Raychel Ferguson

Consolidated Clinical Report by Advisors
February 28, 2013

This short report describes the main clinical issues and initial management and governance areas that impacted on Raychel's care during her hospital admission in June 2001 that the advisors believe require further examination by the Inquiry during the forthcoming Oral Hearings

In addition to all the relevant clinical, nursing & administrative records, the following statements & reports were used in the generation of this document:

1. Protocol & briefs for experts
2. Witness Statements & responses to questions; Mr RR Makar, Senior House Officer, Surgery, Altnagelvin Area Hospital
3. Witness Statements & responses to questions; Dr VK Gund, Senior House Officer, Anaesthesia, Altnagelvin Area Hospital
4. Witness Statements & responses to questions; Dr C Jamison; Senior House Officer, Anaesthesia, Altnagelvin Area Hospital
5. Witness Statements & responses to questions; Mr HM Zafar, Senior House Officer, General Surgery, Altnagelvin Area Hospital
6. Witness Statements & responses to questions; Dr M Butler, Senior House Officer, Paediatric Medicine, Altnagelvin Area Hospital
7. Witness Statements & responses to questions; Dr J Devlin, House Officer, Surgery, Altnagelvin Area Hospital
8. Witness Statements & responses to questions; Dr M Curran, Junior House Officer, Surgery, Altnagelvin Area Hospital
9. Witness Statements & responses to questions; Dr J Johnson, Senior House Officer, Paediatrics, Altnagelvin Area Hospital
10. Witness Statements & responses to questions; Dr B Trainor, Senior House Officer, Paediatrics, Altnagelvin Area Hospital
11. Witness Statements & responses to questions; Dr A Date, Specialist Registrar, Anaesthetics, Altnagelvin Area Hospital
12. Witness Statements & responses to questions; Dr B McCord, Consultant Paediatrician, Altnagelvin Area Hospital
13. Witness Statements & responses to questions; Dr G Allen, Senior House Officer, Anaesthesia, Altnagelvin Area Hospital
14. Witness Statements & responses to questions; Dr Mr Bhalla, Specialist Registrar, General Surgery, Altnagelvin Area Hospital
15. Witness Statements & responses to questions; Dr G Nesbitt, Consultant Anaesthetist & Clinical Director in Anaesthesia & Critical Care, Altnagelvin Area Hospital
16. Witness Statements & responses to questions; Dr CC Morrison, Consultant Radiologist, Altnagelvin Area Hospital
17. Witness Statements & responses to questions; Dr S McKinstry, Consultant Radiologist, Royal Group of Hospitals, Belfast
18. Witness Statements & responses to questions; Dr Crean, Consultant Paediatric Anaesthetist, Belfast Royal Hospital for Sick Children
19. Witness Statements & responses to questions; Dr D Hanrahan, Consultant Paediatric Neurologist, Royal Belfast Hospital for Sick Children
20. Witness Statements & responses to questions; Dr D O'Donoghue, Clinical Fellow in Paediatric Intensive Care, Royal Belfast Hospital for Sick Children
21. Witness Statements & responses to questions; Dr B Herron, Consultant Neuropathologist, Royal Victoria Hospital, Belfast
22. Witness Statements & responses to questions; Dr R Fulton, Medical Director, Altnagelvin Hospitals Health & Social Services Trust

23. Witness Statements & responses to questions; Mr R Gilliland, Consultant Colorectal and General Surgeon, Altnagelvin Area Hospitals
24. Witness Statements & responses to questions; Dr C Loughry, Consultant Chemical Pathologist, Belfast City Hospital
25. Witness Statements & responses to questions; Mrs S Burnside, Chief Executive, Altnagelvin Area Hospitals
26. Witness Statements & responses to questions; Dr B McConnell, Director of Public Health Medicine, Western Health & Social Services Board
27. Witness Statements & responses to questions; D Patterson, Staff Nurse (D Grade), Pediatrics, Altnagelvin Area Hospitals
28. Witness Statements & responses to questions; A Noble, Staff Nurse (E Grade), Ward 6, Altnagelvin Area Hospitals
29. Witness Statements & responses to questions; M McGrath, Staff Nurse, Theatres, Altnagelvin Area Hospitals
30. Witness Statements & responses to questions; M McAuley (née Rice), Staff Nurse (D Grade), Ward 6, Altnagelvin Area Hospitals
31. Witness Statements & responses to questions; A Roulston, Staff Nurse, Ward 6, Altnagelvin Area Hospitals
32. Witness Statements & responses to questions; S Gilchrist, Staff Nurse, Paediatrics, Altnagelvin Area Hospitals
33. Witness Statements & responses to questions; F Bryce, Staff Nurse (D Grade), Paediatrics, Altnagelvin Area Hospitals
34. Witness Statements & responses to questions; E Lynch, Auxillary Nurse (NVQ 2), Paediatrics, Altnagelvin Area Hospitals
35. Witness Statements & responses to questions; E Millar, Sister, Ward 6, Altnagelvin Area Hospitals
36. Witness Statements & responses to questions; Dr E Sumner, Consultant Paediatric Anaesthetist, Great Ormond Street Hospital, London
37. Witness Statements & responses to questions; Dr JG Jenkins, Senior Lecturer in Child Health & Consultant Paediatrician, Antrim Hospital
38. Witness Statements & responses to questions; Mr J Leckey, HM Coroner, Greater Belfast
39. Witness Statements & responses to questions; Mr S Millar, Chief Officer, western Health & Social Services Council
40. Witness Statements & responses to questions; Dr B Kelly, Senior House Officer, A&E, Altnagelvin Area Hospitals
41. Witness statement ; Dr Zawislak, Locum Staff Grade, Surgery
42. Witness Statements by members of the Ferguson family
43. Depositions to Coroner's Inquest
44. PSNI witness statements/interviews
45. RHBSC case notes
46. Altnagelvin Area Hospital case notes
47. Medico-legal report by Mr John D Orr (Paediatric Surgeon)
48. Expert reports by Dr Simon Haynes (Paediatric Anaesthetics)
49. Expert reports by Mrs Sally Ramsay (Paediatric Nursing)
50. Expert report by Wellesley Forbes (Neuroradiologist)
51. Expert reports by Dr Robert Scott-Jupp (Paediatrician)

52. Expert reports by George Foster (Paediatric Surgeon)
53. Expert report by Fenella Kirkham (Paediatric Neurologist)

Summary

The list below summarises the matters for further consideration detailed in the chronological account which forms the bulk of this report. Those items marked *Key issue* are considered as potentially having had a significant effect on outcome.

Pre -operative management

- Did the administration of cyclimorph by Dr Kelly compromise his and Mr Makar's ability to appropriately assess and diagnose Raychel's problem and were alternative diagnoses appropriately excluded?

- The content of the discussion between Mr Makar and his registrar, Mr Zawislak, prior to taking Raychel to theatre.

- What policies existed for operating on children at night: in particular what attention had been given to successive NCEPOD reports dealing with this issue? *Key Issues*

- What information had been provided to the surgical trainees regarding operating on children at night? *Key Issue*

- What information had been provided to junior doctors in the surgical and anaesthetic teams regarding contacting consultants when children were admitted out of hours? *Key Issues*

Fluid prescription and management

- The prescription and management of fluid and electrolyte balance in the immediate post-operative period, including the role and responsibility of nursing staff *Key issue*

- Was there any written guidance regarding the management of intravenous fluids in post-operative children at the time? If not, where did junior doctors find this information? Who had drawn up and approved the 'ward policy' on maintenance infusion fluids? How was it made known to medical trainees in various specialties? *Key issues*

- What awareness did the surgical trainees have of the potential risks of IV fluids, as outlined by GF? *Key issue*

- Did junior doctors understand the post-surgical physiology impacting on fluid balance?

- What instructions were given to junior surgical staff regarding reassessment of fluid balance status and measuring electrolytes in children receiving IV fluids? *Key issue*

- What instructions were given to medical staff on communicating to the nurses how post-operative fluids were to be managed? *Key issue*

- The monitoring, recording and reporting of Raychel's fluid balance in the post-operative period. *Key issue*

Patient management

- What arrangements were in place for undertaking and recording an early postoperative review of children by a registrar or consultant? *Key Issue*

- Why was follow-up apparently left to the most junior and least experienced trainees? *Key issue*

- What were the arrangements in the surgical team for day-to-day supervision of pre-registration house officers and continuity of patient care? *Key issue*

Communication within the clinical team regarding patient management

- What was the usual practice in 2001 for determining reasons for delays in theatre and communicating these to parents?

- What policies and practices were in place to guide junior medical and nursing staff in calling the on call team and the consultant? *Key issue*

- What arrangements were in place to help nurses decide when to refer children to an appropriate doctor? *Key issue*

- What was the role of the admitting consultant in terms of a post-take ward round? *Key issue*

- What was the role of the ward sister in relation to supervision of staff caring for children following surgery? *Key issue*

- Had there been any past experience of difficulties in obtaining a surgical review? If so, had any discussions taken place to consider whether the paediatric team should assume a 'watching brief' for 'surgical' children, as may be the situation in other NHS hospitals?

- Were nurses required to attend children with a doctor when they had asked the doctor to see the patient? If so, how was this communicated to them? *Key issue*

- What policies were in place regarding care planning and maintenance of complete patient records? How did the trust ensure that these records met professional guidance of the time? *Key issue*

- What was the policy on recording weight for children admitted to hospital, especially prior to surgery?

- Is it customary in NHS hospitals for experienced nurses to guide junior doctors regarding the normal practice in a ward. Should this information be written down in a ward handbook, with which all of the ward team are familiar?

Clinical governance and management issues

- Which clinical team should have overall responsibility for postoperative care once a patient has left the recovery area. *Key issue*

- What arrangements did the trust have to ensure that appropriately qualified and experienced medical staff were employed and on duty at this time?

- What policies and practice were in place for the supervision and management of children admitted to Altnagelvin Hospital? *Key issue*

- What was the responsibility of the Deanery and the Regional Surgical Advisor in ensuring surgical trainees were not expected to practice beyond their competence? *Key issue*

- What education about fluid and electrolyte balance and prescribing, was undertaken at all levels at that time (medical school, postgraduate, hospital induction, and nursing)? *Key issue*

- What teaching did junior surgical staff and nursing staff receive in understanding and managing postoperative nausea and vomiting (PONV)? *Key issue*

- How were doctors made aware of the recommendations of NCEPOD reports, where this related to their practice?

- Was there a programme of post-registration professional development, supervision and appraisal in place for nursing staff? *Key issue*

- What was the structure of surgical training at Altnagelvin, given that none of the surgeons involved in treating Raychel were formal surgical trainees and such doctors may have less formal assessment and receive less feedback than trainees? (see GF supplementary report 4.5 (page 6)

Information and Communication with parents

- Whether Altnagelvin Trust acknowledged the concept of family–centred care and what staff training and development was given to staff in this respect.
- The lack of clear information given to Raychel's family during her stay in hospital *Key issue*
- Whether a policy existed regarding recording communications with parents and how this was conveyed to nursing staff. *Key issue*
- Was there any written guidance relating to communication with parents when their child was in theatre?
- The acceptance by parents of information provided by doctors & nurses
- The Trust's immediate response to the family to explain the reasons why Raychel had died, as known at the time. *Key issue*
- What guidance did the trust provide clinical teams regarding meetings with families, especially following the death of a child?
- The differing perceptions resulting from the meeting on September 3rd 2001, in particular to explain the reasons and cause of death *Key issue*

Action taken by The Altnagelvin Trust

- The impact of the Report of a Working Group into Paediatric Surgical Services in Northern Ireland (1999) on the configuration of children's surgery in NI
- The impact of the National Confidential Enquiry into Patient Outcome and Death (Executive summary of 1997 and 2003 reports) on 'out of hours' children's surgery.
- The timing of Raychel's surgery and personnel involved
- The role of the family on the Children's Ward in NI in 2001
- The responsibility for management of children requiring surgery on the wards in 2001
- Record keeping in relation to Raychel's care
- Knowledge of fluid management and hyponatraemia in children
- Development of incident reporting in NI in 2001 and processes in place in Altnagelvin Area Hospitals.

Action taken by the RBHSC Trust

- Whether the RBHSC Trust undertook any review of the death of Raychel, and whether this involved any collaboration or communication with Altnagelvin Hospital
- What lessons were learned following Raychel's death and whether these were conveyed to other hospitals in Northern Ireland.

- Whether The Trust undertook mortality and morbidity reviews and clinical audit in line with guidance from the Paediatric Intensive Care Society (UK)

Chronological Account

1. **Initial management in A&E on 7 June 2001**

When Raychel was admitted to hospital at 20.00 on the evening of 7 June, a diagnosis of acute appendicitis was made by Mr Makar, surgical SHO who decided to undertake an appendicectomy. There is some disagreement between the experts about whether this was the most appropriate course of action:

1.1. Dr Scott-Jupp (SJ), a paediatrician regarded Raychel's initial assessment and the decision to operate as in keeping with best practice.

1.2. Mr Foster (GF), a surgeon is critical of the following aspects of Raychel's treatment:

- Dr Kelly's (A&E SHO) decision to administer IV morphine at 20.20 (for pain relief) would have compromised Mr Makar's ability to properly assess Raychel. This was contrary to standard surgical teaching which was (and is) to avoid powerful analgesia until a surgeon has assessed the patient.
- GF considers Mrs Ferguson's observation of immediate pain relief after cyclimorph as requiring review of the diagnosis of appendicitis.
- Mr Makar did not record a note about the dysuria or proteinuria noted by Dr Kelly. Urine should have been sent for microscopy and culture to exclude urinary tract infection as a diagnosis. SJ disagrees, stating that the combination of 1-2+ of protein on immediate testing with negative nitrite and leucocyte tests made this process unnecessary.
- Failure to comply with the advice of the 1989 report of the Confidential Enquiry into Perioperative Deaths (NCEPOD), which stated that 'No trainee should undertake any anaesthetic or surgical operation without consultation with their consultant. GF states this was standard practice by 2001. He notes Mr Makar's recent statement that he followed his normal practice by informing Mr Zawislak (registrar) of clinical problems. Mr Makar believed the registrar was responsible for communicating with the consultant.

- NB: In WS 044/3, Mr Gilliland strongly disputes many of GF's criticisms

Matters for further consideration

- Did the administration of cyclimorph by Dr Kelly compromise his and Mr Makar's ability to appropriately assess and diagnose Raychel's problem and were alternative diagnoses appropriately excluded?
- The content of the discussion between Mr Makar and his registrar, Mr Zawislak, prior to taking Raychel to theatre.
- What policies existed for operating on children and night: in particular what attention had been given to successive NCEPOD reports dealing with this issue? *Key Issues*
- What information had been provided to junior doctors in the surgical and anaesthetic teams regarding contacting consultants when children were admitted out of hours? *Key Issues*

2. Initial IV fluid prescription

In A&E Dr Makar had prescribed Hartmann's solution intravenously, but this was changed to Solution 18 on the ward following discussion with Nurse Noble about usual practice on the ward. Therefore, prior to surgery, Raychel received 60 mls Solution 18 intravenously.

2.1. SJ regards the fluid regime prescribed on the ward as in line with standard policy at the time, there being nothing in Raychel's condition or the initial blood test results to suggest otherwise.

2.2. GF states that a standard calculation for *maintenance* fluid requirements for children of the weight of Raychel (25kgs) gives a maximum hourly rate of 65mls an hour. Expert Nursing reports by Susan Chapman and Sally Ramsay (SR) refer to calculations supporting this amount (098-092a-333, 224-004-017)). SR suggests that an experienced nurse should have identified the high postoperative infusion rate.

2.3. Consultant anaesthetist, Simon Haynes (SH) is critical of the nurses apparently dictating the fluid regime. He agrees that the traditional Holliday & Segar formula dictated a rate of 65mls/hr but considers the nurses "very unlikely to have a proper understanding of fluid and electrolyte balance or understand how abnormalities could arise."

2.4. In contrast, SR (Sally Ramsay, Children's Nurse) was surprised by the lack of understanding of nurses regarding fluid balance. SR states that it was common for nurses to advise doctors on local protocols and practices. She states that it was reasonable for S/N Noble to inform Mr. Makar that Solution 18 was normally used. She considers that, while nurses have a role in alerting medical staff to errors, their prime duty is to administer fluids as prescribed by medical staff. She notes the General Medical Council document *Good Practice in Prescribing Medicines (2008)* states :

"If you prescribe at the recommendation of a nurse who does not have prescribing rights, you must be satisfied that the prescription is appropriate for the patients concerned and that the professional is competent to have recommended the treatment."

SR considered this to have underpinned good medical practice in 2001.

Matters for further consideration:

- Is it customary in NHS hospitals for experienced nurses to guide junior doctors regarding the normal practice on a ward? Should this information be written down in a ward handbook, with which all of the ward team are familiar?
- What awareness did the surgical trainees have of the potential risks of IV fluids, as outlined by GF? *Key issues*
- Who had drawn up and approved the 'ward policy' on maintenance infusion fluids? How was it made known to medical trainees in various specialties? *Key issues*
- Which clinical team should have overall responsibility for postoperative care once a patient has left the recovery area? *Key issue*

3. Admission to the ward and pre-operative care

Raychel was admitted to the ward at 21.50 for a brief period until she went to theatre at 23.10. Consent had been signed by Mrs Ferguson. Raychel had been starved prior to surgery and had received intravenous Solution 18 (see above). Her observations and blood results were satisfactory prior to theatre with serum sodium at 137mmol/l. An electronic nursing care plan was drawn up by Staff Nurse Patterson, which included both pre and post-operative care.

3.1. GF is critical of the communication during the preoperative period. He stated that there were serious 'vertical communication problems' at Altnagelvin, given that Mr Gilliland, the consultant nominally responsible for her care, did not know Raychel had been admitted until after her death. In addition, he stated that there was no need to operate overnight, rather Raychel should have been re-assessed the following morning and a decision regarding surgery made then. He quotes the NCEPOD 1997 report recommending that out-of-hours surgery should be avoided unless the situation was extremely urgent.

3.2. SH echoes GF's concerns in relation to the anaesthetic care. He notes that it is not clear if the consultant anaesthetist on call was informed about Raychel's admission or the decision to operate on her. He agrees her condition might have improved overnight such that appendicectomy became unnecessary. He quotes the NCEPOD 1999 report "Extremes of Age" that anaesthetic and surgical trainees need to know the circumstances in which they should inform their consultants before undertaking an operation on a child. He cites the report:

***'when a child is about to undergo a surgical procedure in theatre, the appropriate consultant must be informed'* (p39-40).**

3.3. SH noted that Mr Makar had estimated Raychel's weight and stated that it was '*unusual and is not good practice*' for a child not to be weighed in A&E or on the ward. He stated that measuring an accurate weight is normally part of the admission process on a children's ward especially prior to surgery. There is no nursing record that a weight was recorded, although the nursing care plan requires a weight to be recorded (020-027-061). Whilst SH stated that the weight was a reasonable estimate, this measurement is important as fluid and drug calculations are made based on this.

Matters for further consideration:

- What information had been provided to the surgical trainees regarding operating on children at night (see section 1)? *Key Issue*
- What information had been provided to junior doctors in the surgical and anaesthetic teams regarding contacting consultants when children required surgery out of hours (see section 1)? *Key Issue*
- How were doctors made aware of the recommendations of NCEPOD reports, where this related to their practice?
- What was the policy on recording weight for children admitted to hospital, especially prior to surgery?

4. Peri-operative care including recovery

During surgery Raychel was administered anaesthetic agents, anti-emetics, an analgesic, antibiotic and IV Hartmann's solution, an isotonic fluid. The surgery appeared uneventful apart from prolonged sedation from opioids, which presumably was the cause of the delay in Raychel's return to the ward, mentioned by Mrs Ferguson in her witness statements.

4.1. Mr and Mrs Ferguson report that they were not informed of the reason that Raychel was in theatre for longer than anticipated. They did not ask the reason, as they were relieved to see Raychel following the surgery.

Matters for further consideration:

- What was the usual practice in 2001 for determining reasons for delays in theatre and communicating these to parents?
- Was there any written guidance relating to communication with parents when their child was in theatre?

5. Post-operative care on ward 6

5.1. The Ward Round

Dr Zafar reviewed Raychel on the ward round around 8am on 8th June, conducted with Sister Millar and another doctor. This round was not attended by either Mr

Zawislak (Registrar on call) or Mr Bhalla (registrar for 8th June). Dr Zafar wrote a brief note, including a request for observations to continue. He verbally requested that the IV fluids should be reduced as Raychel tolerated oral fluids. The nursing notes recorded the doctor's decision to give 'sips of water as tolerated'.

5.1.1. Dr Zafar is unclear about who normally attended the morning ward round. In his second statement WS-025-2, page 6, he says that a JHO/SHO & SpR would attend the ward round to review post-operative patients, sometimes with a consultant. However, on page 7 he states that 'morning ward round was always conducted by the SHO and JHO' but he did not remember who the JHO was. However, he does recollect Sister Miller being in attendance.

5.1.2. SJ is not critical of the 'very brief and untimed' ward round note on the basis that most patients on routine surgical ward rounds are straightforward and decisions simple.

5.1.3. In contrast, GF states "there is no question that after a 24 hour duty period (usually 8 am to 8 am) a round of patients admitted ['post-take' round] should be made at least [by] a specialist registrar reporting to the consultant or ideally by the consultant himself." This provides an opportunity for the on-call team to hand over to the day team. Had this happened he considers Raychel's case would not have been seen as straightforward and 'more care might have been taken with postoperative observations.' He raises concerns regarding the experience of Dr Zafar, who managed Raychel's care on 8th June, without reference to a more senior colleague.

Matters for further consideration:

- What arrangements were in place for undertaking and recording an early postoperative review of children by a registrar or consultant?
- Why was follow-up apparently left to the most junior and least experienced trainees? *Key issue*
- What arrangements did the trust have to ensure that appropriately qualified and experienced medical staff were employed and on duty at this time?
- What was the role of the admitting consultant in terms of a post-take ward round? *Key issue*

5.2. **Post-operative fluid management**

Dr Gund, the anaesthetic SHO, wrote a prescription for intravenous Hartmann's solution to cover the first few postoperative hours. However, following advice from Dr Jamieson the IV fluid was discontinued in theatre, as the ward team were responsible for IV fluids in paediatrics. The IV No 18 solution was recommenced on the ward at the pre-operative rate.

5.2.1. SH considers Dr Gund's initial prescription to have been appropriate. He was 'placed in a difficult situation' as there was no clear structure or acceptance of responsibility between the senior staff in surgery, anaesthesia and paediatrics,

regarding postoperative fluid prescribing. SH noted that Staff Nurse Noble had '*not received an instruction to recommence Raychel on Solution 18 on return from theatre*'. SH summarises the understanding of fourteen professionals involved in Raychel's care, which clearly demonstrates the lack of clarity regarding responsibility for fluid prescription. This 'generated a system whereby IV fluid prescriptions… were being dictated to junior medical staff by the nursing staff on the basis of custom and practice, rather than patient observation and informed by individual patient need.'

5.2.2. SR reports that post-operative fluids should have been prescribed in theatre before return to the ward, to reflect any required post-operative restriction. She concluded that there was no clear responsibility for intravenous fluid prescription with both paediatric and surgical doctors responding to directions from nurses. There was no apparent fluid prescription protocol available, nor was there any continuity in prescribing.

5.2.3. GF would expect the normal infusion rate to be reduced postoperatively by around 20% to account for the expected postoperative increase in secretion of ADH, a problem well described in surgical textbooks available at the relevant time. The consequence was that 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. He would have expected Mr Makar and experienced nurses to have spotted the over-infusion.

5.2.4. SH and GF both criticise continuing the relatively high volume of fluid (Solution 18) at 80ml/h rather than 65 ml/hr and the failure to have blood analysed for electrolyte levels. This was essential in any post-operative case but particularly in view of Raychel's vomiting, which had the potential to adversely affect electrolyte levels. SH quotes Arieff's paper: "When a paediatric patient receiving hypotonic fluids begins to have headache, emesis, nausea or lethargy, the serum sodium concentration must be measured." SH states that a number of opportunities were missed to take a sample and act on the findings before Raychel had a fit on 9th June.

5.2.5. SJ also considers that blood should have been analysed, the timing determined by the factual matrix relating to the severity of symptoms and rate of deterioration.

Matters for further consideration:

- Did junior doctors understand the post-surgical physiology impacting on fluid balance?
- The prescription and management of fluid and electrolyte balance in the immediate post-operative period, including the role and responsibility of nursing staff *Key issue*

- What instructions were given to junior surgical staff regarding reassessment of fluid balance status and measuring electrolytes in children receiving IV fluids? *Key issue*
- Was there any written guidance regarding the management of intravenous fluids in post-operative children at the time? If not, where did junior doctors find this information?
- What instructions were given to medical staff on communicating to the nurses how post-operative fluids were to be managed? *Key issue*
- The monitoring, recording and reporting of Raychel's fluid balance in the post-operative period. *Key issue*
- What education about fluid and electrolyte balance and prescribing, was undertaken at all levels at that time (medical school, postgraduate, hospital induction, and nursing)? *Key issue*

5.3. **Management of postoperative nausea and vomiting (PONV)**

Raychel returned from theatre at around 02.00 and was stable overnight until around 08.00 when a nurse recorded the first vomit. There were eight further vomits recorded on the fluid balance chart up to 23.00 (020-018-037). However, Mr and Mrs Ferguson have stated that Raychel vomited more frequently and at times described her as 'heaving' and continually vomiting.

5.3.1. SH is critical of the fact that, although antiemetic treatment was prescribed during the afternoon, there is no record of Raychel being examined by any doctor after it became apparent to parents that vomiting was troublesome. He notes that PONV usually settles within the first 6 hours after surgery but may be troublesome for up to 24 hours. He does not criticise the drugs prescribed in an attempt at control the vomiting. However, he states that the first response to persistent nausea and vomiting should be to examine the patient to identify the likely cause, to evaluate gastric losses and to replace these with 0.9% saline.

5.3.2. SH points out that it is standard practice that fluid lost as vomitus should be replaced by 0.9% saline rather than No 18 solution. This is supported by Susan Chapman who stated that 'normal (0.9%) saline with additional potassium would be used for this purpose' (098-092a-334). SH states blood electrolytes should have been measured, particularly when it became obvious that Raychel was vomiting significant amounts.

5.3.3. SJ doubts the vomiting was related to surgery or anaesthesia as it began eight hours postoperatively. He considers nurses should have alerted medical staff leading to an experienced surgeon being consulted (or a senior paediatrician). He is not critical of Dr Butler simply rewriting the IV without examining Raychel or making further enquiry, as he considers this to be normal practice. SH states that Dr Butler should have checked Raychel's weight and calculated the fluid when asked to prescribe a second bag of fluid. He also notes that Dr

Butler was aware of the requirement for daily urea and electrolyte checks in children on intravenous fluids.

5.3.4. GF notes that Dr Butler did not question the high infusion rate and that Raychel's care was 'to all intents and purposes left to the nursing staff.' He notes that the doctors who attended Raychel were very junior surgical trainees (Drs Devlin and Curran). They seem not to have asked themselves why Raychel was vomiting and they 'could not have been expected to make clinical decisions on postoperative children.' Their being first on call was unsatisfactory and he expresses surprise that this 'escaped the scrutiny of the Postgraduate Deanery responsible.'

5.3.5. SJ also draws attention to this last point, noting that Mrs Ferguson's account of Raychel's deterioration is corroborated in part by other visitors and the mother of another patient. He considers that, if this is factual, the nurses should have alerted medical staff who should have made a detailed examination and involved an experienced clinician, either surgical or paediatric. He adds that the latter, in particular 'are trained to recognise these [symptoms]'. GF, in his commendation of the paediatric SHO and registrar can be inferred as supporting this opinion.

5.3.6. SR stated that it was reasonable for nurses to expect that Raychel would follow the expected recovery pathway in the immediate post-operative period. However, she was surprised by the lack of understanding of the nurses about fluid balance, particularly when an IV infusion was in progress or when a child was persistently vomiting. SR was critical of the 'lack of rigour in monitoring fluid intake and output' and the 'failure to record all episodes of vomiting'.

5.3.7. SR criticises the nurses for not identifying the nausea and vomiting as a problem and for not informing the medical staff at 10.30 when Staff Nurse Rice recorded a large vomit on the fluid chart. She stated that at this point, PONV should have been included as a problem in the care plan as it was distressing for the child and family and required treatment. A doctor should have assessed Raychel, administered antiemetic medication and the frequency of observations should have increased. In fact, the first antiemetic was not administered until around 18.30 by Dr Curran. SR concluded that the nursing management of PONV was inadequate.

5.3.8. SR reported that PONV was not unusual in children, especially those between the ages of 5 and 9 years old. Sister Miller reported that the level of vomiting seen in Raychel was not unusual, which suggests the nurses frequently manage this condition. SR stated that the nurses should have been aware of the impact of excessive fluid and PONV and noted a particular concern in relation to Staff Nurse Noble, who knew about a rare complication of vomiting and not a frequently occurring one. However, she reported that it was the nurses' responsibility to raise concerns with the doctors and for the doctors to make the assessment of Raychel and call senior colleagues if they needed assistance.

5.3.9. GF concludes from the nursing statements that there was a '*lack of any formal system to identify a patient whose clinical course fell outside an expected envelope*'. He states that experienced nurses should have been a '*safety net*' for junior house officers.

5.3.10. SH notes that Raychel's abnormal state and deterioration was either 'unnoticed or the significance was not appreciated by nursing staff or medical staff.' Similarly, GF is particularly critical of the failure by all staff involved to recognise the deterioration in Raychel's condition throughout the day. SR noted five different doctors from two teams being asked to prescribe drugs and fluids. None of these doctors saw Raychel more than once during the day on 8th June, which resulted in a lack of continuity. SH noted that whilst the early vomiting may have been due to the causes of PONV, as the day progressed, the persistent nausea and vomiting was associated with a headache and was due to hyponatraemia.

5.3.11. Professor Kirkham raises the possibility that Raychel's vomiting was not due to PONV but to a previously undiagnosed genetic disorder. This raises the issue that the medical staff should have directed investigations into her vomiting, for example by measuring her blood ammonia levels. This might have led to a different treatment pathway. We note that no other medical expert who has commented on this case has raised such an issue.

Matters for consideration:

- What teaching did junior surgical staff and nursing staff receive in understanding and managing PONV? *Key issue*
- What was the responsibility of the Deanery and the Regional Surgical Advisor in ensuring surgical trainees were not expected to practice beyond their competence? *Key issue*
- What were the arrangements on the surgical team for day-to-day supervision of pre-registration house officers and continuity of patient care? *Key issue*
- What arrangements were in place to help nurses decide when to refer children to an appropriate doctor? *Key issue*
- What was the role of the ward sister in relation to oversight of patient care and supervision of staff caring for children following surgery? *Key issue*
- Was there a programme of post-registration professional development, supervision and appraisal in place for nursing staff? *Key issue*

5.4. **Action taken following 'coffee ground' vomiting**

At 21.00 on 8 June the nurses noted coffee grounds in Raychel's vomit and she complained of a headache and was unable to stand. She had several small vomits until 23.00, after which time the nurses noted her to be sleeping, until she was noted to have had a fit at 03.05 on 9th June.

5.4.1. This sign represents stale blood in the vomitus and is described by GF as 'an indication of significant or severe and prolonged vomiting and retching. SJ is

less concerned, stating that 'in this case it is the frequency and the severity of the vomiting which is critical, not the occurrence of coffee-grounds.'

5.4.2. Dr Curran attended but made no note of his attendance or action, nor is there a nursing note of his visit. GF's opinion is that 'he should have, without doubt understood the seriousness…and called his senior colleague' and that 'the nurses should also have insisted on this.' He considers an experienced SHO, registrar or consultant would have acted urgently, taking appropriate remedial measures, including undertaking blood investigations and seeking paediatric and anaesthetic help. He considers the situation was still retrievable.

5.4.3. SJ states that if petechiae had been identified at this point, rather than only after her fit, this should have been another pointer to the severity of vomiting.

5.4.4. SJ states Dr Curran should have discussed Raychel with his senior at 21.00. The lack of response to anti-emetics, especially at 22.00 should have prompted 'more concern and discussion by the junior medical staff [actually junior surgical staff] with more senior colleagues.' Blood tests should have been taken by about 21.00 and certainly by Dr Curran at 22.15. He considers treatment of hyponatraemia at this stage could have avoided or mitigated the outcome.

5.5. **Management of the convulsion**

5.5.1. GF notes that Dr Johnston, paediatric SHO, called by the nurses at 3 am to deal with Raychel's fit 'acted commendably and quickly showing those qualities expected of a good clinician.' He also commends Dr Trainor, whom Dr Johnston asked for help.

5.5.2. He notes the only member of the surgical team who attended between 3 am and 4.45 am was Dr Curran. While he accepts the surgical SHO and registrar might have been busy elsewhere, he asks why a consultant surgeon was not consulted at the time. He concludes 'I am concerned that the surgical department was scarcely represented throughout all these events…'

5.5.3. SH notes a delay between Dr Johnson and Dr Trainor attending Raychel as she was busy elsewhere. He states that it would have been reasonable for Dr Johnson or the nursing staff to call Dr McCord to ask him to see Raychel.

5.5.4. SJ states that, with hindsight, fluids should have been restricted or changed to 0.9% saline during the 45 minutes between taking blood and receiving the result of the low sodium. However, he does not consider this could necessarily have been appreciated at the time as some other cause for her fit may have become apparent. He is not critical of failing to take action until the confirmatory result was received.

Matters for further consideration:

- What policies were in place for the supervision and management of children admitted to Altnagelvin Hospital? *Key issue*
- Had there been any past experience of difficulties in obtaining a surgical review. If so, had any discussions taken place to consider whether the paediatric team should assume a 'watching brief' for 'surgical' children, as may be the situation in other NHS hospitals?

5.6. **Other post-operative management issues**

5.6.1. SR identified that Staff Nurse Rice had attempted to call the surgical JHO several times between 15.00 and 17.00 on 8th June, but had not received a response. There was no attempt to contact another member of the team, which may have resulted in Raychel being assessed and given an anti-emetic sooner. GF notes that Mr Bhalla (registrar) was not aware of Raychel's admission until around 05.00 on 9th June when he was called to the ward.

5.6.2. SR raises concerns that there was no evidence that nurses attended Raychel with medical staff when they called them to give drugs or changed fluids. She states that this provides an opportunity to discuss the patient, aiding communication with doctors that are not regularly on the ward.

5.6.3. SR noted concerns regarding the nursing care plan, which included a lack of adherence to the plan in relation to recording fluid balance and lack of identification of PONV as a problem. In addition, there was limited evaluation of care provided, possibly due to the care plans being electronic and not immediately available at the bedside. However, this presented the risk that contemporaneous information was not recorded and thus some details were not available to other nurses looking after Raychel. Examples include a lack of recording of parental concerns about Raychel's condition and the efficacy of the anti-emetics given.

5.6.4. SH and SR have noted examples where doctors and nurses have not recorded treatment or events, which leaves Raychel's records with an incomplete picture of her condition, management and responses to this.

5.6.5. GF notes that Mr Bhalla did not call Mr Neilly (surgical consultant on call) when he saw Raychel early on 9th June as he did not think the problems related to surgery. Therefore, no consultant surgeon was aware of Raychel's admission until after her death at RBHSC.

Matters for further consideration:

- What advice and guidance was in place for nurses and doctors in relation to calling the on-call team including the consultant?
- Were nurses required to attend children with a doctor when they had been asked to see the patient? If so, how was this communicated to them? *Key issue*

- What policies were in place regarding care planning and maintenance of complete patient records? How did the trust ensure that these records met professional guidance of the time? *Key issue*

6. Transfer to Adult ICU at Altnagelvin Area Hospital

There are no concerns raised in relation to transfer to Adult ICU or care provided once Raychel was in the ICU.

7. Management in PICU, RBHSC

GF regards the care at this stage to have been 'sensitive and professional.' There are no concerns regarding this period of Raychel's care.

8. Haemodilution and hyponatraemia

In this case, as in that of AS, Professor Kirkham has stated her doubts about haemodilution and hyponatraemia as being the major or sole causes of cerebral oedema. In an early response to the deaths of the children, the Chief Medical Officer had used the term 'idiosyncratic' in referring to the complications which arose in the course of all the children's treatment. The advisers note that fatal hyponatraemia is (fortunately) rare, despite so many children over the last 50-60 years receiving relatively dilute IV solutions. They are not aware of any scientific literature which details studies comparing children who do or do not develop cerebral oedema after being given such solutions, so that the hypotheses put forward by Prof Kirkham and, by inference suggested by the CMO, are untested.

9. Information to and communication with Parents

The witness statements suggest that Mr and Mrs Ferguson were provided with little information regarding Raychel's care. They reported brief information provided before and during surgery, based on the fact that they accepted what nurses and doctors said, as they thought they 'knew best'. Mr Ferguson reported that 'nothing was explained' (WS 021-119 a,viii) and 'the nurses weren't listening to me' (095-005-018). There was no evidence from witness statements that nurses had spent time listening to or supporting Raychel and her family or that they raised the parents' concerns with appropriate staff in a timely way. Raychel died on 10th June 2001. We cannot find any references to the family being informed of the cause of death prior to the meeting on Sept 3, 2001.

9.1. SR noted that, whilst it is difficult for nurses to record detailed information regarding all communication with parents and families, it is normal practice to record brief notes in the nursing notes or on a communication sheet. These notes could include details of the parent's concerns and how these were dealt with. However, SR noted a discrepancy in perception between nursing staff and parents about Raychel's condition.

9.2. SR refers to the concept of 'family-centred care' which recognises parents as experts in their own child and necessitates nurses communicating effectively with families to understand how children are responding to treatment. The statements of Raychel's family provide a picture of a breakdown in the communication, which would have enabled the nurses to 'pick up on' Mrs Ferguson's concerns. SR concluded that the 'concerns and observations expressed by Raychel's parents and friends were unnoticed'.

9.3. SH notes that Mr Gilliland did not attend the meeting with Raychel's family on 3rd September. GF and SH state that Mr Gilliland should have attended this meeting in view of the fact that '*he (Mr Gilliland) was responsible for the totality of her care*'.

9.4. There are different recollections between the family and the Trust on the discussions at the September 3rd meeting. In her statement WS-01 Para 46 Marie Ferguson said *"I left the meeting totally confused believing it to be pointless"*. She did not believe that the meeting had addressed the cause of Raychel's death and felt the Trust was *"aggressive and defensive"* and that the meeting "*was the beginning of a cover up*". The Trust Chief Executive in her witness statement (WS 046) felt that a full apology was given with a commitment to be open about what happened.

These issues may be explored further in the consolidated management and governance report, but current **matters for further consideration** are:

- Whether Altnagelvin Trust acknowledged the concept of family–centred care and what staff training and development was given to staff in this respect.
- Whether a policy existed regarding recording communications with parents and how this was conveyed to nursing staff. *Key issue*
- The lack of clear information given to Raychel's family during her stay in hospital *Key issue*
- The acceptance by parents of information provided by doctors & nurses
- The Trust's immediate response to the family to explain the reasons why Raychel had died, as known at the time. *Key issue*
- What guidance did the trust provide clinical teams regarding meetings with families, especially following the death of a child?
- The differing perceptions resulting from the meeting on September 3rd 2001, in particular to explain the reasons and cause of death *Key issue*

10. Actions by the RBHSC Trust following Raychel's death

There appears to be no evidence that the RBHSC Trust undertook a critical incident review of Raychel's death or of any learning which came out of her death. The consultant paediatric anaesthetist (Dr Crean WS 038/2) met Mr and Mrs Ferguson at their request to discuss the post-mortem results but there is little evidence of communication with Altnagelvin Hospital after Raychel's death.

These issues will be considered in the consolidated report on management and governance, once the final witness statements and expert reports have been received and reviewed.

- Whether the RBHSC Trust undertook any review of the death of Raychel, and whether this involved any collaboration or communication with Altnagelvin Hospital
- What lessons were learned following Raychel's death and whether these were conveyed to other hospitals in Northern Ireland
- Whether The Trust undertook mortality and morbidity reviews and clinical audit in line with guidance from the Paediatric Intensive Care Society (UK)

11. Action taken by Altnagelvin Area Hospitals Trust following Raychel's death

The Altnagelvin Trust's response to Raychel's death appeared to be prompt and recognised that the issues were very serious. The investigation which followed the death tended to concentrate on technical issues around fluid management rather than the broader issues of patient observation and communication with relatives. Key staff involved in Raychel's care, such as Drs Kelly and Zafar, had not been included in the investigation. However, there is evidence that the lessons learned were put into practice.

The Trust took immediate action to learn from what had happened to Raychel. There is evidence that senior clinicians and executive managers pursued the wider remit to ensure that the lessons from Raychel's death would benefit the wider NHS community in Northern Ireland. Their message was sent out to other health organisations and they ensured that the Department of Health & Social Services was made aware of the need for good guidance across a wider community.

These issues will be considered in the consolidated report on management and governance, once the final witness statements and expert reports have been received and reviewed:

- The impact of the Report of a Working Group into Paediatric Surgical Services in Northern Ireland (1999) on the configuration of children's surgery in NI
- The impact of the National Confidential Enquiry into Patient Outcome and Death (Executive summary of 1997 and 2003 reports) on 'out of hours' children's surgery.
- The timing of Raychel's surgery and personnel involved
- The role of the family on the Children's Ward in NI in 2001
- The responsibility for management of children requiring surgery on the wards in 2001
- Record keeping by all professionals
- Knowledge of fluid management and hyponatraemia in children
- Development of incident reporting in NI in 2001 and processes in place in Altnagelvin Area Hospitals.

12. Interested Parties

Mr Gilliland:

- For possibly not ensuring that all surgical and paediatric trainees and nurses were aware of whose responsibility it was to prescribe and supervise postoperative IV fluids in children admitted under his care.
- For possibly not ensuring that trainees under his supervision were appropriately trained and understood the basics of IV management, its risks and benefits; and when to seek assistance from more experienced colleagues when called to see a postoperative patient.
- For not undertaking a 'post-take' ward round on 8th June 2001 to review Raychel, who was admitted under his care on 7th June. Consequently he had no knowledge of her so was unable to take any meaningful responsibility for a child under his care.
- For failing to attend the meeting with parents convened by the Chief Executive

Mr Makar:

- For not complying with the requirements of NCEPOD reports of 1989 and 1999, in particular pp39-45 of the latter which includes "when a child is about to undergo a surgical procedure in theatre the appropriate consultant must be told."
- For not considering whether competent practice would have been to have delayed surgery until 'working hours' on 8th June 2001
- For acceding to instructions from a nurse as to what IV fluids he should prescribe, rather than using his own knowledge and skills and/or questioning her reasons for disputing his prescription and/or following a local protocol which he knew to have been agreed by the surgical team for which he worked.

Mr Zafar:

- For failing to document his instructions (as per his Witness Statements) on the morning ward round of 8 June 2001 to reduce Raychel's IV fluids and gradually introduce oral fluids. (The latter point is mentioned in the nursing record but not the former.)

Mr Bhalla:

- For not informing Mr Neilly of the problems relating to Raychel on the morning of June 9th.

Dr Butler:

- For not checking the weight of the patient and calculating intravenous fluid requirements rather than relying on the previous prescription, when asked to prescribe fluids for Raychel.

Dr Devlin:

- For not seeking advice from an experienced member of the surgical team when reviewing Raychel and her fluid therapy on 8 June 2001.

- For possibly not ensuring that he had the necessary skill and knowledge to manage postoperative intravenous fluids in children; and if he did not, to seek appropriate advice [GMC *Good Medical Practice* requires doctors to recognise and work within the limits of their professional competence]

Dr Curran:

- For not seeking advice from an experienced member of the surgical team when reviewing Raychel at about 9pm on 8 June 2001when she was reported to have had 'coffee-ground' vomiting.
- For possibly not ensuring that he had the necessary skill and knowledge to manage postoperative intravenous fluids in children; and if he did not, to seek appropriate advice [GMC *Good Medical Practice* requires doctors to recognise and work within the limits of their professional competence]

Dr Johnston:

- For not calling Dr McCord when Dr Trainor was unavailable to see Raychel when she had a fit
- No criticism is raised by the experts but, if Dr Trainor should have considered hypertonic saline or mannitol, then logic requires that Dr Johnston should have thought of using mannitol.

Dr Kelly :

- For administering a powerful analgesic but not reassessing his diagnosis when it apparently relieved Raychel's pain rapidly

Staff Nurse Gilchrist:

- For not making regular and complete assessments of Raychel when she vomited & thus not recognising how unwell she had become

Staff Nurse McGrath:

- For making a written instruction about fluids, which had not been prescribed

Sister Miller:

- For not assessing Raychel when parents and nursing staff had reported increased vomiting and a need for anti-emetics on the afternoon of 8 June
- For failure to inform a doctor of the vomiting on the morning of 8th June and the delay in Raychel being seen by a doctor later in the afternoon

Staff Nurse Noble:

- For her role in the prescription of intravenous fluids
- For failing to assess and recognise how sick Raychel had become on the night of 8th/9th June

Staff Nurse Rice (McAuley):

- For failure to identify the vomiting as a problem and plan care accordingly
- For failure to recognise the severity of Raychel's vomiting and fully reassess her

- For failure to inform a doctor of the vomiting on the morning of 8th June and the delay in Raychel being seen by a doctor later in the afternoon
- For failure to record oral intake and urine output

Staff Nurse Roulston:

- For failure to recognise the severity of Raychel's vomiting and fully reassess her

Others about whom experts and advisers have not been critical but who might be criticised:

Dr Gund – who correctly prescribed Hartmann's solution – pre and postop, stated **Dr Jamieson** told him to cross out his order for the latter as it was not his responsibility but that of the ward team, so he did so. He could be criticised for doing so, despite an entirely reasonable belief Jamieson was right. Jamieson, who was his junior, should not have dictated to him but Haynes points out she was more familiar with UK medicine so might have been acting out of the best intentions.

Dr Trainor: SH points out she might have sought to use hypertonic saline and/or mannitol when she saw Raychel at about 345 am. However, he is very muted in his comments, especially given he considers the outcome inevitable by then.

All the nursing staff above might be criticised for ineffective communication with Raychel's parents, especially in relation to listening to their concerns about Raychel on 8 June.