job they would have had little experience at treating children. These doctors were the duty team on call with responsibility for seeing and caring for all surgical admissions that day, both adult and children. Their duties would be primarily on the adult wards possibly some distance away (see Dr Curran statement WS-028). I have already asked for the rotas of doctors in June 2001 but these have not been forthcoming from the Trust.

It might also be of help for the Inquiry to have some information on the workload for an average Friday at the Altnagelvin Hospital. Numbers will not have changed between 2001 and today and average numbers of adult and child admissions will give some insight into the workload of these Junior House Officers also responsible for attending the Paediatric ward 6.

7.4 The care of the surgical patients on ward 6 was to all intents and purposes left to the nursing staff on the ward. No doctor more senior than a junior house officer attended the ward during the day on the June 8th. These doctors simply complied with requests from the nursing staff and as very junior trainees could not have been expected to make clinical decisions on postoperative children. If nursing staff were concerned regarding the condition of a surgical child their standard practice should have been to call the duty surgical SHO or one of the Paediatric SHO's on the ward.

To place preregistration junior house officers (who had never done a Paediatric job) in a position of being first on call for postoperative children was unsatisfactory and I am surprised that this situation escaped the scrutiny of the Postgraduate Deanery responsible for the continued education of these preregistration doctors. The preregistration year in 2002 comprised 6 months in General Medicine and 6 months in General Surgery.

There is no evidence, of course, that the Nursing Staff on Ward 6 expressed any concern about Raychel to the Junior House Officers. They were merely asked to prescribe continuation IV fluids; Dr Butler, a paediatric SHO, and antiemetics; Drs Devlin and Curran.

8. A GENERAL CONSIDERATION OF POSTOPERATIVE FLUID BALANCE IN THE SURGICAL PATIENT

The major considerations in this case relate to fluid balance problems encountered on the first postoperative day. This general review is relevant at this stage

8.1 Intravenous fluids are required postoperatively in most surgical patients as a substitute for the normal fluid intake by mouth (total body water requirements). For this replacement hypotonic solutions such as 5% dextrose or 1/5th normal saline are suitable for children and also for adults. These fluids should in the normal postoperative situation be restricted somewhat as a normal physiological response to surgery (or any stress) is an increase in secretion of the anti-diuretic hormone (ADH). This causes an increased absorption of water from the renal tubules. It is sometimes rather oddly referred to as an 'inappropriate increase in ADH secretion' but 'appropriate' might be a better term as these are normal physiological responses to any stressful event such as trauma or surgery. This physiological fact is core knowledge and should be understood by any appropriately trained doctor or nurse. It is taught as part of the medical curriculum in the UK and Ireland and reinforced during teaching for examinations in surgery.

8.2 Maintenance fluids, however, only provide fluid requirements for a normal situation and are totally inappropriate in the presence of abnormal fluid *losses* as seen in vomiting or diarrhoea. These fluids are electrolyte rich (particularly in sodium) and their replacement by fluids such as those 5% Dextrose or 1/5th N saline which basically only provide water

will rapidly lead to a situation of water overload and dilution of the main electrolyte in the extra cellular fluid (ECF): sodium. This leads to hyponatraemia due to water overload. This is a core knowledge fact and should be well known to any surgical trainee. It should be emphasised that the default intravenous fluid in use on paediatric ward 6 was 1/5th N saline (solution 18), quite unsuitable for situations in which abnormal losses were occurring.

8.3 Knowledge of fluid balance expected of a Surgical SHO and above.

I quote from three surgical text books that I myself used in the early 1970's, They were equally familiar to surgical trainees and their tutors in the 1990's

(a) Pye's Surgical Handicraft (1969)[4] pp33
'Hyponatraemia, a relative excess of ECF (extra cellular fluid) water over sodium may result from overloading (particularly by the intravenous route) or from true sodium depletion after chronic losses from the gastrointestinal tract. Excessive ADH secretion may follow surgical trauma.'

(b) Text Book of Surgical Physiology (1964)[5] pp47:
*'After accidental or surgical trauma the discharge of ADH is increased and there is obligatory oliguria (*low urine output*) for 24-48 hours. During this phase the forced administration of water (*as by large infusions of glucose solution, or 5th normal saline; emphasis added*) can make the extra cellular fluid hypotonic. There is then the same risk of water intoxication as in the minor or stoker who makes his extra cellular fluid hypotonic by drinking unsalted water after copious sweating. (*Or by losing fluid by vomiting; my emphasis*). The cells then tend to take up water from the hypotonic extra cellular fluid and oedema of the cells of the brain can lead to extreme lassitude or even to convulsions and coma or death.*
pp51; *'Amongst surgical patients the chief cause of sodium deficiency is loss of sodium content in intestinal secretions when there is vomiting'.*
'From the point of view of replacement therapy fluid loss from the intestine calls for the administration of isotonic saline (.9%) solutions.

(c) Essentials of Fluid Balance (1969)[6]
This was a book I was told to read as a junior surgeon in 1972. pp33
'There is a renewed interest in water intoxication – it is obvious that the causes of clinical water intoxication or inadequate urine volume and the forced administration of hypotonic fluid by abnormal routes (such as intravenous). Inadequate urine volume can be induced by an excess of ADH released in response to pain or trauma.

The above quotes are the expected knowledge base of a reputable surgical SHO or registrar and certainly a consultant. I would have thought a senior nurse would have also have had some training in this. The potentially serious combination of a low urine output, vomiting and the administration of hypotonic fluids is clearly emphasized and, I believe should have been understood by the nursing staff.

8.4 COMMENT

The above knowledge base is that expected from a well-trained doctor; it is taught at medical schools and retested during training as a surgeon (or anaesthetist). The Inquiry has requested the CV of Dr Makar (centrally involved in this case), it is still awaited). Dr

Zafar qualified in Russia in 1985; I have no idea of the extent of his basic medical education but in 2001 it was essential from the point of view of clinical governance and their ongoing education that doctors whose medical training and knowledge base is uncertain were supervised by seniors.

Of some concern is the admission by Staff Nurse Noble, the senior nurse on Ward 6 on the night of the 7th and 8th June, in her evidence at the Inquest (012-043--211) that she was unaware of hyponatraemia. She also stated to the Coroner that she was not concerned about vomiting as fluids were being replaced.

In fairness I do not believe that the junior house officers should necessarily have been conversant with postoperative surgical physiology but during the course of their postgraduate training should have become familiar with postoperative fluid management and replacement of abnormal losses. As I have stressed, however, (7.4) in the case of Raychel the Nursing Staff did not communicate any concerns to the Junior Doctors that they asked to attend; they were merely requested to administer (Dr Devlin) or prescribe (Dr Curran) antiemetics.

When Raychel Ferguson suffered a fit the duty Paediatric SHO Dr Jeremy Johnston) immediately suspected electrolyte abnormalities (020-007-013). I have no doubt whatsoever that if he had been asked to attend in place of Drs Devlin and Curran he would have taken the situation of continued vomiting seriously.

9 FLUID BALANCE IN THE CASE OF RAYCHEL FERGUSON (020-018-037)

(*I cannot understand why Neonatal Intensive Care charts are used)*

9.1 INPUT

In Theatre Raychel had received 200mls of Hartmann's solution intravenously (6.1)

On her return from theatre Raychel was given intravenous solution 18 (5th normal saline) at the rate of 80ccs per hour. This had been prescribed by Dr Makar, after a discussion with Staff Nurse Noble after Raychel's admission to the Ward from A and E. Whilst there are theoretical reasons (renal problems in very young children given isotonic fluids) for the use of hypotonic solutions in paediatric medical patients there is really no justification for their use in surgical children who might suffer abnormal losses.

A standard calculation for *maintenance* fluid requirements for children of the weight of Raychel (25kgs) gives a maximum hourly rate of 65ccs an hour (Susan Chapman report 098-092A). This hourly volume would normally be reduced postoperatively by around 20% to account for a postoperative increase in secretion of ADH (8.1). The 80cc per hour rate was faithfully given throughout the day of the 8th and early hours of the 9th June. Raychel was, in effect, given almost a third more than her calculated requirements in the form of hypotonic saline. *Coupled with electrolyte loss from vomiting this would accelerate haemodilution and the onset of electrolyte changes.*

I do not know why this miscalculation occurred. If Dr Makar made this error it would suggest he was inexperienced in treating children. Unfortunately the Inquiry have not had sight of his CV. *I cannot understand why experienced paediatric nurses, looking after both Medical and Surgical children did not spot this.*

The only recalculation of Raychel's fluid balance can be seen at the top of a prescription sheet in the file (020-019-038) where a calculation of 65ccs an hour is noted. This I believe to be in the handwriting of Dr Jeremy Johnson paediatric SHO who attended Raychel after the fit. The fact that an over prescription of fluids was given for many hours up to this point is a sign of less than a good level of care from the staff on the paediatric ward; I am afraid I cannot agree with Ms Chapman's opinion that care was delivered to a good overall standard (098-092a).

According to the fluid balance chart there was no oral input at all throughout the day although Marie Ferguson in her witness statement does describe Raychel as drinking a small amount of 7up.

9.2 OUTPUT *(as with Input recorded on a Neonatal ICU cha*rt)

VOMITING: Nine episodes of vomiting are recorded on the chart as follows:

June 8th	**Volume**
08.00	Not stated
10.00	Large vomit
13.00	++
15.00	++
21.00	Coffee grounds ++
22.00	Small amount x 3
23.00	Coffee grounds: small

In addition according to her witness statement (095-001-001) Raychel's mother when she took her daughter to the toilet at around midday witnessed a large vomit. She informed a nurse of this.

When Dr Joe Devlin (junior house officer in surgery) was requested to administer an antiemetic at around 18.00 on the 8th (see notes below) according to his statement (WS: 027-1) he noted her to be vomiting. This vomit together with the vomit at 12.00 is not recorded on the fluid chart. No clinical entry was made in the notes.

Elaine Duffy (WS095-007-022) witnessed at least five vomits between midday and 21.00.

It seems clear that the fluid balance chart underestimates the true amount of vomiting that took place on the 8th. The seriousness of this was repeatedly unrecognised. There was no attempt to record accurate volumes and there is a complete inconsistency in their recording from ++ through to the use of words such as 'small' and 'large'. These are of course totally subjective*. However, until a major seizure occurred there is no*

evidence that the charts were examined by anyone who would have appreciated the significance of the situation.

9.3 URINE OUTPUT

At 10.00 on the 8th PU (passed urine) is recorded on the chart and initialed by Staff Nurse Rice. No further records of urine output can be found. The importance of accurate measurement of urine output in a child with repeated vomiting was unrecognised. *It is my belief that urine output was low secondary to dehydration and the inappropriate secretion of ADH.*

9.4 CLINICAL INPUT DURING THE 8TH JUNE UP TO THE TIME OF FIT

It was routine on ward 6 for surgical patients to be cared for by the surgical junior staff on call (see 7.3 above). Their main duties were to care for adult emergency patients and it is likely that none of these junior doctors would have had any formal experience of working on a paediatric ward. They were in the first year of their preregistration house job which at the time was composed of two six month blocks of medicine and surgery with no formal attachment to paediatric wards (see Dr Joe Devlin CV and Curran witness statement WS-028). These medical contacts were as follows:

i **Dr Mary Butler:**

Dr Butler was a paediatric house officer working on the ward. She was not a member of the surgical team but was asked by the nurses at around 12.10 on the 8th to prescribe a further bag of 5th normal saline (solution 18) as the earlier overnight bag had run out. In her statement (095-014-067) Dr Butler admits to little recollection of the event but is certain that no concern was expressed by the nursing staff regarding Raychel's condition. She stated that she is certain that had she been aware that there were concerns she would have examined Raychel. By this time it should be noted that Raychel Ferguson had vomited at least twice. Unfortunately although she was a member of the paediatric staff Dr Butler did not question the 80mls/hour administration rate.

ii **Dr Joe Devlin:**

During the afternoon of the 8th the nursing staff bleeped the surgical on call team to prescribe an antiemetic for Raychel. No doubt this request was prompted by her continued vomiting. According to a statement of Sister Millar (021-068-159) Staff Nurse Rice attempted to contact the Surgical SHO but there was no response. In a later statement (WS056/1) Sister Miller mentioned difficulties in contacting surgical doctors "as they are in theatre and do not answer their bleeps" *(a very unsatisfactory situation).* In her own statement Staff Nurse Rice stated that it was the Surgical JHO that she bleeped (WS051/1). Ideally the Inquiry should attempt to find out who was bleeped, it is possible switchboard records have been kept.

Eventually Dr Devlin arrived on the ward to clerk in a new patient and administered Odansetron intravenously. This had been previously prescribed by Dr Gund (020-017-034) under the trade name Zofran. Dr Devlin re prescribed this (020-017-035) *I cannot find any written confirmation in any contemporaneous Nursing Record of these requests for medical assistance, their timings or outcomes.* There is uncertainty regarding the

time of Dr Devlin's visit; according to Sister Millar (WS-056/1) it was approximately 6.00 pm. Staff Nurse Rice recalled (WS-051/1) it to have been sometime after 17.00. When Dr Devlin wrote up the Odansetron (020-017-034) no time was recorded and he made no note at all in the clinical file.

According to his statement (WS027-1) Dr Devlin was told that Raychel had been vomiting but had been drinking fluids earlier in the day. When he saw her he noted Raychel to be actively vomiting. There is no record in the fluid balance chart of this vomit. He administered intravenous Odansetron (*prescribed as Zofran: the trade name of the dru*g) a standard antiemetic. He stated that he asked to be called again if there were any further changes. There is no evidence that he looked at the fluid balance chart or considered it necessary to consult a senior colleague (Dr Zafar SHO on call) about what, by now, was now at least five episodes of vomiting plus the vomiting that he himself was witnessing. There was, however, no evidence that any concern was expressed by the Nursing Staff regarding the vomiting and clearly Dr Devlin did not appreciate the significance of continued use of 5th normal saline and the vomiting of gastric contents (see 8.2). I have no doubt that if Dr Devlin had consulted a senior surgical or paediatric colleague who, after all, were present on the ward) blood tests would have been ordered and electrolyte abnormalities would have been revealed. Neither Dr Devlin nor the nursing staff seemed to have asked themselves why Raychel (minor appendicitis at the most) was vomiting. It is much to be regretted that apparently experienced nursing staff did not insist that Dr Devlin consult a senior colleague. If a blood electrolyte estimation had been done at this stage I have no doubt that low serum sodium would have been detected and urgent steps taken to remedy the situation. Dr Devlin made no note in the clinical file recording his visit.

iii **Dr Michael Curran:**

At around 21.00 Staff Nurse Gilchrist after noting vomiting of about 150mls of coffee grounds bleeped the JHO on call Dr Curran who she described in her witness statement as a locum (WS053-1). She spoke to Mr. Ferguson telling him she would contact the doctor on call and also spoke to Staff Nurse Noble about contacting the doctor to give an antiemetic intravenously. Coffee ground vomiting is an indication of significant or severe and prolonged vomiting and retching. In a child it should have attracted serious attention as it is due to trauma to the gastric mucosa causing bleeding.

Staff Nurse Gilchrist stated that Dr Curran arrived on the ward at around 22.15 and prescribed Cyclizine which was administered at once (020-017-034). *I can find no contemporaneous Nursing Record confirming the doctor's visit, its timing and action taken. Dr Curran made no note at all in the clinical pages of the file.*

The Inquiry team have obtained a very recent witness statement from Dr Curran dated 23rd November 2011 (WS-028). He was a substantive JHO and not a locum, He admits to a very limited recollection of events but states that he would have assessed Raychel and palpated her abdomen. He does not mention coffee ground (blood) vomiting or referring to the fluid balance chart. He states that he prescribed and administered "Valoid" iv. Valoid is the trade name for Cyclizine. *In 2001 it was reputable practice to prescribe drugs by their generic name; the use of trade names for drugs is much in evidence in relation to this case; it would be regarded as suboptimal in a Hospital*

responsible for the supervision and training of junior doctors). Dr Curran's statement then goes on to describe events after Raychel suffered a major seizure.

Unfortunately Dr Curran made no note in the clinical file, Clearly he did not recognise the serious significance of vomiting that had been going on throughout the day and which recently had contained blood. He was apparently not alerted by the Nurses to any concerns. It seems he merely prescribed an antiemetic as requested and made no attempt to alert a senior colleague to the situation. Even as a junior House Office he should have, without doubt, have understood the seriousness of the continued vomiting and blood loss in a child of nine and called his senior colleague (*the Nurses should also have insisted on this*)

If Dr Zafar (or a paediatric SHO) had been called at this stage and inspected the charts and examined Raychel I believe they would have been concerned at the situation and urgent blood tests would been organised and senior advice sought, I believe that at this stage the situation was still retrievable. That a senior doctor was not called by Dr Curran and the Nursing staff is evidence of substandard practice and much to be regretted. This almost certainly meant that the last chance to reverse the situation was lost

9.5 If an experienced SHO, SpR or Consultant had seen Raychel either at 17.0 (Devlin visit) or 22.00 (Curran visit) I believe that they would have acted at once. Urgent blood tests would have been performed and Raychel catheterised so that urine output could have been accurately estimated and urine electrolytes measured. A nasogastric tube would have been passed and frequently aspirated. Assistance would have been requested from the Paediatric team and also Anaesthesia. Hyponatraemia would have been corrected with saline fluids and water overload treated with diuretics to accelerate urine output of water and reverse the effect of ADH

10 RAYCHEL FERGUSON'S CLINICAL CONDITION THROUGHOUT THE 8TH JUNE 2001

10.1 The fluid charts**,** observation records and clinical events of the 8th June show all too clearly how **a** team can be locked into a mindset of what they expect to happen. Charts are kept and clinical judgement and experience should be such as to allow the identification of cases that do not fit a pattern. For a patient who had apparently suffered mild appendicitis, at the most, it should have been obvious that by the afternoon of 8th June Raychel who was persistently vomiting did not fit the expected postoperative pattern. By the afternoon of the 8th June Raychel should have been mobile, drinking and beginning to eat; she should have been welcoming her friends and talking about going home. The vast majority of children after mild appendicitis would have been fit for discharge on the morning of the 9th. In reality from midday on the 8th her clinical state went in reverse to that expected. I cannot understand why the nursing staff did not recognise this

After further coffee ground vomits at around 23.00 and 00.35 on the 9th Raychel seemed to settle down to sleep but remained restless.

10.2 FLUID BALANCE SITUATION AND CHARTS

I have already referred to these critical areas in Section 8 above.

10.3 The clinical condition of Raychel deteriorated slowly throughout the day and is mentioned in various witness statements to which I shall refer. Unfortunately up to the time of a major fit there is no evidence from the clinical records that Raychel was examined by any doctor between the visit of Dr Zafar at the morning ward round (untimed) and the emergency attention from Dr Jeremy Johnson at 03.15 on the 9th. The clinical note made by Dr Zafar does not confirm that Raychel was examined.

Raychel was seen by Dr Devlin who observed her vomiting (8.) but there is no evidence that he examined her. He made no clinical note

Dr Curran thinks he examined the Raychel (WS-028) but admits to a poor recollection of events. He made no note in the file.

In the absence of a contemporaneous note I can make no comment on examinations performed by Drs Zafar and Curran and recalled some years later.

10.4 According to her mother's detailed statement (095-001-001) Raychel slept after her return from theatre at around 02.15. Mrs. Ferguson went home at around 06.00 and returned at 09.00. At this visit Raychel reported that she had been sick: this is consistent with the fluid chart (7.8) she was however active and colouring in. At 12.00 Mrs. Ferguson took Raychel to the toilet. As she was about to leave Raychel vomited what her mother described as a large volume. This was not recorded on any chart. Her mother mentioned continued vomiting throughout the afternoon together with at times the vomiting of bile.

During the afternoon Raychel became listless and, according to her mother, "not her lively self'". Her parents left at 15.00 and returned at 15.45 clearly noting this change in their child. They noted continued vomiting and recall an injection (the Odansetron prescribed by Dr Devlin (9.4.ii). When Mr. and Mrs. Ferguson noted blood in the vomit a nurse apparently told them 'that this was natural'. At around 21.30 more blood was noted and Raychel complained of a headache. Paracetamol was given and eventually she settled down to sleep. Mr. and Mrs. Ferguson left at 00.40 to return urgently at 03.45 after the fit.

10.5 From the early afternoon Raychel clearly began to deteriorate with continued vomiting and listlessness. This would be consistent with the onset of electrolyte abnormalities due to persistent vomiting and the continued administration of intravenous hypotonic saline. Her parents concern should have alerted the nursing staff to ask for senior surgical assistance or at the very least discuss her condition with the paediatric staff on the ward.

10.6 In her further statement Mrs. Ferguson (095-002-006) confirms all the above facts and emphasizes that in the afternoon Raychel paid little attention to cards and gifts and did not respond to encouragement. This must have all been very distressing for Mrs. Ferguson who was continuing to witness repeated episodes of vomiting. She reported these to the nurses. Clearly this clinical deterioration was not consistent with a normal

recovery from an appendicectomy for mild appendicitis (9.1). I cannot understand why the nursing staff did not respond to this.

10.7 In his statement Raymond Ferguson (095-005-0015) confirms the above facts. He also recalled seeing Dr Makar on the ward in the morning who confirmed to him that the appendix was 'slightly inflamed'. Mr. Ferguson clearly recalled that when Raychel's best friend Lisa came to see her about 16.45 Raychel did not acknowledge her and remained in bed. By this point in a normal situation she should have been mobile, active and sociable. Mr. Ferguson reported blood being vomited on several occasions and this must have been distressing to the young girl's parents. Her father was adamant that statements made by nursing staff regarding Raychel's mobility throughout the day were untrue and felt anger at the way in which she was treated for her headache.

10.8 Further statements of Margaret Harris (godmother 095-006-020) Elaine Duffy (daughter on adjacent part of the ward) (095-007-022) and Steven Duffy (095-008-0025) confirm Raychel's deterioration throughout the day particularly throughout the afternoon. Mr. Duffy remaining in the ward overnight recollects clearly the urgency with which the medical staff treated Raychel after her fit.

10.9 This is a consistent record documenting Raychel's deterioration through the afternoon and evening of the 8th June. I am at a loss as to why the nursing staff did not appreciate that this was certainly not the expected course of events after 'mild appendicitis'. There were numerous occasions throughout the day when the situation could have been reversed by a competent practitioner with prompt investigation and treatment (9.5). By the time a major fit occurred at 03.00 I believe that cerebral oedema was now leading to brain stem damage and the time for reversal of events was past.

10.10 It is likely that during the evening and later on the 8th increasing intracranial pressure was, by now, itself a factor in vomiting and retching which was causing gastric trauma and the petechial rash noted by Dr Bernie Trainor (10.5)

10.11 I do not believe that it can be disputed that Raychel vomited significantly more both in frequency and volume than the charts record. A mother would not forget her daughter vomiting and vomiting was observed by Dr Curran. There may well have been other events.

10.12 I am, of course, aware that the clear and consistent evidence of the witnesses above contrasts with views of the Nursing staff that Raychel was well and mobile. However these views are substantiated by any contemporaneous notes. The only record with a timing was made at 5pm (initialed by Nurse Rice) stating Raychel to be *asleep.*

10.13 I am concerned at the lack of written nursing notes for June 8th. Written observation sheets were kept for the 7th and 9th (020-016-31/32). The only record for the 8th we are told is a general chart (020-015-029) recording 5 hourly observations after 09.00am. The only note that mentions vomiting is made by S/N Gilchrist at 21.15: *vomiting++. Headache.* Notes made at 13.00 and 18.00 do not mention vomiting at all! Any critical reader of the file can only conclude that the true severity of the vomiting suffered by this child was seriously underestimated by the nursing staff on ward 6.

11 COMPUTERISED EPISODIC CARE PLAN (020-027-056 to 066)

A printout of this care plan was run off on Tuesday 12th June 2001. This represents a computerised record maintained by the nursing staff to document a patient's stay in hospital. It is subdivided into specific events; admission, treatment, contact with relatives and discharge planning. Records such as these were in universal use in 2001 but were usually kept in parallel with written observation records

11.1 On the 7th June 2001 Raychel's admission is documented (020-027-056). This was recorded at 23.00 by Staff Nurse Daphne Patterson (the named nurse for Raychel). The preoperative prescription of Cyclomorphine was mentioned together with an intention to proceed to an appendicectomy later on.

11.2. The next note is made on the 8th June at 05.00. Raychel is stated to be comfortable on return to the ward (signed by Staff Nurse Daphne Patterson). 020-027-057

17.00 on the 8th: no complaints of pain seen by Dr this am (presumably *the Dr Zafar visit*) sips as tolerated (***there is no mention of vomiting)****; by this time the fluid balance chart (020-018-037) confirms at least 4 vomits*); signed Staff Nurse McCauley. 020-027-057

06.00 9th June (after *the fit and when Raychel had been found to have evidence of brain stem injury)*: Child continued to complain of headache pr panadol with effect. Child settled (***no mention of vomiting***) signed Staff Nurse Ann Noble. *This note was made after Raychel had been found to be critically ill; clearly it bears no relationship to the reality of the situation at this time.* 020-027-057. *It should also be noted that at a meeting with the family on September 3rd 2001 SN Noble stated that she was not aware of blood in the vomit* ***or of Raychel's sore head*** (095-010-046k paragraph 9)

11.3

Contact with relatives: An entry on the 9th June at 06.00 by Staff Nurse Noble refers to the parent's distress at being informed of Raychel's serious condition together with details of their interview with Dr McCord 020-027-058. *I am surprised that this note was made at the same time as that in section ii paragraph 3 above which records Raychel as 'settled'.* This entry was signed by SN Noble

11.4 At bottom of page 020-027-059 is a section on the maintenance of adequate hydration:

7th June 2001 23.00: Commenced with solution 18 at 80 mls/hr signed Staff Nurse Daphne Patterson

8th June 2001 05.00: iv fluids running 80ccs per hour. Signed Staff Nurse Daphne Patterson

8th June 2001 17.00: iv fluids running 80ccs per hour tolerating small sips of water (***no mention of vomiting; already there had been at least 4 vomits***).

9th June 2001 06.00: Transfused with 0.9% sodium chloride 40ccs per hour signed Staff Nurse Noble (*this was during resuscitation and during the emergency treatment of hyponatraemia.*

11.5 On page 020-027-062 the records discuss problems and expected outcomes.

A note timed 06.00 0n 9th states "child went to theatre and returned post removal of mildly inflamed appendix". *This was made when Raychel was critical but summarises the care plan as achieved.* In computer terms this, in effect, signed off Raychel from Ward 6. This entry was signed by SN Noble

11.6 On page 020-027-064 there are further notes on problems and expected outcomes dealing with reducing risks and ensuring an uneventful recovery.

07.00 details Raychel's return from theatre and mentions ongoing antibiotics prescribed; signed SN Patterson

17.00: Vomited x 3 this AM but tolerating small amounts of water this evening; *This **is the only reference to vomiting this entire computer record**.* This entry is signed by SN McCauley

06.00 9th; The fit, subsequent events and attempted resuscitation are all documented. This is signed by Staff Nurse Noble.

11.7 COMMENT

These computerised notes are universally made these days and take up large amounts of nursing time. They are frequently criticised as being of little value. They are usually kept in parallel to written records. Although there are written records for the 7th and 9th, I cannot find any records for June 8th

The notes here, confirm the lack of awareness by the nursing staff on Ward 6 of the seriousness of Raychel's condition throughout the 8th June. Entries were only made at 05.00 and 17.00. Only a single entry mentions vomiting and completely underestimates the amount.

I cannot understand why there is no mention anywhere in the nursing notes of the fact that the junior medical staff were summoned on 3 occasions on the 8th. (9.4)

It is reputable Nursing Practice to record in writing when a member of the medical staff is called. The doctor should be named together with action taken and times.

The Nursing Staff and the Junior Doctors in their witness statements clearly describe the visits to prescribe IV fluids (Dr Butler) and antiemetics (Drs Devlin and Curran).

Within file 20 I can find no contemporaneous reference to requests for these visits and the outcomes from them within the clinical or nursing notes. That no such notes were apparently made I find difficult to explain and is much to be regretted

12 EVENTS SURROUNDING FIT, SUBSEQUENT INTENSIVE TREATMENT AND ATTEMPTED RESUSCITATION

12.1 At 03.00 Nursing Assistant Lynch reported urgently to Staff Nurse Noble that Raychel was fitting: She was found to be in a left lateral position in a tonic state and had been incontinent of urine. In her statement (012-043-209) Staff Nurse Noble stated that she urgently asked Dr Jeremy Johnston (Paediatric SHO) who was at the nursing station adjacent to Raychel's room.

He made detailed notes in the clinical file (020-007-013), these were timed at 03.15.

12.2 Dr Johnston's notes were as follows:

'C*alled to see regarding fit. Day one post op appendicectomy. Unresponsive for five to ten minutes with contraction and flexion of upper limbs. Not classical tonic/chronic. Urinary incontinence.*
Unresponsive to 5mgs Diazepam pr given Diazemuls 10mgs.

*On examination apyrexic 36. Still unresponsive due to Diazepam. Pulse 80bpm (*beats per minute*) regular rhythm and normal character and volume. JVP (*jugular venous pressure) <-> *heart sounds 1 and 2 nil. Chest clear good ae (*air entry) *vesicular bs (*breath sounds).

nb. No known history of epilepsy. Fit postop complications? Secondary to vomiting and electrolyte abnormality.'

I cannot decipher the first two words of this line, then is written:
'*urgent check electrolytes, calcium, magnesium, fbp (*full blood profile) *ecg – see by reg/consultant'.* This is signed by Jeremy Johnston SHO.

12.3

Dr Johnston was Senior House Officer in paediatrics. He attended Raychel urgently when she suffered a fit. In spite of his close proximity to Raychel's ward it is much to be regretted that when she was vomiting throughout the evening he, or if he had only just come on duty, his predecessor had not been informed by the nurses of Raychel's predicament. When Dr Johnston saw Raychel urgently he immediately suspected that she was suffering from electrolyte imbalance secondary to vomiting. This I think relates well to my comment (8.3) regarding core knowledge expected of junior clinicians. He immediately requested urgent investigations. He stopped the fit in the usual way by using Diazepam and considered that her unresponsive state was due to the drug. This was quite reasonable but what was probably happening was that continued increasing intracranial pressure was now causing brain damage and the unresponsiveness was due to this.

Dr Johnston acted commendably and quickly showing those qualities expected of a good clinician

In his statement (098-025-070) Dr Johnston expanded upon his clinical note. He summarised that he was finishing a paediatric medical admission on the ward when he was asked by Staff Nurse Noble to see Raychel. He promptly attended her. After an

initial dose of rectal Diazepam the fit was unresponsive he therefore injected 10mgs of intravenous Diazepam (Diazemuls) via the intravenous cannula. This stopped the fit. He then did a brief examination and made the note in the chart quoted above. He immediately bleeped the on call surgical pre-registration house officer Dr Mike Curran and explained that the patient had no history of epilepsy and was afebrile. He advised Dr Curran to contact his surgical registrar and senior house officer urgently.

Dr Johnston noted that Raychel remained stable and once again he could find no abnormality. When Dr Curran arrived Dr Johnston asked him to send blood samples urgently to the laboratory as he suspected that an electrolyte abnormality would be a likely cause of the fit in this postoperative patient. The electrolyte profile, calcium, magnesium and full blood picture was sent urgently. Dr Johnston once again strongly advised Dr Curran to contact his senior colleagues.

Dr Curran bleeped Dr Zafar who told Dr Curran that he was in the casualty department and would come to the ward as soon as he could.

The full blood picture (haemoglobin) became available first but as Dr Johnston was much more concerned about biochemistry (electrolytes) he bleeped the on call biochemist again to speed things up. He did a twelve lead ECG. In view of the seriousness of the situation he decided to discuss the case with his paediatric registrar Dr Bernie Traynor.

Dr Johnston went to the neonatal intensive care unit to try to find Dr Trainor, by this time it was approximately 04.00.

Whilst he was explaining the situation to Dr Trainor he was bleeped by the nursing staff from Ward 6 who reported that Raychel looked more unwell. On receiving this information Dr Traynor left the admission that she had been doing and went to assess Raychel leaving Dr Johnston to take over her clinical duty.

Later Dr Johnston processed an arterial blood gas sample brought by Dr Curran. Dr Curran informed Dr Johnston of the seriously abnormal electrolyte result (sodium 118 mmol/l).

12.4

Dr Johnston clearly did his very best to speed up events. He told Dr Curran to ring his seniors and expedited as fast as he could the blood results expecting, quite rightly, abnormal electrolytes. After insisting that Dr Curran ring his seniors Dr Johnston immediately consulted with his own registrar; a second term SHO Dr Bernie Traynor. In his deposition to the Inquest (098-025-073) Dr Johnston enlarged upon some of these facts. When questioned by Counsel he confirmed the urgency of the situation and his instruction to contact the on call surgical team. He confirmed that Dr Zafar did not arrive until 04.45am one and a half hours after attempts to contact him. During this one and a half hour period Dr Curran a JHO was the only member of the surgical team present. He concluded his answer to Counsel stating '*I had started on the ward late afternoon. I was doing a night shift. The surgical team look after their own patients (*098-025-073).

12.5 The clinical file continued (020-015-023) with a detailed clinical note made by Dr Bernie Trainor. She also gave a clear deposition and statement for the inquest (098-027-079). Dr Traynor's note commences:

‘*Nine year female surgical patient.*
Post appendicectomy day 1.
Vomiting today.
*U&A (*urea and electrolytes) *normal 7601.*
No diarrhoea.
No temperature.
Fairly stable until 03.00.
Tonic seizure and bed wet.
Unintelligible.
Given 5mgs pr Diazepam 10mgs iv Diazepam
Lasted some 15 minutes.
Called to see patient around 04.15.
Looking very unwell, unresponsive, pupils dilated and unresponsive, apyrexic, face flushed and widespread red macular rash. Petechiae neck and upper chest.
Probably secondary to vomiting.
Heart rate 160per minute sats (oxygenation) *97%*
Sounds rattly ?aspirated
Abdo soft
Chest transmitted sounds
Not hypertonic
Limbs flaccid
Impression seizure secondary to electrolyte problem ?cerebral lesion
She then reports the electrolytes with a sodium level of 118.
Full blood count already taken.
Face mask oxygen
Dr McCord (paediatric consultant) contacted to come in. transferred to treatment room.
Initially saturations 99% then fell to 80s
Anaesthetist fast bleeped. Bag and masked ventilation and then intubated by anaesthetist.
Comment about possible meningitis and a confirmation of the prescription of Benzylpenicillin and Cefotaxime *(*clearly the paediatricians wished to exclude this as a possible diagnosis).
0.9% sodium chloride 40ccs per hour was started and Intravenous magnesium sulphate given. An urgent CT of the brain was requested. This detailed entry is signed *B.Trainor SHO (*020/015/024).

Dr Trainor enlarged upon her clinical notes in her witness statement (098-027-079); she confirms her discussion with Jeremy Johnston who reported the seizure that he had witnessed. He felt Raychel looked unwell and Dr Trainor went straight to ward 6. When she arrived on ward 6 she confirmed the presence of the surgical junior house officer. She made sure that the blood sample had not been taken from the same arm as the drip (what she means is that if hypotonic solution was running into the same veins as the blood sample had been taken from it would give her abnormally low sodium). In fact the blood had not been taken from this area and the abnormally low sodium was a genuine result. She asked the house officer to repeat the electrolytes. This is a standard procedure when a result is very abnormal.

Dr Trainor confirms that she had examined the medical notes and noted that Raychel had vomited seven times (fluid balance chart record*: in fact nine as 3 vomits were recorded as a single entry*)). She then went to examine Raychel noting her to be

extremely unwell, unresponsive with pupils fixed, dilated and unreactive. She had rattly breathing. She noted a petechial rash. She immediately asked Staff Nurse Noble to contact Dr McCord Consultant paediatrician on call. She spoke to Dr McCord explaining Raychel's condition and asking him to come to the ward immediately.

Raychel was transferred to the treatment room. By that time Mr. Ferguson had arrived and Dr Trainor explained that Raychel had had a seizure and was very ill. She explained that she was worried about her condition and had called the consultant in. Dr Johnston was then asked to come and assist in inserting an intravenous line.

After this point Raychel's oxygenation deteriorated, the on call anaesthetist was fast bleeped and quickly intubated Raychel. Dr McCord arrived and shortly afterwards spoke to Mr. and Mrs. Ferguson. Dr Trainor confirmed that around 05.30 she accompanied Raychel to the x-ray department for a CT scan.

At the inquest Dr Trainor confirmed that she had had no involvement with Raychel prior to this event. She stated that her duties related to medical patients only and that Raychel was a surgical patient. She confirmed the low sodium which she states '*made me think immediately of the possibility of hyponatraemia. I did not accompany Raychel to the Royal Belfast Hospital for Sick Children. I have experienced hyponatraemia in children previously but in these cases the sodium level was not as low as in Raychel's case. The children survived. Antibiotics were given in case the petechial rash signified meningitis however it could have been caused by vomiting.*'

12.6

Like Dr Johnston Dr Traynor reacted with commendable speed suspecting as did Dr Johnston an electrolyte imbalance as a cause of the seizure. She did a detailed examination and must have been distressed when it became apparent that Raychel's pupils were fixed and dilated. This of course signified brain stem damage and I have no doubt the doctors already recognised the seriousness of the situation. They must have been extremely concerned to see a nine year old girl in this situation.

A note can also be found (020-015-025), it is rather difficult to read but has been made I think by Dr McCord Consultant Paediatrician. He confirms events and the presence of fixed dilated pupils. He agreed that Raychel should be transferred to the Intensive Care Unit. Further down the page is a record of the electrolyte levels.

12.7 The only surgeon present throughout this tragic time was the junior house officer Dr Curran. Doctors Zafar and Mr. Kumar Bhalla arrived on ward 6 at around the same time as Dr McCord. I cannot see that either of them made a clinical note but by this time attempts were being made to resuscitate Raychel who had been intubated and noted to have fixed dilated pupils.

The absence of the surgeons throughout this critical time is much to be regretted. Clearly I appreciate they had duties elsewhere in the hospital with surgical patients both in the wards and A&E but as Drs Trainor and Johnston have pointed out the responsibility for surgical patients rested with the surgical staff. When Raychel suffered vomiting throughout the day it was surgical staff at a very junior level who were contacted and they failed to discuss the case at any point with Dr Zafar or Mr. Bhalla. It

is only at this point that the surgical registrar is referred to at all and I wonder if he had been on duty throughout the day of the 8th. If he had he would have been another person to whom the junior surgeons could have referred.

Raychel Ferguson was a nine year old girl and it was little more than twenty eight hours after an appendicectomy had been performed under the care of the surgical unit at the hospital. I do have to ask at this point as to where was the surgical consultant on call? The paediatricians had attended right up to consultant level and very shortly afterwards Dr Nesbitt consultant anaesthetist and clinical director of anaesthesia arrived and I have no doubt whatsoever that the consultant surgeon on call should have come in. He should have noted events, made a clinical note and above all seen the parents. It may well be that Mr. Gilliland who was off duty at this time was not available and from what I can see from the notes the surgeon on call during the early hours of the 9th was Mr. Panesar. I cannot believe that Drs Zafar and Bhalla did not contact him regarding the urgency of this situation which had become a critical incident. However, there is no evidence from the notes that he had been consulted and if they had not done so this is a very serious issue. If he had been consulted he should have come in and taken some responsibility. This is very much to be regretted that he did not do so.

12.8 Shortly after 05.00 a CT scan was done. This suggested cerebral swelling but on consultation with a neurosurgeon in Belfast a further CT scan with enhancement with contrast was performed. These were both carried out by Dr CCM Morrison consultant radiologist. He did wonder about a possible sub-arachnoid haemorrhage but this was not born out by the second scan (020-015-026).

Following the scans at around 09.00 on the 9th and discussions between the clinicians at the Altnagelvin Hospital and the Royal Belfast Hospital for Sick Children it was decided that Raychel should be transferred to the paediatric intensive care unit in Belfast. Dr G Nesbitt (paediatric anaesthetist) who had been present since the first scan went with the child to Belfast in a blue light ambulance.

To conclude this section all this must have been extremely distressing to the paediatricians and to the anaesthetists involved. It was little more than an hour between Raychel suffering a seizure (no doubt due to increasing intracranial pressure) and her pupils becoming fixed and dilated due to severe damage to the brain stem. During that time all the doctors acted with speed in spite of the anxieties that they must have been feeling and all necessary investigations were performed. By this time it must have been obvious to all of them that little could be done to save this little girl. They did their best to make the gravity of the situation clear to Raychel's parents.

I am concerned that the surgical department was scarcely represented throughout all these events and I cannot emphasize how the absence of a surgical consultant must have been obvious to all the team involved. This was a surgical patient and the surgical senior should have been there.

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13. TRANSFER TO ROYAL BELFAST HOSPITAL FOR SICK CHILDREN (RBHSC)

13.1 Following a period of stabilisation in the adult intensive care unit this transfer took place by blue light ambulance: This left Altnagelvin at approximately 11am on the 9th June.

Raychel was accompanied on this transfer by Dr G Nesbitt (Clinical Director of Anaesthesia and Specialist Children's Anaesthetist). The details of this are well documented by him in his statements (096-010-030.WS.035/1). A transfer record (020-024-053) was completed by Dr Nesbitt summarising observations during the journey from Altnagelvin to Belfast, this transfer took one hour and ten minutes. During the transfer Raychel's condition remained stable but unchanged.

13.2 Raychel was admitted to the Paediatric Intensive Care Unit (PICU) under the care of Dr Peter Crean, Consultant Paediatric Anaesthetist WS-030). Her pupils were noted to be remaining unreactive and neurological assessments of brain function were performed (063-015-035).

13.3 The treatment team considered that irreversible brain stem change had most likely occurred (063-009-023) and Raychel's parents were told of this critical situation.

13.4 Brain stem tests were performed on two occasions (17.30 on the 9th June and 09.45 on the 10th): They confirmed brain stem death.

13.5 At 11.35, in the presence of her parents and family, ventilation was discontinued and Raychel was certified dead at 12.09 (063-022-026); the Coroner for Greater Belfast was informed.

13.6 The care provided for Raychel was clearly sensitive and professional. The treatment team at the RBHSC must have been most concerned to admit a young girl after apparently minor surgery. There is no doubt that they treated Raychel's distressed parents with all possible care and sensitivity.

14. POST-MORTEM

14.1 A Coroner's post-mortem was carried out on the 11th June 2001 by a Consultant Neuropathologist Dr Brian Herron (012-031-157) and pathologist Dr Al-Husaini.

14.2 A further report was obtained from a consultant Chemical Pathologist Dr Clodagh Loughrey regarding the link between the hyponatraemia and cerebral oedema.

14.3 The final clinical summary on the autopsy was signed by Dr Herron on the 20th November 2001. The conclusion of the pathologist (advised by Dr Loughrey) referred to three factors:

i Infusion of low sodium fluids postoperatively.
ii Vomiting.
iii Inappropriate secretion of anti-diuretic hormone (ADH).

15. INQUEST

15.1 On the 5th February 2003 an inquest was opened by Mr. John Leckey, Coroner for the District of Greater Belfast.

15.2 The inquest verdict was delivered by Mr. Leckey on the 10th February 2003 and was as follows:

On the 7th June 2001 the deceased was admitted to Altnagelvin Hospital complaining of sudden onset, acute abdominal pain. Appendicitis was diagnosed and she underwent and appendectomy the same day. Initially postoperative recovery proceeded normally. However the following day she vomited on a number of occasions and complained of a headache. The next day 9th June she suffered a series of tonic seizures necessitating her transfer to the Intensive Care Unit of the Royal Belfast Hospital for Sick Children where she died the following day. A subsequent post-mortem investigation established that she died from cerebral oedema caused by hyponatraemia. The hyponatraemia was caused by a combination of inadequate electrolyte replacement in the light of severe postoperative vomiting and water retention resulting from the inappropriate secretion of ADH (anti-diuretic hormone). (012-026-139).

15.3 Evidence was taken from many witnesses including the majority of doctors involved in the care of Raychel, the nurses from Ward 6 at Altnagelvin Hospital and from an expert witness instructed by the Coroner to provide a report into Raychel's death, Dr Edward Sumner Consultant Paediatric Anaesthetist at Great Ormond Street Hospital London. I have referred to the witness statements in the body of this report and will concentrate now only on the evidence of Mr. Gilliland, Drs Fulton and Nesbitt and that of Dr Sumner.

15.4 Evidence of Mr. Gilliland. This is taken from his signed deposition to the Coroner (012-038-176)

Mr. Gilliland confirmed that Raychel had been admitted under his care. He further confirmed that he had not seen her at any time during her stay in Hospital and that his comments were based on her clinical records.

Mr. Gilliland stated that he would expect to be told if a child vomited more than once or twice. He did not consider he would expect to be informed of coffee ground vomit alone although considered that continuous vomiting called for investigation.

Mr. Gilliland explained the surgical rota included an SHO doing a 24 hour on call period.. He explained that Dr Zafar (*on call on the 8th)* was not directly supervising Raychel but was available to the JHO or the Nurses. He explained (see my report above) that the nurses would call on the JHO first before calling an SHO. He stated that the nurses did not feel the vomiting sufficiently severe to warrant reporting to Dr Zafar and the JHO did not feel he needed to consult a senior colleague (*in fact two JHO's were involved)* He concluded his deposition by stating that he only became aware of hyponatraemia after the death of Raychel (012-038-178).

I do not think this is the case, most surgeons are aware of fluid balance and its relation to surgical physiology. The question of electrolyte imbalance is taught and tested during surgical training and as I have stated above is familiar to the majority of reputable surgeons in practice.

15.5 Evidence of Dr G Nesbitt: As with the evidence of Mr. Gilliland I have taken this from his signed deposition to the Coroner (012-037-173). Dr Nesbitt described his care of Raychel after he was called in to the Altnagelvin Hospital at approximately 05.00am on the 9th June. He confirmed that he was a Consultant Anaesthetist with an interest in paediatrics.

He commented on the use of intravenous fluids before surgery. He explained his present doubts about the safety of solution No 18 (1/5th normal saline) Common practice had now changed to the use of Hartmann's solution or half strength saline

Dr Nesbitt emphasized the importance of accurate recording of fluid balance. He confirmed that solution No 18 was no longer used at the Altnagelvin Hospital, a change in practice having been prompted by the case of Raychel Ferguson. He also pointed out that children on intravenous drips should have a blood test and reassessment after 12 hours. He pointed out that there appeared to be no test on the 8th June.

Dr Nesbitt concluded his deposition by confirming that specialist literature on hyponatraemia although available had not been widely read through at the time of the death of Raychel.

15.6 Evidence of Dr Sumner; I have taken this from his signed deposition to the Coroner dated 5th February 2003 (098-037-117 to 121). This is handwritten and is not easy to read.

Dr Sumner in his statement expands on the subject of fluid and electrolyte balance and hyponatraemia which he states is something taught to Medical Students. He describes the use of a nasogastric tube as routine in many postoperative cases which he uses in any child whose abdomen is opened. *I do not agree with this at all, I cannot remember when I last saw a nasogastric tube used in this way. The time to have passed a nasogastric tube on Raychel would likely have been on the afternoon or evening of the 8th June. Together with a urinary catheter this would have allowed for the accurate measurement of fluid balance.* Dr Sumner makes the point, as do I, that when Raychel became listless this should have been cause for concern.

Overall considering the importance that has been attached to Dr Sumner's Reports this is a short deposition. I wonder if an accurate transcript of his evidence to the Inquest is available.

15.7 I am concerned at the absence from the inquest of the only surgeons who saw and treated Raychel namely Drs Makar and Zafar.

They must have been aware of the date of the inquest but apparently at the time of it Dr Makar was away on holiday and Dr Zafar was taking examinations. Whilst it is not appropriate for me comment on inquest procedures it seems as an outside observer that these were extremely important witnesses and I cannot understand why they were not issued with a witness summons to be present.

16. ACTION TAKEN AT ALTNAGALVIN AREA HOSPITAL FOLLOWING THE DEATH OF RAYCHEL FERGUSON

16.1 On the 12th June 2001 a critical incident enquiry was called by Dr Raymond Fulton Medical Director of the Trust and a Consultant Dermatologist (020-108-337). He ceased the Medical Director role in March 2002 and was succeeded by Dr Geoffrey Nesbitt.

16.2 All relevant staff attended the meeting (WS043/1). Dr Fulton was struck by the subdued and shocked tone of the meeting. Hand written notes only were taken. Dr Fulton asked

individual doctors and nurses to describe their part in Raychel's treatment from her admission through to her transfer to Belfast.

16.3 *I will detail the doctors and nurses statements as they represent the nearest the Inquiry has to a contemporaneous record of events when memories would be sharp and clear (WS03/043/1).*

a. Dr Makar described making a diagnosis in A&E. *This diagnosis had previously been suggested by Dr B Kelly who administered intravenous Cyclomorphine. Dr B Kelly was not at the meeting.* Dr Makar described his initial prescription of Hartmann's fluid intravenously but changed this to 1/5th normal saline (solution 18) at the request of Staff Nurse Noble (5.4). Staff Nurse Noble confirmed this it as ward policy to use this fluid.

b. Dr Claire Jamison confirmed setting up Hartmann's solution when Raychel arrived in theatre. The solution 18 that had been running on the ward had been terminated before Raychel was transferred to theatres. This would be usual practice.

c Dr Vijay Gund confirmed this and recalled discarding the remaining Hartmann's after surgery was completed (6.1). He left future intravenous fluids to be written up according to ward protocols (1/5th normal saline). The infusion volume (80mls per hour) was not mentioned at this stage (8.3).

d. Dr Makar confirmed a routine appendicectomy at 23.40 (the USA spelling appendectomy was used).

e. Staff Nurse Noble confirmed restarting 1/5th normal saline (solution 18) on Raychel's return to paediatric ward 6.

f. Sister Millar and Staff Nurse Rice confirmed the infusion rate of 80mls per hour after surgery and throughout the day of the 8th.

g. Staff Nurse Rice recalled asking a paediatric SHO (Dr Butler 8.6i) to write up a further bag of 1/5th normal saline when the chart prescription expired (020-019-038).

h. Dr Fulton recalled several nurses including Sister Miller as stating that Raychel was making a normal recovery until later *in the afternoon*. She had walked to the toilet with her father.

i. The nurses noted several episodes of vomiting which they felt was not excessive. These were recorded on +1 to+++++4 scale. They confirmed that Raychel became drowsy and had a seizure on Friday evening *(in fact it was Saturday am 03.00)*.

j. Dr Jeremy Johnson called to investigate the seizure and sent blood for urgent electrolytes.

k. Dr Bernie Trainor called by Dr Johnson when the sodium was found to be 118 mmol/l changed the intravenous fluid to 0.9% of saline and reduced the infusion rate to 40mls/hour.

l. Dr McCord (*Consultant Paediatrician)* describes being called in and finding Raychel seriously ill. He was concerned at the low sodium. He ordered a CT of the brain which

showed either a subarachnoid haemorrhage or cerebral oedema. A second CT scan confirmed cerebral oedema. Raychel was transferred to the Royal Belfast Hospital for Sick Children (RBHSC) on Saturday 9th June.

m. Dr Nesbitt accompanied Raychel by ambulance to the RBHSC. Dr Fulton noted at the meeting that he still seemed shocked by events. Dr Nesbitt commented on fluid balance charts and infusion rates. He felt that an infusion rate of 80mls/hour was too high for Raychel but emphasized that in the early stages postoperatively it would not necessarily be inappropriate. Dr Nesbitt pointed out that at this early stage 1/5th normal saline might be unsuitable for postoperative children as they were predisposed to hyponatraemia. He was aware that the use of 1/5th normal saline was common practice in both Altnagelvin and other hospitals in Northern Ireland and offered to contact other hospitals in the area to establish their current practice.

Dr Fulton also asked Dr Nesbitt to review current medical literature.

I cannot understand why Drs Devlin and Curran were not at this important meeting

16.4 Following discussion by the group a six point action plan was drawn up (026-004-005). The plan was as follows:

- Review evidence for use of routine postoperative low electrolyte iv infusion and suggest changes if evidence indicates. No change in current use of solution 18 until review. **Action Dr Nesbitt**.

- Arrange daily U&E on all postoperative children receiving iv infusion on ward 6. Six hourly BMS on children on Hartmann's solution. **Action Sister Millar**.

- Inform surgical junior staff to assess these results promptly. **Action Mr. Gilliland**.

- All urinary output and vomiting should be measured and recorded while iv infusion is in progress. **Action Sister Miller.**

- A chart for iv infusion rates to be displayed on ward 6 to guide junior medical staff. **Action Dr McCord**.

- Review fluid balance documentation on ward 6. **Action A Witherow**.

COMMENT

Whilst much has been said and written since June 12th 2001 essentially this meeting established that the cause of death of Raychel was haemodilution and hyponatraemia and proposed actions including an urgent review of the use of solution 18 (1/5th normal saline). If the protocol above had been in place four days earlier it is likely that the sad events of that day would have been forestalled.

17. CHANGES IN CLINICAL PRACTICE AND GOVERNANCE AT ALTNAGALVIN HOSPITAL FOLLOWING THE DEATH OF RAYCHEL

17.1 Following the critical incident inquiry and its action plan Dr Nesbitt contacted other hospitals urgently. He discovered that a number of other hospitals including the RBHSC had discarded the use of 1/5th normal saline in postoperative patients.

17.2. On the 14th June Dr Nesbitt advised the medical director that 1/5th normal saline (solution 18) would no longer be used for surgical patients. A clear notice of this was posted on the 12th June 2001 (022-103-318).

This was followed up by a clear letter to the clinical surgical director (Mr. P Bateson) on the 3rd July 2001 (022-098-309) requesting urgent discussion by the surgeons. It also suggested that fluid management of surgical children might be undertaken by the paediatric staff.

17.3 A clear consensus statement from all paediatricians regarding iv fluids was signed in May 2002 (021-052-113). By then the use of 1/5th normal saline for all patients had been discontinued throughout the Trust.

17.4 Throughout the remainder of 2001 and 2002 Dr Fulton and Dr Nesbitt took care to publicise the problem of hyponatraemia in children throughout the area. They made contact with the Northern Ireland Chief Medical Officer (Dr Henrietta Campbell) and Director of Public Health (Dr William McConnell) (012-039-180).

17.5. Dr Nesbitt devised a lecture presentation on hyponatraemia and the syndrome of inappropriate ADH secretion. He presented this widely throughout the area.

17.6. In April 2002 the Northern Ireland Department of Health circulated its own guidelines regarding the use of intravenous fluids in children and risks of hyponatraemia from hypotonic solutions.

17.7 In May 2002 Dr Nesbitt (by then Medical Director of the Altnagelvin Trust) on discovery of the death of a child from hyponatraemia (thought by the Inquiry to be Adam Strain), who died in the RBHSC following a renal transplant wrote to Dr Campbell expressing his concern that guidance had not been issued after this case. He stated '*I would be grateful if you could furnish me with details of that particular case for I believe questions will be asked as to why we did not learn from what appears to have been a similar event'.(012-039-196)*

Dr Campbell, in her reply stated: '*The Department was not made aware of the case at the time either by the Royal Victoria Hospital or the Coroner. We only became aware of that particular case when we began the work of developing guidelines following the death at Altnagelvin (012-039-197).*

17.8 In September 2004 Dr Nesbitt wrote to all medical staff in the Trust (021-039-082) clarifying that solution 18 was no longer to be prescribed for children and that fluid balance charts should be strictly kept. The need for intravenous fluid should be assessed by senior staff and electrolyte estimations performed frequently.

17.9 Writing this as a general surgeon Dr Nesbitt is to be commended for his dedication to ensuring that changes in practice were urgently made, not just at the Altnagelvin Trust but throughout Northern Ireland.

18. CHANGES IN SURGICAL PRACTICE AT THE ALTNAGALVIN HOSPITAL FOLLOWING THE DEATH OF RAYCHEL FERGUSON

18.1 In May 2003 a joint memorandum was circulated from Dr Nesbitt and Mr. P Bateson Clinical Director of Surgery (021-044-091) It read as follows:

Paediatric Fluid Management

As a result of some uncertainty regarding the management of surgical paediatric patients I wish to advise you of the following action which has been agreed by Mr. Bateson Clinical Director:

- *All surgeons will do a ward round Monday to Friday of all their patients including paediatric patients starting at approximately 08.30am. To facilitate this it has been agreed that fixed sessions e.g. theatres and outpatients will begin at 10.00 am.*
- *The previous days on call surgeon will visit the paediatric ward first thing every morning to check the condition of surgical patients admitted during the night.*
- *Surgeons will direct surgical management of the paediatric patients and will advise the nursing staff of their specific test requirements for each patient.*
- *The paediatric nursing staff will bleep the surgeon or nominated deputy and inform them of results when available. If the named consultant is not available then the on call surgeon should be bleeped.*
- *Surgeons are responsible for the management of the children admitted under their care. If they require advice regarding the medical condition of the child the paediatricians will be happy to provide assistance.*

18.2 As elaborated by Mr. Gilliland in his statement (WS044/1 page 5) it proved difficult to bring this suggested procedure into practice as very often there were serious admissions of adults requiring attention early in the day. *This would confirm of course the busy workload at the Altnagelvin Hospital.*

18.3 Further in his statement Mr. Gilliland described the introduction of a 'Surgeon of the Week' system in 2004 ensuring a single consultant was on call for emergencies and freed of all other duties. This allowed for senior level ward rounds, decisions, operating and teaching. *The surgeon of the week system was gradually instituted universally throughout the United Kingdom from around 2001 to 2002. In my hospital we originally started with a Surgeon of the Day in 2000 moving to a Surgeon of the Week in 2003.*

18.4 I believe that the changes introduced in surgical practice at the Altnagelvin Trust between 2001 and 2004 have addressed flaws in the system that existed in June 2001

The honesty, frankness and transparency showed by the staff of the Altnagelvin Hospital in sharing the details of this sad case with colleagues in other hospitals is a complement to the standards of clinical governance at the Altnagelvin Trust.

19. MEETING WITH FAMILY SEPTEMBER 3RD 2001

19.1 A meeting with the family of Raychel was held at the Altnagelvin Hospital on the 3rd September 2001.

Mrs. Ferguson, her brother, sister and a friend attended. Their GP Dr Ashenhurst attended the meeting which was chaired by Mrs. Stella Burnside Chief Executive of the Hospital. Dr Nesbitt, Dr McCord, Sister Miller, Staff Nurse Noble and the Patient Advocate Mrs. A Doherty were also present.

19.2 Dr Nesbitt explained the circumstances of Raychel's admission; he did his best to answer questions from the family and their representatives.

19.3 Sister Millar and Staff Nurse Noble answered questions concerning events on the ward.

19.4 The doctors expressed serious concerns when Raychel suffered a seizure.

19.5. Dr Nesbitt promised a review of procedures and more frequent blood testing. He explained that fluids used on children were under review.

19.6 Mrs. Burnside promised support for the family and an open door from the Trust for further discussion at any time.

COMMENT

This meeting must have been extremely difficult for everyone present.

Dr Nesbitt did his best to explain clinical matters to the family. I cannot believe that he and Dr McCord were left to do this and that no surgeon was present. Raychel had been admitted with abdominal pain and was operated on. As a result of this surgery she suffered complications and died. Raychel was a surgical patient and was under the care of their teams. The surgeons at senior level should have been at this meeting. As far as I am aware from perusing the clinical documents relating to this case no representatives of the senior surgical staff have met with the Ferguson family since the death of their daughter. This is much to be regretted.

20. REPORTS OF DR EDWARD SUMNER

20.1. John Leckey HM Coroner for Greater Belfast requested a report on Raychel's death from Dr Edward Sumner (012-001-001) who at the time of Raychel's death was Consultant Anaesthetist at Great Ormond Street Hospital, London. He retired from that post in 2001. His report has been much quoted and led to a media interview on the 18th February 2003 (098-087-265 to 279) at which many questions were asked. Dr Sumner

had I understand previously assisted the Coroner following the death of Adam Strain in1996 that of Lucy Crawford at the RBHSC in April 2000.

20.2 Dr Sumner (012-001-005) after recording the facts of the case concluded that Raychel had died from cerebral oedema secondary to hyponatraemia caused by inadequate electrolyte replacement in the face of severe postoperative vomiting.

20.3. In a further report to the PSNI (Police Service for Northern Ireland) dated September 2005 (098-093-349) he further concluded that Raychel's death was caused by a general systems failure rather than by individuals and I would certainly agree with this. He described the standard practice on a paediatric ward of the use of 1/5th normal saline (solution 18) as used in general paediatric medical practice as inappropriate for the care of surgical children.

20.4 He considered that the nursing staff did not take Raychel's vomiting seriously and regarded her as a straightforward appendix case (*my comments 9.1)*. He concluded that the severity of the vomiting was never clearly communicated to the doctors (*7.10*). He considered a collective ignorance of the need to replace gastric losses with appropriate fluid rather than hypotonic saline (8.3).

20.5 I must say I am puzzled at this late stage by the fact that the Coroner did not request a report from a Surgical Expert at the time of the inquest. As Dr Sumner examined the anaesthetic and fluid balance facts of the case a surgeon could have considered surgical matters covered in this Report. Dr Sumner rightly concentrated on fluid issues which were central to the case. These issues however led directly from surgery performed and arrangements in place at the Altnagelvin Hospital for the postoperative observation of surgical patients on paediatric ward 6.

21. REPORT OF DR JOHN JENKINS

21.1 A report was provided to the Coroner by Dr J Jenkins, Senior Lecturer in Child Health at Queens University Belfast an Expert retained by the RBHSC (012-023-132). Dr Jenkins mentions that the traditional paediatric use of 1/5th normal saline but accepts that it may not be relevant in the postoperative situation. He emphasized that guidelines have developed since Raychel's death but considered that the problems of hyponatraemia in the surgical patients whilst being emphasized in specialist literature had in 2001 not really been fully shared in the general area of paediatrics and surgery.

22. COMMENT

In my view Raychel suffered a basic surgical problem of postoperative vomiting compounded by infusion of inappropriate volumes of hypotonic fluid. This was immediately recognised by an SHO in paediatrics at the time of a seizure. I believe that if an experienced surgeon had seen Raychel in the afternoon or early evening of the 8th June they would have similarly understood the situation (8.6, 8.7).

23. WHAT WAS THE CAUSE OF RAYCHEL'S ABDOMINAL PAIN

23.1 *It was not appendicitis*. The histology of the appendix showed no inflammation (020-022-047). The presence of a faecolith in a non inflamed appendix is irrelevant.

23.2 *A Urinary Tract infection*. Protein was present on two urine tests (1+ and ++). Raychel had complained of pain on urination (020-016-020) and although she had no temperature and no inflammatory changes on blood testing a lower urinary tract infection was a possibility here. Urine should have been sent for microscopy and culture. At least one urine sample should have been sent for microscopy and culture. Microscopy results would have been readily available quite speedily and the presence of leucocytes would have been an indication for a trial of antibiotics and definite deferment of surgery.

23.3 *Non specific abdominal pain.* This is the commonest pain in surgical practice [7]. Whilst there is no doubt patients with this condition are often admitted to hospital, in spite of relevant investigations there is never an eventual diagnosis. Non specific abdominal pain is often noted in the right iliac fossa and is more common than appendicitis. It settles after a period of time and observation. Non specific abdominal pain may well have been the diagnosis here.

23.4 *Constipation*. This is a common cause of abdominal pain in children. Distension of the caecum either by flatus or faecal content causes definite tenderness in the right iliac fossa. I have very frequently seen this in my practice. It is usually cured by reassurance and mild laxatives and is of course always accompanied by normal blood tests. A plain abdominal x-ray can sometimes show a loaded colon. There is no doubt that constipation can cause gastrointestinal stasis with subsequent delay in gastric emptying. This of course might explain the vomiting of undigested food (after apparent fasting) noted by Staff Nurse Rice on the morning of the 8th June (WS051/1).

24. WHY DID RAYCHEL VOMIT

24.1. There had been no vomiting preoperatively although Raychel was reported to be nauseated

24.2 *A postoperative ileus* is a common cause of vomiting after surgery and is due to handling of the intestine. This causes a temporary inactivity and lack of propulsion in the areas handled[8] The terminal ileum would have been handled during this operation as Dr Makar in his operation note (020-010-018) reported that a Meckel's diverticulum was not present. These are quite rare (2%), an embryonic remnant they are usually found approximately two feet proximal to the caecum[9]. To search for a Meckel's diverticulum the terminal ileum needs mobilising out of the incision and it is often handled quite firmly in returning it to the abdomen. Dr Makar mobilised approximately 3 feet (020-010-018). This may well have led to a localised ileus.

24.3 *Opiate administration*: This is a very common cause of vomiting postoperatively particularly in children. Raychel had been given a large intravenous dose of Cyclomorphine preoperatively (020-006-010) and a further 5mgs in the recovery room after surgery. There was a delay in returning Raychel to the ward due, according to the anaesthetic record to prolonged sedation with opioids (020-009-017). This anaesthetic record page was signed by Dr Vijay Gund.

24.4 *A rise in intracranial pressure* is also of course a common cause of vomiting[10]. This was no doubt the cause of vomiting and retching in the afternoon and evening of the 8th June as haemodilution was I am certain by that time beginning to cause cerebral oedema. Prolonged retching would explain the coffee ground vomiting due to gastric trauma and a petechial rash noted by Dr Traynor (020-015-024).

24.5. Raychel's vomiting was I believe likely due to multiple causes. It is likely that the opiate side effects played a major role in the early vomiting and a rise of intracranial pressure exacerbated vomiting later in the day[10]. Overlying both was a possible ileus.

AREAS IN WHICH SURGICAL CARE of RAYCHEL FERGUSON AT THE ALTNAGELVIN AREA HOSPITAL in JUNE 2001 FELL BELOW A SATISFACTORY STANDARD

IN GENERAL

- The default intravenous fluid on paediatric ward was 1/5th normal saline; this was on the recommendation of the Paediatricians who played no formal role in the treatment of surgical children. Dr McCord's statement gives a good summary of the situation in 2001 (WS-032/1 page4)

- No post take ward round by specialist registrar or a consultant; implications from the point of view of governance and medical education

- Leading on from this no formal handover at end of 24 hour take period.

- No formal arrangements for consultation with a senior prior to performing children's surgery.

- Cover for children on paediatric ward provided by surgical JHO's: in 2001 they have not have done a substantive paediatric job. I have no idea how this got by the scrutiny of the Postgraduate Deanery

- Surgical junior house officers (JHO's) also on call for acute adults elsewhere in many areas of the hospital.

- Cover for paediatric surgical patients should be provided by surgical SHO's and above with assistance from paediatric staff

- No formal protocols for postoperative blood tests in children.

- Evidence of poor vertical communication between members of the surgical teams.

- Poor quality recording of fluid balance

SPECIFIC

- A diagnosis of appendicitis was suggested by an Accident and Emergency SHO. Cyclomorphine was given before the result of blood tests became available and Raychel was seen by a surgeon.

- Abnormal urine test ignored by all involved doctors.

- Decision to operate was made at SHO level without consultation with a senior contrary to NCEPOD recommendations.

- Out of hours non emergency surgery was performed once again contrary to NCEPOD recommendations.

- There was incorrect calculation of intravenous fluid volumes which remained uncorrected for more than 24 hours.

- This use of intravenous hypotonic solutions in a vomiting patient. The danger of this was not recognised by the Nursing Staff or Junior House Officers

- In spite of vomiting no blood tests were done throughout the 8th June.

- Raychel Ferguson continued to vomit throughout the day and as the day progressed coffee grounds were noted. No senior consultation or referral was made by either nursing staff or junior house officers.

- No attempts were made to measure or estimate volumes of vomit and methods of recording them were imprecise and subjective.

- At the time of a major fit prompt attention was given by paediatric doctors on the ward. Why they were not consulted by worried nurses earlier is inexplicable.

- This prompt attention was accurate and commendable and an early diagnose made of electrolyte imbalance. The paediatric doctors did all they could but by that time brain stem damage had occurred.

- This was a critical event and the child was about to be transferred to Belfast. It took one and a half hours for the surgical SHO and registrar to appear, during this time the resuscitation team comprised a JHO in Surgery, paediatricians up to Consultants and a full Anaesthetic team This is quite unsatisfactory.

- At this time of considerable distress to Raychel's parents the consultant surgeon on call should have come in and exercised appropriate authority.

APPENDIX

My advice to the Inquiry on specific matters as requested in Item 133 of my brief:

a. The reasonableness of Mr. Makar's decision to prescribe solution 18 following a conversation with Staff Nurse Noble when he was told that his previous prescription of Hartmann's solution was not in keeping with ward practice.

I don't think Mr. Makar had any choice; the use of solution 18 was standard practice on the paediatric ward. This was the default fluid for use with paediatric medical patients who were under the care of paediatricians. Surgical children were under the care of surgical junior doctors who would have had little experience with the use of this fluid.

b. The correctness of Mr. Makar's decision to permit an infusion rate of iv solution 18 at 80mls/hour.

It should have been 65ccs/hour. We have no idea of how Mr. Makar arrived at the rate of 80ccs/hour. He was responsible for this calculation.

c. The reasonableness of Mr. Makar's decision to proceed to an appendectomy in all of the circumstances.

I have covered this in detail in my report; I don't think it was reasonable to proceed to an appendicectomy in the late evening of the 7th June.

d. The care provided to Raychel in theatre.

The operation was correctly performed but when the appendix was noted to be normal the question of an abnormal urine test should have been revisited.

e. The facts that should have been taken into account when prescribing fluids postoperatively and the extent to which Mr. Makar would have contributed to the decisions about prescribing.

I believe that the anaesthetists should be responsible for prescribing initial postoperative fluids and the default solution used on paediatric ward 6 would I am certain not have been a consultant anaesthetist's first choice. Hartmann's solution or similar would be much more appropriate but of course following Raychel's death the use of solution 18 was terminated.

f. The steps that Mr. Makar should have taken to ensure that Raychel's postoperative care was appropriate.

Unfortunately the rota system at Altnagelvin in 2001 did not allow for this, Mr. Makar went off duty on the morning of June 8th to be replaced by Mr. Zafar who was on general call for the hospital. If Raychel of course had had significant and serious appendicitis then Mr. Makar would have been responsible for ensuring that correct antibiotics and so on were written up. In point of fact he thought he had removed a very mild appendix at most and would have had no concerns.

g. The steps that Mr. Zafar ought to have taken when he saw Raychel as part of reassessing her continuing need for iv fluids.

On the morning of the 8th June Raychel would have been well and had only one vomit at 08.00am. He instructed that she start oral fluids in small quantities at first and this was in line with standard practice.

h. The reasonableness of Mr. Zafar's decision to permit Raychel to continue to receive both iv solution no 18 and at an infusion rate of 80mls/hour.

This was a default solution on ward 6. Mr. Zafar allowed the solution to continue at the high rate of 80ccs/hour, he did not see any reason to change this and one cannot really blame him. Unfortunately none of the nursing staff had realised that this was too fast a rate. He would have likely assumed that if Raychel had started to drink as a normal post appendix case would then by the time she was taking free fluids which as I have stated would usually have been in the afternoon the drip would have been discontinued.

i. Whether arrangements ought to have been made for Raychel to have been seen by members of the surgical team at any point after the morning ward round to re-evaluate her fluid regime or otherwise.

In retrospect of course she should have been seen as she began to vomit at 8 o'clock and continued at regular intervals during the day. The nursing staff did not seem concerned at this and did not ask the surgical team to see her. Their first request to the surgeons was sometime in the afternoon with an ineffective bleep to either to the SHO (Sister Millar 021-068-159) or JHO (SN Rice WS 051/1). This bleep was not answered and when Dr Devlin attended the ward for another reason he was simply asked to administer the already prescribed Odansetron.

j. The frequency of electrolyte results that should have been sought and in particular whether Raychel's serum electrolytes should have been checked on the 8th June once it became clear that she was going to require iv fluids for at least 24 hours and particularly in light of the repeated vomiting.

I believe that if a review by a competent doctor had been requested by the nurses by the afternoon of the 8th electrolyte tests would have been performed. I have stated this in detail in my report. The junior house officers on call should have been persuaded by the nurses to call a senior colleague but the nurses did not pass on their concerns to the medical staff.

k. Whether the surgical team reacted appropriately to the nursing team to contact them from about 16.30 on the 8th June.

The team did not react at all; they did not apparently answer their bleep. This is quite unsatisfactory. However when Dr Devlin arrived on the ward later on he administered the Odansetron. It was quite unacceptable practice for an SHO or JHO on call in a busy hospital to have made no arrangements for someone to answer their bleep. It is standard practice when a bleep goes off in theatre for a member of the theatre team to find out why the bleep has gone off and to inform its doctor owner of the problem.

l. The appropriateness in 2001 of giving responsibility to junior house officers to attend with a post surgical patient who was unwell and was vomiting more than twelve hours after surgery.

This was quite inappropriate practice; a junior house officer with no experience of working on a paediatric ward was in no position to attend post-operative surgical children. I have covered this point in this report.

m. The specific steps which (1) Dr Devlin and (2) Dr Curran should have taken to appraise themselves of Raychel's history and condition and the sources of information available to them.

I have covered this in this report; my main concern is that the nursing staff did not pass on any concerns to these very junior doctors. Dr Devlin merely administered the Odansetron as prescribed but observed Raychel to be vomiting (WS-027/1). Later on when Dr Curran saw Raychel he should have been informed that the vomit had included coffee grounds I believe he should, on his own initiative, have inquired more deeply into the history and informed his senior colleague.

n. The adequateness and appropriateness of the care and treatment which was provided to Raychel by (1) Dr Devlin and (2) Dr Curran.

I think Dr Devlin acted appropriately in the circumstances merely administering the antiemetic as requested. One should recall that he was on general call for the complete surgical take and for a number of different wards in the hospital. Dr Curran as I have mentioned above should I believe have taken matters further.

o. Whether (1) Dr Devlin or (2) Dr Curran should have recognised or considered the possibility that Raychel was suffering from hyponatraemia.

It is to be regretted that these very junior doctors apparently did not recognise or consider this possibility. However they would have had little training in surgical physiology and postoperative care and this I believe to be a serious governance issue. I think an exceptional junior house officer would however have recognised that there were significant problems. However I would emphasize that the nursing staff did not pass on any concerns to either Dr Devlin or Dr Curran.

p. Whether (i) Dr Devlin or (ii) Dr Curran should have discussed Raychel's condition with any other person or specialty after they attended her and whether they should have sought advice

Dr Devlin attended the ward to clerk a patient; a previous bleep to the surgical team (i above) had not been answered. Dr Devlin was asked to administer an intravenous antiemetic that had been prescribed by an anaesthetist. The Nurses expressed no concerns, Although he observed Raychel to be vomiting his actions were reasonable. It is to regretted he did not make a note in the file.

Dr Curran was called at 21.30 as Raychel was continuing to vomit and had vomited blood. He should have recognized this as a serious matter and sought senior advice without delay. The situation was still retrievable at that time.

q. Whether (i) Dr Devlin or (ii) Dr Curran should have arranged to carry out a follow up examination of Raychel after administering the antiemetic.

These were busy doctors with general duties throughout the hospital. It would have been difficult for them to do this. As I have mentioned on more than one occasion if a senior colleague or an SHO in paediatrics had seen Raychel I am sure they would have taken action to assess the situation. Dr Curran should have sought senior advice or consulted his Paediatric colleagues at the time of his visit

r. The nature of the communication which should have taken place between the nursing team and Dr Devlin and Dr Curran to include what either doctor might reasonably have expected to have been told by the nursing team. What they should have requested from the nursing team and whether either doctor ought to have provided any advice or directions to the nursing team with regard to Raychel's care plan.

Personally I believe that in a specialised paediatric ward such as this the nursing staff themselves should have told the doctors of their concerns. I cannot understand why they regarded multiple episodes of vomiting as the normal postoperative course of a mild appendix case. There was obviously confused communication between the nurses and each other and a mindset that did not seem to accept that a serious problem was occurring. Dr Curran I believe should have on his own initiative approached a senior colleague but Dr Devlin did all that could have been expected of him.

s. The nature of the communications if any which should have taken place between the surgical team, the paediatric team and the anaesthetist after the surgeons had discovered that Raychel had suffered ongoing vomiting and before she suffered a tonic fit and the information which should have been provided to the anaesthetic team and the paediatric team by the surgical team.

These were very junior doctors and they did not inform their senior colleagues. As I have mentioned on more than one occasion in my report the paediatric SHO's must have been present on the ward virtually constantly and I cannot understand why the nursing staff did not speak to them.

t. The adequacy of the steps taken by Dr Curran and other members of the surgical team after Raychel suffered a tonic fit.

After Raychel suffered a fit her care was, in effect, taken over by the paediatricians and later the anaesthetic teams. This care was of high quality. Dr Curran was asked firmly to call in his senior colleagues but it took one and a half hours for them to arrive. This tells us a little of how busy Altnagelvin probably was on a surgical duty day and emphasizes the inadequacy of the cover arrangements for general surgical children.

u. Whether electrolyte results were obtained in a timely fashion after Raychel suffered her tonic fit.

Yes.

v. The adequacy of the note or record keeping of the following doctors members of the surgical team.

Dr Makar: He took a history and wrote an operation note only.

Dr Zafar: A rather brief recording of his visit on the morning of the 8th was made, there was no record of any examination of the child and these notes were barely adequate.

Dr Devlin: Apart from a drug chart entry Dr Devlin made no note in the clinical file, this is unacceptable practice.

Dr Curran: Apart from a drug chart entry Dr Curran made no note in the clinical file, this is unacceptable practice.

I am further puzzled by the lack of any nursing note or record that relates to the request to bleep Dr Zafar and to the visits of Drs Butler, Devlin and Curran together with the timings of these visits.

w. The adequacy of the communication that took place between the surgical team and Raychel's parents.

I am disappointed at the communication that took place between the surgical team and Raychel's parents. When Raychel suffered a fit and it was obvious that she was very seriously ill the consultant on call should have attended and seen Mr. and Mrs. Ferguson urgently. The surgical team should also have been present at the meeting with the family in September 2001

x. The adequacy of the system that Altnagelvin had in place for the provision of medical care for postoperative children.

As I think I have demonstrated in an analysis of this case the system in place in June 2001 had serious flaws.

After Raychel's death these flaws in care were recognised and action taken to change cover arrangements and the use of intravenous fluids to ensure safe and proper care of surgical children.

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Statement of Truth

I understand that my duty as an expert is to provide evidence for the benefit of the Inquiry and not for any individual party or parties, on the matters within my expertise. I believe that I have complied with that duty and confirm that I will continue to do so.

I confirm that I have made clear which facts and matters referred to in my report(s) are within my own knowledge and which are not. Those that are within my own knowledge I confirm to be true. The opinions I have expressed represent my true and complete professional opinions on the matters to which I refer, having studied all the relevant documents supplied to me.

I confirm that I have no conflict of interest of any kind, other than any disclosed in my report(s). I do not consider that any interest that I have disclosed affects my suitability as an expert witness on any issue on which I have given evidence. I undertake to advise the Inquiry if there is any change in circumstances that affects the above. I have no personal interest in supporting any particular point of view.

I understand that I may be called to give evidence.

Signed: 

Date: 2/4/2012

Summary of the 1995/96 Report "Who operates when?"

(Published September 1997)

Contents:

Summary of the Method

This report differed significantly from previous NCEPOD work, and the method is outlined below.

Between 1 April 1995 and 31 March 1996, data were provided to NCEPOD from 355 hospitals in the NHS and 22 independent sector hospitals about surgical procedures performed over seven 24-hour periods. The dates for the data collection were specified by NCEPOD and each of the seven dates for a Trust or unit occurred on a different day of the week.

NCEPOD defined as "out-of-hours" any surgical procedure for which the start of anaesthesia, or the start of the procedure, was between 18.01 and midnight (evening), or midnight and 07.59 hours (night-time), or the procedure was performed on a Saturday, Sunday or bank holiday. For these out-of-hours cases, the consultant surgeon or gynaecologist was asked to confirm or amend the starting time and other details and to state why the procedure was performed at that time.

The local contacts who had provided the initial data were asked also to inform NCEPOD of the death of any patient whose procedure was performed on the days studied. These were restricted to deaths within 30 days of that procedure. The relevant consultant surgeon and anaesthetist were asked to complete questionnaires about these patients.

Summary of findings in NHS hospitals

- 54% of all operations during the daytime on a weekday were performed in the presence of a consultant surgeon and 56% in the presence of a consultant anaesthetist.

- 71% of the operations during the daytime on a weekday were performed in the presence of a trained surgeon, where 'trained surgeon' includes staff grade, associate specialist, senior registrar and consultant. The figure for 'trained anaesthetists', similarly defined, was 72%.

- 7% of the operations during the daytime on a weekday and 20% during weekday evenings were performed by apparently unsupervised senior house officers. The related figures for SHO anaesthetists were 9 % and 47%.

- 37% of the emergency procedures during weekday daytime's (08.00 to 18.00 hrs), and 6.3% during weekday evenings (18.01 to 24:00 hrs) were performed during sessions scheduled primarily for emergency theatre cases. The overall percentage (08.00 to 24:00 hrs) was 25%.

- 51% of the participating hospitals had scheduled operating sessions for emergency procedures during the day from Monday to Friday.

- 46% of the routine cases started during the daytime from Monday to Friday were day cases.

Recommendations

- All hospitals admitting emergency surgical patients must be of sufficient size to provide 24-hour operating rooms and other critical care services. There should also be sufficient medical staff to perform these functions.

- These provisions should be continuous throughout the year: trauma and acute surgical emergencies do not recognise weekends or public holidays.

- Patients now expect to be treated and managed by trained and competent staff. Patients assume trainees to be taught appropriately and supervised as necessary. Consultants should acknowledge these facts and react accordingly.

Implementation

Organisational

- All hospitals which admit patients for emergency procedures should have an emergency surgery list, staffed and in a fully-equipped theatre suite. Anaesthetists and surgeons rostered for emergency work should be free from other commitments: this should be a fixed part of the consultant contract.

- Consultant anaesthetists, surgeons and hospital managers should together plan the administration and management of emergency admissions and procedures.

- In order to avoid queuing for theatre space it may be necessary to nominate an arbitrator in theatres who would decide the relative priority of theatre cases. This practice already successfully operates in some hospitals and should be used more widely.

- All hospitals should record the grades of anaesthetists and surgeons present in the anaesthetic room and the operating theatre and their responsibilities.

- Systematic clinical audit should include the pattern of work in the operating theatres.

- An attempt to harmonise the definitions used by the NHS Executive, and the clinical definitions commonly used by surgeons and anaesthetists, would be welcome.

Clinical

- The condition of patients should be optimised prior to anaesthesia and surgery. This may involve the use of local protocols addressing issues such as: the required duration of preoperative starvation, the use of emergency admission units/wards, the preoperative use of critical care services (ICU/HDU etc.), the management of comorbidities by other consultant medical specialists as appropriate, fluid management, analgesia and appropriate use of facilities for the elderly.

Key Points - review of deaths

Anaesthetic questionnaires

Much of the information is identical to that in previous NCEPOD reports but in examining these cases the specialist registrar advisors drew attention to a number of issues.

- Decision-making was still considered to be unsatisfactory in some cases; too many are made by too junior trainees. The specialist registrar advisors were strongly of the opinion that a decision to operate should be made by consultants.

- Preoperative management was sometimes poor. Guidance from experienced staff was needed in resuscitating patients, and on occasions this may require referral to an ICU preoperatively. A rush to operate before adequate resuscitation was completed was likely to lead to prolonged and often unproductive postoperative intensive care.

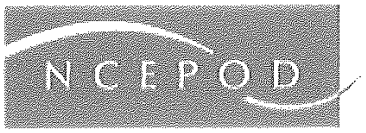
- Management of intravenous fluids was poor in some cases. There are benefits and dangers in their use. On occasions a lack of fundamental understanding of physiology appeared to be the problem.

- Records and charts were often poorly kept or inadequate.

Surgical questionnaires

- The authors and advisors were concerned about the lack of preoperative preparation received by many of these patients who died; particular attention is drawn to the low use of intravenous fluids, infrequent use of objective cardiac assessment and patchy application of thromboembolic prophylaxis.

- With regard to individual patients, the authors and advisory groups identified several themes concerning sub-optimal standards of delivery of care. These mainly concerned delays in admission and surgery, inappropriate grades of surgeon (too junior), failure of preoperative preparation, lack of communication between specialists and inappropriate operations. These problems have all been identified in previous NCEPOD reports and recommendations made repetitively.



Summary of the 1989 Report

(published June 1990)

Contents:

Sample group

The detailed sample for the 1989 Report was deaths of children aged ten years or under.

Recommendations

- The information systems, particularly clinical information systems, in the NHS should be considerably improved to provide accurate and timely information for audit and clinical quality assurance. All consultants should assist in achieving this improvement.
- Local audit meetings are essential to good clinical practice and all consultants should participate.
- Surgeons and anaesthetists should not undertake occasional paediatric practice. The outcome of surgery and anaesthesia in children is related to the experience of the clinicians involved.
- Consultants who take the responsibility for the care of children (particularly in District General Hospitals and in single surgical speciality hospitals) must keep up to date and competent in the management of children.
- Consultant supervision of trainees needs to be kept under scrutiny. No trainee should undertake any anaesthetic or surgical operation on a child of any age without consultation with their consultant.

Key points

- The overall surgical and anaesthetic care of children as revealed to this Enquiry is excellent.
- Few children die following surgery. Those who die have multiple congenital anomalies often not compatible with life, or malignant tumours, or suffer severe multiple trauma.
- Much surgery and anaesthesia for children is given by clinicians with a regular paediatric practice. However, this is not always so.
- While most children's surgery and anaesthesia is undertaken by, or under the direct supervision of, consultants on some occasions this supervision was lacking.
- The clinical competence of some locum appointees to care for the special needs of children must be questioned.
- The needs of children in single surgical speciality units are not always fully met. Whilst the natural dominance of surgical requirements (for neurosurgery and burns in particular) are paramount, an absence of facilities in intensive care for children and a lack of skilled paediatric anaesthetists, paediatricians and paediatric nurses were found in some units.
- Local audit meetings to review the management of children occur in 83% of cases. This is a considerable improvement on the situation reported in the report of a Confidential Enquiry into Perioperative Deaths (1987).
- The system established by NCEPOD for the collection of data worked well. Its success was ensured by the enthusiasm of the consultants who participated. NCEPOD has again demonstrated that consultant anaesthetists and surgeons are willing to review their performance (only 0.2% of consultants refused to participate).
- The data systems in the NHS are inadequate. Rates of events (admissions, operations and deaths) cannot be calculated because contemporary data are not available. Thus valid comparisons between hospitals, districts or regions cannot be made promptly enough to influence clinical practice.