CLINICAL OPENING: RAYCHEL DOB 4th February 1992

THE ORAL HEARINGS IN THE INQUIRY INTO HYPONATRAEMIA-RELATED DEATHS

Chairman: John O'Hara QC

Banbridge Court House, 1 February 2013

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I. Introduction

Raychel

1. Raychel Ferguson was born on 4th February 1992. She was one of four children, and the family's only daughter.

2. Raychel was a Primary 5 pupil at St. Patrick's Primary School in Derry. She is described by her mother as a very popular girl who was caring and helpful to her many friends.[1]

The Opening

3. As with both Adam and Claire's cases, Raychel's case involves clinical and hospital management and governance issues. The clinical issues are to be addressed first. There will then be another hearing concerning management and governance issues which will be the subject of a separate opening.

4. Mr. Chairman, as I open Raychel's case I am mindful of the fact that Lucy Crawford had been admitted into the Erne Hospital and had died some 14 months before Raychel was admitted into the Altnagelvin Area Hospital ("*Altnagelvin Hospital*").

5. The issues raised by Lucy Crawford's case will be the subject of a further separate hearing so that you might determine to what extent there was a failure to learn appropriate lessons from Lucy's death, and whether any such failure had important consequences for how Raychel was subsequently treated.

6. This Opening will:

   (i) Set out the principal clinical issues in Raychel's case in the context of the evidence gathered to date and the revised Terms of Reference and List of Issues; and

   (ii) Identify the main areas which the Legal Team consider requires further investigation through questioning in these Oral Hearings.

II. The Inquiry's Terms of Reference

7. Raychel's name was included in the original Terms of Reference for the Inquiry as published on 1st November 2004 by Angela Smith MP (then

[1] Information provided by Mrs. Ferguson to the Inquiry, under cover of e-mail dated 19th February 2012

Minister with responsibility for the Department of Health, Social Services and Public Safety).[2]

8. Those original Terms of Reference were:

"In pursuance of the powers conferred on it by Article 54 and Schedule 8 to the Health and Personal Social Services (Northern Ireland) Order 1972, the Department of Health, Social Services and Public Safety hereby appoints Mr. John O'Hara QC to hold an Inquiry into the events surrounding and following the deaths of Adam Strain and Raychel Ferguson, with particular reference to:

1. *The care and treatment of Adam Strain and Raychel Ferguson, especially in relation to the management of fluid balance and the choice and administration of intravenous fluids in each case*

2. *The actions of the statutory authorities, other organisations and responsible individuals concerned in the procedures, investigations and events which followed the deaths of Adam Strain and Raychel Ferguson*

3. *The communications with and explanations given to the respective families and others by the relevant authorities[3]"*

9. As you are aware, and as I commented in the General Opening, the then Minister of Health Michael McGimpsey MLA, revised the original Terms of Reference on 17th November 2008 to exclude entirely Lucy Crawford's name.[4]

10. Nevertheless, as I explained in my opening of the previous section of this Inquiry, the exclusion of Lucy's name from the Terms of Reference does not mean that issues raised by her death are no longer of interest to the Inquiry. On the contrary, as we prepare to commence the Oral Hearings in Raychel's case it is appropriate to remind ourselves of your view, Mr. Chairman, that any failure to learn lessons from what happened to Lucy is in fact an essential part of the Inquiry's investigation into what happened to Raychel.

11. Bearing in mind the removal of Lucy's case from the Inquiry's Terms of Reference you have previously explained that you will approach these matters in the following way:

"… the terms still permit and indeed require an investigation into the events which followed Lucy's death such as the failure to identify the correct cause of death and the alleged Sperrin Lakeland cover-up because they contributed, arguably, to the death of Raychel in Altnagelvin. This reflects the contention that had the circumstances of Lucy's death been identified correctly and had lessons been learned from the way in which fluids were administered to her, defective fluid management would not have occurred so soon afterwards (only 14 months later) in Altnagelvin, a hospital within the same Western Health and Social Services Board area."

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2 Now Baroness Smith of Basildon

3 Ref: 021-010-024

4 Ref: 303-033-460

12. Raychel's case is otherwise being investigated according to precisely the same terms as those of Adam and Claire.

13. As with the cases of Adam and Claire, special attention is being paid to the management of Raychel's fluid balance. In particular, the Inquiry has been concerned to explore whether Raychel's serum sodium levels should have been checked, and whether she should have received the particular type of fluid that she did receive at the rate that it was administered. However, her treatment also includes other elements, for example, whether she should have undergone an emergency appendicectomy at the time that she did.

14. The second part of the Terms of Reference requires an investigation into the actions of the statutory authorities, other organisations and responsible individuals concerned in the procedures, investigations and events that followed Raychel's death.

15. The third part of the Terms of Reference concerns the communications with and explanations given to Raychel's family and others by the relevant authorities.

III. Evidence Received

16. As I explained in earlier openings, the Inquiry's search and request for relevant documents started in or about the beginning of 2005[5] and is ongoing. Such requests are guided by the Inquiry's Advisors and its Experts as well as arising out of documents received and responses to the Inquiry's requests for Witness Statements.

17. For convenience, the sources of the documents and other material received, which includes reports of experts engaged by the Coroner and the PSNI,[6] are set out in Appendix I to this Opening.

18. As with the cases of Adam and Claire, I am conscious that you, Mr. Chairman, will be making findings and recommendations on the basis of all of the evidence received and not just what is heard during the Oral Hearings. You, of course, have a complete set of the documentary materials which have been gathered by the Inquiry as part of its investigation in Raychel's case. Therefore, I do not propose to recite or summarise the contents of those materials. Rather, I will try to indicate the key elements of the evidence that has been received in Raychel's case.

5 Ref: 089-007-016

6 See List of Persons Ref: 312-003-001

Expert Reports

19. The Inquiry has, with the guidance of its Advisors, engaged Experts to address the role of the clinicians and nurses who were involved in Raychel's care, with particular emphasis on the period when she was a patient in Altnagelvin Hospital.

20. The following Experts have been retained:

    (i) Dr. Robert Scott-Jupp[7] (Consultant Paediatrician, of Salisbury District Hospital, England) whose reports concern the paediatric issues as well as general medical issues.[8]

    (ii) Dr. Simon Haynes[9] (Consultant in Paediatric Cardiothoracic Anaesthesia and Intensive Care, of Freeman Hospital, Newcastle Upon Tyne) whose reports concern the role and responsibilities of the anaesthetists who cared for Raychel, the anaesthetic issues, as well as general management issues.[10]

    (iii) Mr. George Foster[11] (Consultant General Surgeon with an interest in General Paediatric Surgery of Countess of Chester Hospital, and Grosvenor Nuffield Hospital, both Chester) whose reports concern the role and responsibilities of the surgical staff who cared for Raychel.[12]

    (iv) Ms. Sally Ramsay[13] (Independent Children's Nursing Advisor) who has provided a report on the nursing aspects of Raychel's care.[14]

    (v) Dr. Wellesley St. C. Forbes[15] (Consultant Neuroradiologist, formerly of Salford Royal Hospitals NHS Foundation Trust and Manchester University Children's Hospitals NHS Foundation Trust, recently retired from full time practice) whose report addresses certain issues arising out of the CT head scans which were performed on Raychel.[16]

    (vi) Dr. Fenella Kirkham, Professor of Paediatric Neurology at Institute of Child Health, London and Consultant Paediatric Neurologist Southampton General Hospital, who has provided a report in relation to certain neurological issues arising out of Raychel's death.[17]

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7 See List of Persons Ref: 312-003-001
8 Ref: 222-002 and Ref: 222-004
9 See List of Persons Ref: 312-003-001
10 Ref: 220-002 & Ref: 220-003
11 See List of Persons Ref: 312-003-001
12 Ref: 223-002 & Ref: 223-003
13 See List of Persons Ref: 312-003-001
14 Ref: 224-002, Ref: 224-004 & Ref: 224-005 & Ref: 224-006
15 See List of Persons Ref: 312-003-001
16 Ref: 225-002 and Ref: 225-003
17 Ref: 221-002-001 *et seq* & 221-004-001 *et seq*

21. The Legal Team, together with the Inquiry's Advisors and its Experts, have also reviewed the reports of the experts that were engaged by the Coroner before the Inquest, and by the Police Service of Northern Ireland ("PSNI") to assist with its investigations into matters arising from Raychel's death:

    (i) Dr. Edward Sumner[18] (Consultant Paediatric Anaesthetist at Great Ormond Street Children's Hospital) who provided a report to the Coroner on 1st February 2002[19] and provided various reports to the PSNI.[20]

    (ii) Ms. Susan Chapman[21] (Nurse Consultant for acute and high dependency care at Great Ormond Street Children's Hospital) who provided a report to the PSNI dated 24th September 2005.[22]

22. The Inquiry has also had the opportunity to consider the views expressed in various medical reports obtained by the former Altnagelvin Group of Hospitals Trust ("Altnagelvin Hospitals Trust") from the following experts:

    (i) Dr. John Jenkins[23] (Senior Lecturer in Child Health and Consultant Paediatrician) who provided reports dated 12th November 2002[24] and 30th January 2003.[25]

    (ii) Dr. Declan Warde[26] (Consultant Paediatric Anaesthetist) who provided a report dated January 2003[27] and Dr. Jenkins' comments on it.[28]

Background Papers

23. I have previously referred to the commissioning of Background Papers by Experts in both the General Opening and Adam and Claire's Clinical Openings. The background papers which may be of particular relevance to the clinical issues in Raychel's case are:

    (i) Dr. Michael Ledwith,[29] Clinical Director of Paediatrics, Northern Trust and Professor Sir Alan Craft,[30] Emeritus Professor of Child Health, Newcastle University Education on the training and continuing professional development of doctors in Northern Ireland, the rest of

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18 See List of Persons Ref: 312-003-001
19 Ref: 012-001-001
20 Ref: 098-081-235, Ref: 098-081-244, Ref: 098-098-373
21 See List of Persons Ref: 312-003-001
22 Ref: 095-092a-328
23 See List of Persons Ref: 312-003-001
24 Ref: 317-009-002 *et seq*
25 Ref: 317-009-004 *et seq*
26 See List of Persons Ref: 312-003-001
27 Ref: 317-009-006 *et seq*
28 Ref: 317-009-002 *et seq*
29 *"A Review of the Teaching of Fluid Balance and sodium management in Northern Ireland and the Republic of Ireland 1975 to 2009"* Ref: 303-046-514
30 *"A Review of the teaching of fluid balance and sodium management in Northern Ireland and the Republic of Ireland 1975 to 2009"* Ref: 303-047-561

the United Kingdom and the Republic of Ireland over the period 1975 to 2009.

(ii) Professor Mary Hanratty,[31] former Vice-President of the Nursing and Midwifery Council and Professor Alan Glasper,[32] Professor of Children and Young Person's Nursing, University of Southampton on the training and continuing professional development of nurses in Northern Ireland, the rest of the United Kingdom and the Republic of Ireland over the period 1975 to 2011.

(iii) Dr. Bridget Dolan,[33] Barrister at Law and Assistant Deputy Coroner, on the systems of procedures and practices in the United Kingdom for reporting and disseminating information on the outcomes or lessons to be learned from Coroner's Inquests on deaths in hospital (involving Hospitals, Trusts, Area Boards, Department of Health and Chief Medical Officer).

24. All of those reports have been made available to you Mr. Chairman and to the Interested Parties. The reports of the Inquiry's Experts will be published on the Inquiry's website in due course in accordance with the Inquiry Protocols and procedures. The other expert reports (e.g. those of Dr. Sumner) are already available on the Inquiry's website.

IV. Schedules Compiled by the Inquiry

25. The Inquiry has received a vast amount of information which is relevant to Raychel's case. In order to assist you and the Interested Parties, the Legal Team has compiled a number of schedules and charts as ancillary documents to permit this information to be more readily accessed and understood.

List of Persons Involved in Raychel's Case

26. The Legal Team has compiled a list of all those persons involved in the clinical aspects of Raychel's case from all of the information received by the Inquiry.[34] It explains their position at the time of Raychel's admission to Altnagelvin Hospital and briefly summarises their role in her treatment and care.

27. This document is supplemented by two schedules which help to explain the terminology in use at the time when Raychel was being cared for in hospital, in respect of the grading of medical and nursing staff: 'Nomenclature &

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31 *"Chronology of Nurse Education in Northern Ireland – Comparisons with UK mainland and Republic of Ireland 1975 to date"* Ref: 303-048-571

10 *"A Selective Triangulation of a Range of Evidence Sources Submitted to Explain the Chronology of Nurse Education in Northern and England with Reference to the Teaching of Record Keeping and the Care of Children Receiving Intravenous Infusions 1975 to date"* Ref: 303-049-674

33 *"Report to the Inquiry into Hyponatraemia-Related Deaths"* Ref: 303-052-715

34 See List of Persons Ref: 312-003-001

Grading of Doctors 1948 to 2012'[35] and 'Nomenclature & Grading of Nurses 1989 to 2012'.[36] You are already familiar with these schedules from your consideration of the cases of Adam and Claire. Accordingly, unless it is of particular relevance to the issues, I shall not deal with the grade or training of any particular clinician.

28. The List of Persons also identifies those who have made statements and for whom they were provided.

29. As with the cases of Adam and Claire, there will be a number of witnesses who will not be required to give evidence at the Oral Hearings and arrangements will be made to have their Witness Statement tendered in lieu of oral evidence. In due course Mr. Chairman the Legal Team will compile a Schedule of all those whose evidence it is tendering to you in that way. It will then be a matter for you to decide whether you nonetheless wish any particular witness to be called to give oral evidence.

30. While Dr. Jeremy Johnston provided the Inquiry with a preliminary witness statement,[37] at the time of writing the Inquiry has been unable to obtain a supplementary witness statement from Dr. Johnston[38]. The Inquiry has been informed that Dr. Johnston is presently taking steps to provide the statement, which will be made available before commencement of the Oral Hearings.

Chronology of Events (Clinical)

31. The Legal Team has prepared a Chronology of Events (Clinical) which, as with the cases of Adam and Claire, details the clinical events that occurred over the period of Raychel's admission (both to the Altnagelvin Hospital and the Royal Belfast Hospital for Sick Children).[39] This document is compiled almost exclusively from Raychel's medical notes and records, but it is supplemented from other sources such as from Depositions or PSNI Statements where this appears to be appropriate and uncontroversial. However, if any particular timing or event is disputed, then it is expected that witnesses giving oral evidence will make their position clear to the Inquiry, either directly or through their legal representatives.

32. The structure of the Chronology is straightforward and follows the pattern already established for the previous cases. The date and time are on the left-hand side, the event is in the middle and the reference for the source of the information is on the right-hand side. The far right columns identify the doctors and nurses that were on duty at the relevant time. The footnotes contain any comments or clarifications.

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35 Ref: 303-003-048
36 Ref: 303-004-051
37 Ref: WS-29/1
38 See List of Persons Ref: 312-003-001
39 Ref: 312-004-001

Timeline of Raychel's Treatment (7th June 2001 to 9th June 2001)

33. A Timeline of Raychel's treatment has been produced to supplement the Chronology of Events.[40] The objective of this document is to assist with the understanding of the key developments in Raychel's treatment and condition from her admission to Altnagelvin Hospital to her transfer to the Royal Belfast Hospital for Sick Children ("RBHSC") by depicting them in a visual form, as they occurred over time. It contains details such as:

    (i) Events around admission and surgery

    (ii) The cumulative total of Solution No.18 received

    (iii) Her episodes of vomiting

    (iv) Examinations by clinicians and nursing staff

    (v) Administration of medication

    (vi) Her serum sodium results

    (vii) The doctors and nurses on duty or on call during each period

    (viii) The times at which Mr. or Mrs. Ferguson or both were present in the hospital with Raychel

    (ix) Events around deterioration and transfer

34. As can be seen, the Timeline is colour-coded. Items in blue relate to Raychel's fluid and sodium balance. Items in red concern any attacks or seizures suffered by Raychel. Items in purple relate to medications administered to Raychel.[41] Items in black relate to admission and attendances by doctors.

Other Documents

35. The Legal Team has also compiled a Glossary building on the Glossaries provided for Adam and Claire's cases.

36. These other documents will be further explained and discussed under the relevant sections.

V. List of Issues in Relation to Raychel

37. The issues raised by the Terms of Reference are reflected in the Inquiry's List of Issues.[42] The List of Issues is a working document that is updated and

40 Ref: 312-001-001

41 For the purposes of the timeline, all medications are assumed to have been administered.

42 Ref: 303-038-478

revised as appropriate. The current List of Issues was published by the Inquiry on 14th February 2012.

38. In relation to the clinical area of Raychel's case, the following are the main areas of concern:

Investigation into the care and treatment that Raychel Ferguson received especially in relation to the management of fluid balance, to include an investigation into the care that she should have received, particularly in relation to the following matters:

(i) *Prescription and administration of the intravenous fluids in terms of choice of fluid, infusion rate and total amount*

(ii) *Monitoring and management of her fluid balance*

(iii) *The consideration given to the appropriateness, of Raychel's IV fluid management, including the communication, if any, that took place between nursing staff and medical staff*

(iv) *Whether Raychel's care plan should have been reassessed and if so, at what time and in response to what events*

(v) *Whether there was a delay on the part of the surgical team in responding to calls from the nursing team to see Raychel, and if so, why that delay occurred, and whether nursing staff should have taken any further steps to secure the prompt attendance of a member of the surgical team*

(vi) *Whether the nursing and medical teams who cared for Raychel adequately monitored her condition, and whether they provided her with appropriate treatment, both before and after she suffered a tonic seizure*

(vii) *If not, what steps should have been taken to adequately monitor her condition and to provide her with appropriate treatment*

(viii) *Whether those treating Raychel should have reached the view that she was seriously ill, and if so by what time, what action should have been taken, with what effect*

(ix) *Whether any lessons learned from Adam's death in 1995, from the Inquest into his death in 1996, from Claire's death in 1996 and from Lucy Crawford's death in April 2000, affected how Raychel's care was managed, and if so, in what way*

39. As part of its consideration of the clinical area of Raychel's case, it will also be necessary to examine what information was provided to Raychel's family by nurses and clinicians at the Altnagelvin Hospital and the RBHSC at the various stages of Raychel's treatment and after her death.

40. As with the treatment of clinical issues in the cases of Adam and Claire, the issues to be addressed during the Oral Hearing will essentially concern as yet unresolved differences between:

    (i) Documents and the evidence of a witness

    (ii) Evidence of witnesses, whether between the accounts given by a witness or between the accounts of different witnesses

    (iii) Evidence of a witness and the views of an Expert

    (iv) Views of the Experts on a particular issue

VI. Raychel's Admission to Altnagelvin Hospital on 7th June 2001

Afternoon of 7th June 2001

41. Raychel's mother, Mrs. Marie Ferguson, has described her daughter as having no significant medical history prior to her admission to Altnagelvin Hospital in June 2001.[43]

42. Raychel returned home from St. Patrick's Primary School at approximately 15:20 on Thursday 7th June 2001.[44] Mrs. Ferguson found her daughter to be in good form. Raychel went out to play and returned to the house at 16:30 when she asked for her dinner. At that point, she was experiencing what she described as "*hunger pains*" in her stomach.[45]

43. According to her mother,[46] Raychel ate her dinner at 16:45 (although the hospital notes say that dinner was 17:10[47]) and when she finished she again went outside to play. However, she came back and forward to the house several times and complained to her mother of ongoing pains in her stomach.[48] Her mother suggested to her that going to the toilet might resolve the problem but Raychel explained that she did not need to go.[49]

44. At around 17:46, Mrs. Ferguson decided that Raychel should stay in the house as the pains had not resolved. She made Raychel a bed on the sofa but Raychel's condition did not improve. She identified the area around her belly button as being the source of the pain.

45. At around 18:30, Mrs. Ferguson decided that she should take Raychel to the Accident and Emergency Department of the nearby Altnagelvin Hospital. By

43 Ref: 095-002-005
44 Ref: 012-025-135
45 Ref: 012-025-135
46 Ref: 012-025-135
47 Ref: 020-007-011
48 Ref: 012-025-135
49 Ref: 012-025-135

that time, Raychel was becoming very grey about the face, and Mrs. Ferguson was concerned. Raychel's father, Mr. Raymond Ferguson[50], was still at work at that time so she arranged to collect him en route to Altnagelvin Hospital. The Ferguson family lived about 15 minutes from the hospital[51] and they arrived there at shortly after 19:00.[52]

Examination at Accident and Emergency

46. Raychel's attendance at the Accident and Emergency Department was logged at 20:01.[53] She was triaged by Staff Nurse McGonagle[54] at 20:05.[55] The triage notes recorded Raychel's temperature (36°C) and her blood pressure (126/76) as being normal.[56]

47. Dr. Barry Kelly[57], Senior House Officer in Accident and Emergency, examined Raychel. Dr. Kelly noted that Raychel was complaining of sudden onset of abdominal pains which had begun at around 16:30 on 7th June 2001 and which had increased in severity from that time until she presented at Altnagelvin Accident and Emergency Department.[58] She had been complaining of nausea but no vomiting. He noted Raychel's weight as 26kg, that she was not known to have any allergies, and that she had no past medical history of note. She described pain on passing urine. On examination of the abdomen, Dr. Kelly found clinical signs of tenderness in the right iliac fossa,[59] particularly over McBurney's point,[60] along with rebound tenderness[61] and guarding. He therefore suspected appendicitis and asked for a surgical assessment.

48. Raychel's complaint of pain on passing urine was recorded on both the accident and emergency sheet,[62] and on the nursing observation sheet.[63] Blood tests were arranged. A urine test was conducted. It revealed +1 protein.[64]

49. Dr. Robert Scott-Jupp[65], the Inquiry's Expert in Paediatrics, has commented that Dr. Kelly's assessment and management of Raychel in Accident and Emergency was "*entirely straightforward*"[66] and "*in keeping with best practice*."

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50 See List of Persons Ref: 312-003-001
51 Ref: 012-028-149
52 Ref: 012-025-136
53 Ref: 020-006-010
54 See List of Persons - Ref: 312-003-001
55 Ref: 020-006-010
56 Ref: 020-006-010
57 See List of Persons Ref: 312-003-001
58 Ref: 020-006-010
59 'Iliac fossa' – see Glossary Ref: 312-005-001
60 'McBurney's point' – see Glossary Ref: 312-005-001 See too Ref: 312-006-001
61 'Rebound tenderness' – see Glossary Ref: 312-005-001
62 Ref: 020-006-010
63 Ref: 020-016-031
64 Ref: 020-016-031
65 See List of Persons Ref: 312-003-001
66 Ref: 222-004-002

50. However, Mr. George Foster, the Inquiry's Expert on General Paediatric Surgery[67], has noted that Dr. Kelly's post-qualification experience of working with children was limited at that time.[68] He explains that diagnosing appendicitis *"particularly in the face of a short history and normal vital signs requires considerable experience"* since *"tenderness, guarding and rebound are extremely difficult to clarify in a child".*[69] He considers it *"unfortunate"* that Dr. Kelly *"came rapidly to the diagnosis of possible appendicitis*."

Administration of IV Cyclimorph

51. Dr. Kelly prescribed IV cyclimorph[70] 2mgs[71] for pain relief.[72] This was administered at 20:20.[73] Dr. Kelly decided to administer the medication intravenously because Raychel might require an operation and could therefore have no oral intake.[74]

52. Mr. Ferguson recalls that after the injection, Raychel was "*well improved*".[75] Mrs. Ferguson agrees that Raychel began to brighten up and her colour returned.[76] Mr. Foster thinks this is significant. He states that the *"immediate effect of the injection suggests...that Raychel's pain was not due to inflammatory factors but was more likely visceral in origin."*[77] He adds that taken together with the normal blood tests, Raychel's positive response to the analgesic ought to have *"prompted a review of the appendicitis diagnosis."*

53. Dr. Kelly is unable to recall whether the cyclimorph was administered before the surgeon saw Raychel.[78] Mr. Ragai Reda Makar[79], Surgical Senior House Officer, has stated that Raychel had been given the cyclimorph in Accident and Emergency before he assessed her.[80]

54. Mr. Foster has criticised Dr. Kelly's decision to administer cyclimorph before the surgeon had been afforded the opportunity of examining Raychel.[81] He is of the view that, if Dr. Kelly was concerned that Raychel was suffering severe pain, he could have prescribed simple pain relief such as paracetemol (whether orally or by suppository).[82] He says that the administration of cyclimorph should have been sanctioned by a senior clinician.[83]

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67 See List of Persons Ref: 312-003-001
68 Ref: 223-003-004
69 Ref: 223-003-007
70 'Cyclimorph' – see Glossary Ref: 312-005-001
71 Ref: 020-006-010
72 Ref: WS-254/1, p.5, Q.7(j)
73 Ref: 020-016-031
74 Ref: WS-254/1, p.5, Q.7(m)
75 Ref: 095-005-015
76 Ref: WS-020-1, p.3-4
77 Ref: 223-003-001
78 Ref: WS-254/1, p.5, Q.7(m)
79 See List of Persons Ref: 312-003-001
80 Ref: WS-022/1, p.4
81 Ref: 223-002-006
82 Ref: 223-003-004
83 Ref: 223-003-005

55. Mr. Foster is also of the view that the administration of this "*powerful intravenous analgesic*"[84] would have "*compromised*"[85] the ability of Mr. Makar to take an accurate history and to interpret findings on examination. He is of the view that, unless symptoms are very severe, it is "*standard surgical teaching*"[86] that analgesia should be deferred until a patient is seen by a surgeon (ideally the operating surgeon).

56. Mr. Makar has stated that he does not think that the administration of cyclimorph had any effect on his examination of Raychel as it should not have masked the peritoneal signs of appendicitis or peritoneal infection.[87]

57. However, Mr. Foster profoundly disagrees with this view. He says that the intravenous administration of cyclimorph would indeed have the effect of masking the peritoneal signs of appendicitis or peritoneal irritation,[88] and that this would have exacerbated the already difficult task of assessing a child with abdominal pain.

58. Whether it was prudent of Dr. Kelly to administer cyclimorph before Raychel was examined by the surgeon, whether this should have been sanctioned by a senior clinician and whether its administration compromised Mr. Makar's ability to reach an accurate diagnosis, are matters to be considered during the course of the Oral Hearings.

Examination by Mr. Makar

59. Raychel was seen by the surgeon, Mr. Makar, who made an untimed note of his attendance with Raychel.[89] On examination, he found that Raychel was tender to the right iliac fossa, with guarding and mild rebound.[90] He recorded the results of the blood tests which were taken in Accident and Emergency. It showed no abnormality: white blood cell count was normal, and serum sodium was found to be normal at 137mmol/L.[91]

60. Having referred Raychel to the surgical team, Dr. Kelly believes that he would have had a discussion with the surgeon about his clinical findings and Raychel's need for assessment. However, he is unable to recall in specific terms the conversation which was conducted.[92]

61. A repeat urine test was performed. The results, which were available at 23:19 (i.e. prior to surgery), showed +2 protein.[93]

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84 Ref: 223-002-006
85 Ref: 223-002-006
86 Ref: 223-002-006
87 Ref: WS-022/2, p.13, Q.12
88 Ref: 223-003-007
89 Ref: 020-007-011, 020-007-012
90 Ref: 020-007-012
91 Ref: 020-007-012 – the 'normal' range being 135-145mmol/L
92 Ref: WS-254/1, p.5, Q.7(n)
93 Ref: 020-015-030

62. Mr. Makar reached the view that Raychel was suffering from acute appendicitis/obstructed appendix.[94] He obtained consent from Raychel's mother for an appendicectomy[95] and directed fasting and the administration of IV fluids. Mr. Makar has explained the consent process in the following terms:

> *"I obtained informed consent for appendectomy after explaining the operation; the risks involved with surgery including general anaesthesia and possibility of having normal appendix versus the risks of waiting and the incidence of morbidity from acute appendicitis."*[96]

63. Mrs. Ferguson says in her PSNI statement that the doctor looking after Raychel, whom she subsequently identifies as Mr. Makar,[97] told her and her husband that if Raychel's *"pain increased then they would have to open her up and remove the appendix"* but *"that it would be the early hours of the following morning before any operation could take place and that an Anaesthetist would have to examine her as well"*.[98]

64. Mrs. Ferguson explains in her Inquiry witness statement that she signed the consent form for the appendicectomy even though Raychel had begun to *"brighten up"*[99] because *"the consent was needed in case she took bad"*.[100] Indeed, Mrs. Ferguson says that Raychel's admission to the ward was explained to her as being *"a precautionary measure"*.[101]

65. The extent to which Mr. and Mrs. Ferguson left Raychel in the evening of 7th June 2001 believing that any surgery would be dependent upon an increase in pain or other deterioration in her condition is a matter to be considered further during the Oral Hearings. Exactly what Mr. Makar intended to convey to Raychel's parents about the circumstances in which surgery would take place and its likelihood are also matters to be considered at the Oral Hearings.

Admission to Ward 6

66. Raychel was therefore admitted into Ward 6, a mixed 43 bed children's ward caring for medical and surgical patients.[102] Her admission was timed at 21:41.[103]

67. Raychel was admitted to Hospital as an emergency patient under the care of Mr. Robert Gilliland[104], who was appointed to Altnagelvin Hospital as a

94 Ref: 020-007-012
95 Ref: 020-008-015
96 Ref: 012-045-216
97 Ref: 095-002-005
98 Ref: 095-001-002
99 Ref: 095-001-002
100 Ref: WS-020/1, p.3 Q3(e)
101 Ref: WS-020/1, p.3 Q3(e)
102 Ref: WS-056/1, p. 7
103 Ref: 020-001-001
104 See List of Persons Ref: 312-003-001

Consultant Colorectal and General Surgeon in August 1997.[105] He was the on-call surgeon for emergencies from 09:00 on 7th June 2001 until 09:00 on 8th June 2001. Between those times, all patients admitted to General Surgery would have been admitted under his care.

68. An episodic nursing care plan[106] was formulated for Raychel by Staff Nurse Daphne Patterson[107] at about 21:50[108]. She noted in the care plan that on admission Raychel was complaining of "*only slight pain.*"[109]

69. Ms. Sally Ramsay, the Inquiry's Nursing Expert, has noted that the possibility of post operative nausea and vomiting was not identified as a potential problem in the care plan. Ms. Ramsay comments that considering the frequency of this problem in children it was "*an omission in care planning*" to fail to include this.[110] This is an issue which will be further considered at the Oral Hearings.

70. Mr. Makar has stated in his statement to the Inquiry[111] that he discussed the presentation of Raychel and the plan for appendicectomy that evening with Mr. Zawislak,[112] the on-call Surgical Registrar. He states that he contacted him via the switchboard and contacted him again before he went to start the operation.

71. However, in his witness statement to the Inquiry Mr. Zawislak states:

> *"I have no recollection of being contacted by anybody to discuss the treatment of Raychel Ferguson on the night of the 7th June 2001. I was not involved in her treatment at any stage. This was a very high profile case and very tragic case. Should I have be [sic] involved in anyway I would remember that. Therefore I am positive that nobody contacted me to discuss the treatment of this patient at any stage."*[113]

Whether Mr. Makar discussed the presentation of Raychel and the plan for appendicectomy will be a matter that will be explored at the Oral Hearings.

72. Raychel's parents left the hospital once Raychel was settled in the ward to get her some clothes. They arrived home at 22:30[114]/22:40[115]. Mrs. Ferguson states that the hospital rang at 22:50 to say that they were taking Raychel to theatre.[116] It seems that it was Nurse Patterson who phoned them.[117] Mr. and Mrs. Ferguson returned immediately to the hospital.

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105 Ref: WS-044/2, P.3, Q.1(e)
106 Ref: 020-027-056
107 See List of Persons - Ref: 312-003-001
108 Ref: WS-048/1, p.5
109 Ref: 020-027-056
110 Ref: 224-004-026
111 Ref: WS-022/2, p.17, Q.13(j)
112 See List of Persons Ref: 312-003-001
113 Ref: WS-314/1, p.3
114 Ref: 095-005-015
115 Ref: 012-028-145
116 Ref: 012-028-145

VII. The Decision to Operate

73. An issue which has arisen during the investigation of Raychel's case concerns whether it was appropriate to subject her to surgery on the late evening of 7th June 2001.

74. Mr. Chairman, while it is a matter for you to determine whether the surgery was carried out properly, it is important to state that none of the experts from whom you will hear raise any suggestion that the surgery was anything other than competently performed. There is also no support in any of the materials gathered by the Inquiry to suggest that the conduct of the appendicectomy itself caused the death of Raychel.

75. However, following on from this surgery was a requirement to provide Raychel with appropriate post-operative care. The Experts who have examined how Raychel was cared for in the Altnagelvin Hospital consider that it was the failure to provide adequate care in response to post-operative complications which led directly to her death.

76. Accordingly, while it is appropriate for the Inquiry to ask questions at the Oral Hearings regarding the reasonableness of the surgeon's decision to proceed to surgery at the time he did, and about the process which led to that decision, these issues are not central to the Inquiry's Terms of Reference. Hence, there is a requirement for a proportionate approach in the Inquiry's treatment of these matters.

Diagnostic Reasons

77. Mr. Foster considers that the decision to operate on Raychel was reached on "*tenuous grounds*."[118] He refers to the short duration of symptoms, the absence of signs of inflammation, normal temperature, and normal pulse rate.[119] In this context, Mr. Foster also says that Mr. Makar ignored an abnormal urine sample.[120]

78. Mr. Makar has identified eight factors which he took into account when diagnosing acute appendicitis or obstructive appendix:[121]

    (i) the start of peri-umbilical pain shifting to the right iliac fossa;

    (ii) nausea and no appetite for food at the time of assessment;

    (iii) localised tenderness to the McBurney's point;

    (iv) guarding over McBurney's point;

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117 Ref: WS-048/1, p.3
118 Ref: 223-002-007
119 Ref: 223-002-006
120 Ref: 223-002-007
121 Ref: WS-022/2, p.14, Q.13(a)

(v) positive rebound tenderness;

(vi) absence of upper respiratory infection which could produce mesenteric adenitis or referred pain;

(vii) sudden onset of the pain suggestive of obstructed appendix (faecolith); increasing severity.

79. Mr. Foster states that it is difficult to accept the factors relied upon by Mr. Makar in support of his diagnosis. He explains that:

(i) Dr. Kelly had not noted any movement of the site of the pain;

(ii) Tenderness, guarding and rebound are difficult to clarify in a child;

(iii) It is problematic to suggest the presence of an obstructed appendix in the absence of systemic signs of inflammation;

(iv) The pain was not increasing in severity but had almost disappeared after the injection;

(v) The dysuria identified by Dr. Kelly and the finding of proteinuria were not mentioned by Mr. Makar.[122]

80. Mr. Makar has stated that he gave consideration to alternative causes of Raychel's symptoms, but he ruled these alternatives out.[123] He decided that it was necessary to proceed to theatre taking into account the symptoms, and the risk that as a child she could suffer a generalised peritonitis if the appendix perforated.[124]

81. The indication that Raychel was experiencing pain on passing urine was not identified as an issue in her nursing care plan. Nevertheless, in answer to the problem, *"find cause of abdominal pain"* one of the stated actions was to *"obtain urine for urinalysis and MSU."*[125]

82. Mr. Makar has said that isolated proteinuria[126] was not an indication for routine urinary culture and sensitivity.[127] He has said that Raychel's pain on passing urine was characteristic of lower abdominal pain which could happen with peritoneal irritation.[128] He denies that the pain was symptomatic of 'dysuria'. He states that the presence of proteinuria did not explain Raychel's presentation with right iliac fossa pain in the absence of other markers of urinary tract infection.[129] He explains that urinary tract infection or renal pain

122 Ref: 223-003-007
123 Ref: WS-022/2, p.14, Q.13(c)
124 Ref: WS-022/2, p.14, Q. 13(b)
125 Ref: 020-027-062
126 'Proteinuria' – see Glossary Ref: 312-005-001
127 Ref: WS-022/2, p.16, Q.13(f)
128 Ref: WS-022/2, p.16, Q.13(d)
129 Ref: WS/022/2, p.16, Q.13(e)

were of "*low probability*" in the absence of dysuria, urinary nitrate, blood and leucocytes.[130]

83. The records made available to the Inquiry show that while urine tests identified the presence of proteinuria, a urine sample was never sent to the laboratory for microscopic examination and bacterial culture.

84. Mr. Foster explains that proteinuria is an indication of renal disease and he considers that it was Mr. Makar's responsibility to ensure that at least one urine sample was sent for culture and microscopy before any final decision to operate was made.[131] Mr. Foster believes that the history of pain on urination (which he describes as 'dysuria') in conjunction with the finding of proteinuria in each of the urine tests should have prompted Mr. Makar to consider an alternative diagnosis to appendicitis, such as a urinary tract infection, constipation or of abdominal pain of a non-specific nature.[132] He therefore does not think it was reasonable to proceed to appendicectomy in the late evening of 7th June 2001.[133]

85. Dr. Simon Haynes[134], the Inquiry's Expert in Paediatric Anaesthesia, shares Mr. Foster's concern that the decision to proceed with surgery was debatable. He says that the "*wisdom of proceeding so rapidly to surgery has to be questioned*,"[135] since Raychel was not febrile, the severity of the abdominal pain had decreased by the time she was taken to theatre, and her white cell count was not elevated. Mr. Foster[136] and Dr. Haynes[137] each consider that an alternative course would have been to admit Raychel for observation, and proceed to appendicectomy the following day if definitely indicated.

86. Mr. Gilliland disagrees with the views of Mr. Foster and Dr. Haynes. He has explained that he carried out a review of the notes and records and held an informal discussion with Mr. Makar shortly after Raychel's death. He concluded that *"Raychel's symptoms were such that it was appropriate for her to undergo an emergency appendicectomy."*[138]

87. In addition, Mr. Gilliland disputes Mr. Foster's suggestion that the abnormal urine tests ought to have been sent for culture and microscopy. Mr. Gilliland is of the view that the findings of proteinuria and pain on urination were consistent with appendicitis and did not require further investigation before the decision to operate.[139]

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130 Ref: WS-022/2, p.14, Q. 13(c). For 'dysuria', 'urinary nitrate' and 'leucocytes' see Glossary Ref: 312-005-001
131 Ref: 223-002-006
132 Ref: 223-002-036
133 Ref: 223-002-039
134 See List of Persons Ref: 312-003-001
135 Ref: 220-002-008
136 Ref: 223-002-007
137 Ref: 220-002-008
138 Ref: WS-044/2, p.9, Q.15(c). See also answers given to question 16(b), p.9 and 10 of WS-044/2
139 Ref: WS-044/2, p.10, Q.16(b)(v) and (vi), and Q.17

88. Dr. Scott-Jupp broadly agrees with Mr. Gilliland.[140] He explains that the history and symptoms of appendicitis were typical, and because of the danger or of missing an acute appendicitis, it was routine practice to arrange an appendicectomy. In addition, children often complain of painful urination when they feel unwell, but this does not necessarily indicate a urinary infection. Moreover, he adds that '+1' or '+2' protein in the urine could well be normal, and he finds that since leucocyte and nitrate tests were negative on both urine tests[141] this *"virtually rules out a urinary infection."* He is satisfied that it was acceptable not to send a urine sample to the laboratory for further analysis.[142]

89. Whether Mr. Makar should have given further consideration to investigating the presence of a urinary tract infection, or whether the symptoms that were detected justified the decision to go to theatre, are matters to be considered during the Oral Hearings.

Pre-Operative Involvement of Senior Surgical Staff

90. In his initial report, Mr. Foster disapproves of what he assumed was Mr. Makar's omission to discuss the need for surgery with the Consultant on-call (Mr. Gilliland) or any other senior member of the surgical team before electing to proceed to surgery. Mr. Foster explained that it was standard general paediatric surgical and anaesthetic practice in 2001 to conduct such a discussion.[143]

91. In support of his position, Mr. Foster has referred to the 1989 report by the National Confidential Enquiry into Perioperative Deaths (NCEPOD):

> *"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."*[144]

92. Mr. Foster further states in his report that surgery conducted on children at night should be performed by a senior operator.[145] He also refers to the findings of a second NCEPOD report (1997), which concluded that out of hours surgery should be avoided, unless the situation is extremely urgent.[146]

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140 Ref: 222-004-002

141 Ref: 020-015-030 & -031

142 Ref: 222-004-003

143 Ref: 223-002-007. Dr. Haynes is of the view that a similar obligation was applicable to those trainees intending to anaesthetise a child. This is discussed elsewhere in this Opening.

144 Ref: 223-002-007. Mr. Foster appends to his report at Ref: 223-002-052 a copy of the summary of the NCEPOD 1989 report: Campling BA, Devlin HB, Lunn, JN: Who Operates Where? Report of the National Confidential Enquiry into Perioperative Deaths, Royal College of Surgeons (1989).

145 Ref: 223-002-007

146 Ref: 223-002-007. Mr. Foster appends to his report at Ref: 223-002-046 a copy of the summary of the NCEPOD 1997 report: Campling BA, Devlin HB et al: Who Operates When? Report of the National Confidential Enquiry into Perioperative Deaths, Royal College of Surgeons (1997)

93. Mr. Foster concludes that surgery was "*unnecessary*",[147] and that had Mr. Makar consulted with a senior surgeon it is likely that it would have been deferred and then likely that it would never have been performed.

94. In contrast, Mr. Gilliland is of the view that there was no need for Mr. Makar to discuss the plan to operate with senior members of the surgical team.[148] He has said that it was permissible for a SHO, such as Mr. Makar, to conduct an appendicectomy, *"if he/she was competent to make the decision to operate and conduct the procedure competently."*[149] In Mr. Gilliland's view, Mr. Makar was "*an experienced surgeon who was working within his competency*."[150]

95. Mr. Gilliland was asked how he would have advised Mr. Makar had he contacted him that night to seek guidance on how to manage Raychel. He said:

> *"I think it is likely that had I been contacted by Mr. Makar and told that he had a 9 year old girl with a history of periumbilical abdominal pain that had migrated to the right iliac fossa who was indicating that her pain was maximal over McBurney's point and in whom examination revealed tenderness, guarding and percussion rebound in the right iliac fosssa that I would have concurred with his decision to perform an appendicectomy."*[151]

96. Mr. Gilliland concedes that, in June 2001, he was not aware of the conclusions of the NCEPOD.[152] Whilst working on the basis that Mr. Makar had not discussed his plan to conduct an appendicectomy with a senior colleague, Mr. Gilliland recognises that the recommendations of the NCEPOD were not applied in Raychel's case, although he has indicated that whether they ought to have applied in the case of a previously healthy 9-year-old child undergoing an appendicectomy *"is a matter for debate."*[153]

97. Dr. Scott-Jupp supports the view expressed by Mr. Gilliland:

> *"Raychel's initial assessment, management in the Accident and Emergency Department and the decision made to plan an appendicectomy for her, were in my view entirely straightforward and in keeping with best practice. The history and symptoms of appendicitis were typical, with a typical duration of a few hours, and a history of localisation of pain moving from the whole abdomen to the right iliac fossa. It is well recognised that even when the appendix is not inflamed, these typical symptoms can occur, and because of the danger of missing an acute appendicitis, routine practice would have been to arrange an appendicectomy. It appears that Mr. Makar carried out the surgery competently and made satisfactory records."*[154]

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147 Ref: 223-002-008
148 Ref: WS-44/2, p.7, Q.9
149 Ref: WS-44/2, p.8, Q.10
150 Ref: WS-44/2, p.8, Q.14(c)
151 Ref: WS-44/2, p.10, Q.16(d)
152 Ref: WS-044/2, p.6, Qs. 4, 5 and 6
153 Ref: WS-044/2, p.6
154 Ref: 222-004-002

98. Mr. Makar states that while he was unaware of the recommendations contained within the 1989 NCEPOD report[155] cited by Mr. Foster, he was aware of the subsequent NCEPOD reports published in the 1990s.[156] He adds that in his view there was no need to discuss an appendicectomy for a fit child with the Consultant on call[157] and that he was planning to proceed with appendicectomy before midnight to avoid night time surgery [158]

99. Nevertheless, in his second statement for the Inquiry he says that he did in fact discuss his plan for Raychel's surgery in the course of two conversations with the general surgical Registrar on call, Mr. Zawislak[159] and that they agreed that if Raychel was not called to theatre by 23:00 consideration would be given to postponing the operation until the morning. Mr. Makar explains that it was the responsibility of the Registrar (such as Mr. Zawislak) to make communication upwards to the consultant on-call in appropriate cases.

100. As noted above, Mr. Zawislak emphatically denies that he was contacted by anyone to discuss Raychel and states that he would have remembered such an event if it had occurred.

101. In his supplementary report Mr. Foster acknowledges that Mr. Makar now asserts that he discussed Raychel's need for surgery with Mr. Zawislak before going to theatre.[160] However, he notes that there has been no previous mention of Mr. Zawislak in connection with the treatment of Raychel whether in witness statements or depositions or indeed in Raychel's hospital notes and records. He expresses surprise that the discussion between Mr. Zawislak and Mr. Makar was not recorded.

102. In addition, it is notable that Mr. Gilliland, who had carried out a review of matters relating to the surgery which included a discussion with Mr. Makar, states in his second Inquiry witness statement that Mr. Makar did not discuss his decision to operate with him or any other member of the senior surgical team.[161]

103. Mr. Makar's assertion that he discussed Raychel's need for surgery with Mr. Zawislak clearly conflicts with the recollections of Mr. Zawislak and Mr. Gilliland. These are matters of factual dispute to be considered during the Oral Hearings.

104. If it is established that a discussion did take place between Mr. Makar and Mr. Zawislak, it will be necessary to go on to consider what was discussed

155 Ref: WS-022/2, p.18 Q.13(l)
156 Ref: WS-022/2, p.18 Q.13(l)
157 Ref: WS-022/2, p.17, Q.13(h)
158 Ref: WS-022/2, p.6, Q.5(h)
159 Ref: WS-022/2, p.17, Q.13(j)
160 Ref: 223-003-008
161 Ref: WS-44/2, p.7, Q.8

between them, and whether the latter ought to have contacted Mr. Gilliland to further discuss Raychel's care.

Pre-Operative Involvement of Senior Anaesthetic Staff

105. Dr. Vijay Kumar Gund[162], Senior House Officer in Anaesthesia, was the lead anaesthetist during Raychel's appendicectomy. He had commenced working in Altnagelvin Hospital on 10th May 2001, and, during the month of May, he had worked under the supervision of a Consultant /associated specialist prior to taking up a role on the on-call rota.[163] He has confirmed that he was unaware of the findings of the NCEPOD, and he was unaware of any requirement to inform the Consultant Anaesthetist if he was planning to anaesthetise a child.[164] He understood that his obligation was to inform the second on call anaesthetist of all out of hours cases,[165] which he did.

106. Dr. Gund pre-assessed Raychel and found her fit for emergency surgery.[166] He gave directions for Raychel to be brought to theatre after 23:00. He made a note of his attendance with Raychel.[167] He reported the case to the second on call anaesthetist, Dr. Claire Jamison[168], Senior House Officer in Anaesthesia, but he did not discuss the appropriateness of proceeding to surgery with his on-call Consultant or the surgeons.[169]

107. Dr. Jamison too was unaware of the findings of the NCEPOD regarding the need to inform her Consultant prior to undertaking any anaesthetic on a child.[170] She has said that it would have been "*normal practice*" to inform the Consultant on call if there was a child on an emergency list, but she cannot remember doing so herself in Raychel's case.[171] If she did not do so and Dr. Gund did not do so, it would appear that this "*normal practice*" was not complied with in Raychel's case.

108. Dr. Haynes questions "*how appropriate it was in 2001 for a junior trainee such as Dr. Gund to be expected to anaesthetise, during the night, a nine year old child without direct supervision*."[172] He bemoans the fact that the Consultant Anaesthetist on call was not informed that such a child was to be anaesthetised out of hours, particularly if neither trainee had significant experience and training in anaesthetising children.

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162 See List of Persons Ref: 312-003-001
163 Ref: WS-023/2/2, p.2-3, Qs 1 and 2
164 Ref: WS-023/2 p.11, Q.13, Q.16
165 Ref: WS-023/2 p.11, Q15
166 Ref: 012-033-161
167 Ref: 020-009-017
168 See List of Persons Ref: 312-003-001
169 Ref: WS-023/2, p.6, Q.6
170 Ref: WS-024/2 p. 6, Q.7
171 Ref: WS-024/2, p.7, Q.10
172 Ref: 220-002-015

109. In a supplementary report, Dr. Haynes acknowledges that in 2001 Dr. Gund was *a "considerably experienced anaesthetist".* Nevertheless, he remains of the view that appropriate arrangements for anaesthetising a 9 year old child in 2001, even for a relatively straightforward operation, necessarily required the Consultant on call to be informed of the child's case before s/he was taken to theatre, assuming also that the Consultant was satisfied of the capabilities of anaesthetist(s) who would be conducting the procedure.[173]

110. Whether surgery was necessary late on the evening of 7th June or at all or whether it could have been deferred, whether senior clinicians were or should have been consulted by the senior houses officers about the need for surgery, and whether the surgery should only have been performed by those senior clinicians are matters that will be considered during the course of the Oral Hearings.

111. The question of whether Mr. Makar, Mr. Gilliland, Dr. Gund and Dr. Jamison should have known about the 1989 NCEPOD report, and how they should have learnt about it, are matters to be pursued further in the context of hospital management and governance.

VIII. Fluid Management Pre-Operatively

Prescription and Choice of Fluid

112. In preparation for surgery, the plan was for Raychel to fast and for intravenous fluids to be administered.[174]

113. Mr. Makar had prescribed Hartmann's solution[175] at the Accident and Emergency Department, although a written record of this has not been provided to the Inquiry.[176] Mr. Makar says that he wrote and signed for Hartmann's solution on a fluid balance sheet in the Accident and Emergency Department.[177] He has explained that he chose Hartmann's because of its isotonic nature.[178] However, he was asked by Staff Nurse Ann Noble[179], a nurse on duty in Ward 6, to change the fluid prescription to Solution No.18 (dextrose 4% saline 0.18%), since this was "*the recommended solution at that time for the children in the Paediatric ward (6).*"[180]

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173 Ref: 220-003-004
174 Ref: 020-007-012
175 'Hartmann's solution' – see Glossary Ref: 312-005-001
176 Ref: WS-022/1, p.2, Q.1
177 Ref: WS-022/2, p. 5, Q.5
178 Ref: WS-022/1, p.2, Q.1
179 See List of Persons Ref: 312-003-001
180 Ref: WS-022/1, p.2, Q.1

114. Mr. Makar recalls that Ward 6 did not routinely keep Hartmann's in its stock.[181] He makes it clear that he only prescribed in respect of the pre-operative period when Raychel would have been fasting.[182]

115. Nurse Noble recalled the sequence of events reported by Mr. Makar, and has indicated that she was the nurse who informed Mr. Makar that Solution No.18 was used on the Ward.[183] A prescription was then written and signed for by Mr. Makar indicating "No.18" as the type of fluid to be given.[184] So far as Mr. Makar is aware, Raychel did not receive any Hartmann's solution before the fluid prescription was changed.[185]

116. In recalling her intervention with Mr. Makar, Nurse Noble has explained that, long before 2001, Solution No.18 had become embedded as the default fluid for pre and post surgical and medical patients being cared for on the Children's Ward in Altnagelvin Hospital:

> "*When I arrived on Ward 10 (Paediatrics) May 1990, Solution No.18 was prescribed for pre and post surgical and medical patients and it was the practice of both the medical and surgical doctors to prescribe Solution No.18 and was commonly used as the first fluid of choice.*"[186]

117. Since Nurse Noble placed herself in the position of advising Mr. Makar about the appropriateness of the fluid he had decided to prescribe, Mr. Foster believes that the admission by Nurse Noble at Raychel's Inquest that she "*had never heard of hyponatraemia*"[187] in fourteen years of nursing to be "[*o*]*f some concern*."[188]

118. Nurse Noble now disputes the accuracy of what has been recorded in the deposition at the Inquest and which she signed. She claims that what she actually told the Coroner was that she "*had not knowingly encountered Hyponatraemia as a post operative complication*."[189] Nevertheless, Nurse Noble accepts that at the time she was treating Raychel she was not aware of the factors which could cause an electrolyte imbalance in a paediatric patient following surgery.[190]

119. Mr. Foster observes that Mr. Makar would appear to have had no choice but to comply with the standard practice of the ward, which was to prescribe Solution No.18.[191]

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181 Ref: WS-022/2, p.6, Q.5
182 Ref: WS-022/1, page 2, Q.3
183 Ref: WS/049/1, page2, Q.1
184 Ref: 020-021-040
185 Ref: WS-022/2, p.6, Q.5(c)
186 Ref: WS-049/2, p.5, Q.4(A)
187 Ref: 012-043-211.
188 Ref: 223-002-013
189 Ref: WS-049/2, p.13, Q.14(a)
190 Ref: WS-049/2, p.12, Q.12(a)
191 Ref: 223-002-039

120. Dr. Scott-Jupp states that administering Solution No.18 was in keeping with the standard policy on the ward at the time, and that there was nothing in Raychel's condition or on the initial blood results that suggested she should have had a different fluid regime.[192]

121. Dr. Haynes makes the point that although the nurses had knowledge of, and were able to recite to junior medical staff, what was routinely prescribed on the Ward, they "*were very unlikely to have a proper understanding of fluid and electrolyte balance or understand how abnormalities could arise.*"[193] Dr. Haynes adds that seemingly nobody took ownership of the supervision of fluid and electrolyte balance; "*not surgeon, anaesthetist not paediatrician.*"[194]

122. Ms. Sally Ramsay[195], the Inquiry's Expert in Nursing, states that it was "*reasonable*"[196] for Nurse Noble to apprise Mr. Makar of the fact that Solution No.18 was normally used in Ward 6, and that it was for the doctor to ensure that this information was accurate and that his prescription was appropriate.[197]

123. In support of her analysis Ms. Ramsay refers to the General Medical Council's guide, 'Good Practice in Prescribing Medicines,' which, although published in 2008, would have reflected the practice in 2001:

> *"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."*[198]

124. The reasonableness of the decision to prescribe Solution No. 18 to Raychel when the original decision was to prescribe Hartmann's Solution is a matter which will be considered at the Oral Hearings.

Rate of Fluids

125. The prescription sheet indicates that Solution No.18 was to be administered at a rate of 80 ml/hr. The fluids were erected at 22:15 by Nurse Patterson,[199] and checked by Staff Nurse Fiona Bryce.[200] This is confirmed on the fluid balance sheet.[201] Raychel received a total of 60ml of Solution No.18 during the pre-operative period before fluids were disconnected and she was taken to theatre.[202]

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192 Ref: 222-004-003
193 Ref: 220-002-003
194 Ref: 220-002-004
195 See List of Persons Ref: 312-003-001
196 Ref: 224-002-016
197 Ref: 224-004-016
198 Ref: 224-004-017
199 Ref: WS-054/1, p.3, Q.1
200 See List of Persons Ref: 312-003-001
201 Ref: 020-020-039
202 Ref: WS-022/1, p.2, Q.1

126. Dr. Haynes refers[203] to the 'Holliday-Segar'[204] formula for calculating normal daily maintenance fluid[205] and that on this basis the appropriate calculation ought to have been:

Raychel's weight:	25kg
Initial 20kg:	60 ml/hr
Further 5 kg	5 x 1 = 5 ml/hr
Total daily fluid requirement:	**65 ml per hour**

127. Dr. Haynes,[206] Mr. Foster[207] and Ms. Ramsay[208] all consider that the decision to set the rate at 80 ml/hr to be in excess of Raychel's maintenance requirement of 65 ml/hr.

128. Mr. Makar accepts that Raychel's maintenance fluid requirement was based on the Holliday-Segar formula. However, he considered that as Raychel had been fasting since 17:30 and was then placed in a warm hospital environment, and since the IV fluids were only started at around 22:00, there was a possibility that she was in fluid deficit.[209] He therefore increased her rate by about 20% to 80 ml/hr, which he considered would be easily compensated by her renal excretion. He believed that these fluids were only going to be administered over the hour or so prior to her going into theatre.

129. Mr. Makar says in his Inquiry witness statement that he estimated Raychel's weight as 26kg.[210] 26kg is also the "*approximate*" weight noted by Dr. Kelly on the Accident and Emergency form.[211] However, her electronic Nursing 'Front Assessment Sheet' which was completed on admission to Ward 6 by Nurse Patterson records her weight as 25kg.[212] 25kg is also noted, and used as the basis of a calculation by Dr. Trainor in the fluid calculations made after Raychel had her seizure on 9th June 2001.[213] It is not clear whether this 25kg weight was a measurement, or was also an approximation.

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203 Ref: 220-002-004

204 Dr. Haynes has appended to his report a copy of Holliday MA, Segar WE. Pediatrics 1957:19:823-832. The Maintenance need for water in parenteral fluid therapy, Ref: 220-002-168

205 Ref: 220-002-193 Holliday MA, Segar WE. Pediatrics 1957:19:823-832. The Maintenance need for water in parenteral fluid therapy as repeated in Chapter 4, Hatch and Sumner's Textbook of Paediatric Anaesthesia 3rd edition, 2008.

206 Ref: 220-002-004

207 Ref: 223-002-013

208 Ref: 224-004-017

209 Ref: WS-022/2, p.7, Q.5

210 Ref: WS-022/2, p.7, Q.5(i)

211 Ref: 020-006-010

212 Ref: 020-028-067

213 Ref: 020-019-038

130. Dr. Haynes says that if Raychel was not automatically weighed on admission either to Accident and Emergency or to the ward it is "*unusual*"[214] and is "*not good practice*". This is an issue which will be considered at the Oral Hearings.

131. Ms. Ramsay does not believe that it would have been common practice at the time for a nurse to recalculate intravenous therapy to something she regarded as appropriate.[215] However, she thinks an experienced nurse would have noticed that the volume was excessive. In such circumstances, if the nurse is concerned about the appropriateness of the dose, their obligation is to check the position with the prescriber.

132. In his statement to the Inquiry, Dr. Geoff Nesbitt[216], Consultant Anaesthetist and Clinical Director in Anaesthesia and Critical Care at Altnagelvin Hospital, agrees that pre-operative fluids should have been 65 ml/hr, although it "*is often more than this figure to account for the fasting period prior to surgery.*"[217] It is his view that the rate of administration should then be reduced following surgery.[218]

133. The extent to which there was a failure to accurately calculate and prescribe for Raychel's fluid requirements pre-operatively will be examined at the Oral Hearings, as will the action that should have been taken by the clinicians and nurses (should there have been such a failure).

134. This is potentially a significant issue since under the arrangements which appear to have operated in Ward 6 at that time, after her surgery and return to the ward Raychel continued to receive the same fluid and at the same rate that had been administered before her surgery.

IX. Appendicectomy

Preparation

135. Raychel was brought to theatre at approximately 23:10[219] in preparation for the appendicectomy. She was accompanied by her mother and Staff Nurse Bryce.[220]

136. The appendicectomy was carried out by Mr. Makar, and Raychel was anaesthetised by Dr. Gund. Dr. Jamison was in attendance for part of the operation but left during the procedure in order to carry out other duties. There is no concern or criticism attached to this.

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214 Ref: 220-003-004
215 Ref: 224-004-016
216 See List of Persons Ref: 312-003-001
217 Ref: WS-035/1, p.8, Q.6
218 Ref: WS-035/1, p.8, Q.6
219 Ref: 020-027-057
220 Ref: 054/1, p.3, Q.1

137. The checking nurse /recovery area nurse was Staff Nurse Marian McGrath[221] and the scrub nurse was Staff Nurse Vivienne Ayton.[222]

138. The intraoperative nursing record shows that Raychel was administered with a diclofenac (Voltarol)[223] suppository (12.5mg) and a paracetamol suppository (500mg).[224] The anaesthetic record indicates that Raychel received ondansetron 2mg, fentanyl 50mg total, propofol 100mg, suxamethonium 30mg, cyclimorph 0.5ml, mivacurium 3mg and metronidazole 250mg.[225]

139. The same record also shows (via the addition of a retrospective note[226] apparently requested by Dr. Nesbitt[227]) that although a 1 litre bag of Hartmann's solution was put up, Raychel only received 200mls during her surgery. Dr. Jamison signed off on this retrospective note and it was witnessed by Dr. Nesbitt.

140. Dr. Jamison addressed this issue in her deposition at Raychel's Inquest on 5th February 2003: *"I am certain that Raychel received 200mls. It is a litre bag with markings"*.[228]

141. However, in an earlier statement provided by Dr. Jamison following the critical incident meeting on 12th June 2001 she said that Raychel had received approximately 300mls during the course of the anaesthetic.[229]

142. The question of precisely how much intravenous fluid was received intraoperatively will be further considered at the Oral Hearings.

Conduct of the Surgery

143. The operation started at approximately 23:40 and lasted until about 00:20.[230] Surgical,[231] anaesthetic[232] and nursing[233] notes relating to the conduct of the surgery were recorded.

144. Mr. Makar has described a "*straightforward standard appendectomy operation*,"[234] a view shared by Dr. Gund who states in his Inquiry witness statement that

221 See List of Persons - Ref: 312-003-001
222 See List of Persons Ref: 312-003-001
223 'Voltarol' – see Glossary Ref: 312-005-001
224 Ref: 020-013-021
225 Ref: 020-009-016
226 Ref: 020-009-016
227 Dr. Jamison's deposition at Raychel's Inquest – Ref: 012-034-165
228 Ref: 012-034-165
229 Ref: 012-015-118
230 Ref: 020-009-016
231 Ref: 020-010-018
232 Ref: 020-009-016
233 Ref: 020-012-020, Ref:020-013-021
234 Ref: 012-045-217

Raychel remained stable and haemodynamically[235] normal throughout the surgery and whilst in recovery.[236]

145. The Experts instructed by the Inquiry have assessed the conduct of the surgery. Dr. Haynes states that the anaesthetic management appears to have been "*completely satisfactory*" [237] and the appendicectomy operation carried out "*with due care and attention.*"[238] Mr. Foster agrees that from a technical perspective, the surgery was "*properly performed*."[239] Dr. Scott Jupp adds that the drugs given before and immediately after the anaesthetic, and the quantity of fluid given intra-operatively, were appropriate.[240]

Surgical Findings

146. In the surgical notes, Mr. Makar recorded that there was a "*mildly congested appendix*", an "*intraluminal faecolith*"[241] and that the peritoneal cavity was "*clean*".[242]

147. Mr. Foster observes that such findings do not of themselves justify the decision to operate in the first place. He says that the description of the appendix as "*mildly congested*" and the presence of a faecolith (hard faecal material) are both often seen even when the appendix is in fact normal. He refers to the fact that Raychel's appendix was found on histology to be entirely normal.[243]

148. In contrast, Dr. Scott-Jupp states that the fact that the appendix turned out to be normal on histology frequently occurs, is "*irrelevant*",[244] "*not of great significance*",[245] and does not mean that the decision to perform the appendicectomy was incorrect.

149. Whether the surgical and histological findings support Mr. Foster's view that proceeding to surgery was unnecessary is a matter to be considered during the Oral Hearings.

Recovery Area

150. The surgery finished at about 00:20 on 8th June 2001. Over the following 90 minutes or so, Raychel was nursed in the theatre while she recovered because it was the practice for the recovery ward to be closed at night.[246]

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235 'Haemodynamics' – see Glossary Ref: 312-005-001
236 Ref: WS-023/1, p.3, Q.3
237 Ref: 220-002-005
238 Ref: 220-002-005
239 Ref: 223-002-009
240 Ref: 222-004-004
241 'Intraluminal faecolith' – see Glossary Ref: 312-005-001
242 Ref: 020-010-018
243 Ref: 020-022-047
244 Ref: 222-004-017
245 Ref: 222-004-004
246 Ref: WS-050/1-p.2, Q.1

151. Raychel was ready to return to Ward 6 at 01:30.[247] Before transferring Raychel to the ward, Dr. Gund had prescribed intramuscular cyclimorph, paracetemol, Diclofenac and Ondanestron[248] on an "*as required basis*".[249] The infusion of Hartmann's solution was stopped. The arrangements for re-commencing intravenous fluids on the ward are discussed in detail below.

152. Mr. Makar gave instructions for an antibiotic (Metronidazol) to be given intravenously initially, and then later as a suppository or orally.[250] Mr. Foster observes that the surgeon's decision to recommend multiple doses of a prophylactic antibiotic is indicative of "*muddled thinking*" on his part.[251] He explains that the normal approach would be to administer a single dose intravenously at the time of the surgery for wound infection.[252]

153. Mr. and Mrs. Ferguson were concerned that there was a delay in Raychel returning to the ward from theatre.[253] Mrs. Ferguson states in her deposition to the Coroner that a nurse told them, as Raychel was taken into the theatre for her operation, that Raychel would be back on the ward within an hour. When this did not happen they sought an explanation at about 00:30.[254] Mrs. Ferguson states in the same deposition that she was told by nurses that it should not be much longer for Raychel to be out of the anaesthetic.[255] Mr. and Mrs. Ferguson asked about Raychel's return again at 01:30 as by that time they were "*really worried*".[256] They were told by nurses that Raychel was in the recovery room and that "*everyone is different*" in terms of when they come around after an anaesthetic. However, when Raychel returned to the ward no explanation was given to them as to why there had been such a delay in her case.[257]

154. The explanation for the delay appears to be contained in a contemporaneous note made by Dr. Gund. He noted that there was "*prolonged sedation due to opioids.*"[258] Dr. Haynes agrees that the delay "*is of no significance*",[259] again citing the sedating quality of the opioids.

155. Nurse McGrath confirms in her Inquiry witness statement that Raychel was slow to wake up but that this was felt to be due to the opioids.[260] She records Raychel's observations as being within normal limits and does not note any

247 Ref: WS-050/1, p.3, Q.1
248 Ref: 020-017-033, Ref: 020-017-034. For 'Diclofenac' and 'Ondanestron' – see Glossary Ref: 312-005-001
249 Ref: 012-033-162
250 Ref: 020-010-018
251 Ref: 223-002-009
252 Ref: 223-002-009
253 Ref: 095-001-002
254 Ref: WS-020/1, p.5, Q.7(c)
255 Ref: 012-028-145
256 Ref: WS-020/1, p.5, Q.7(c)
257 Ref: WS-020/1, p.6, Q.7(f)
258 Ref: 020-009-017. For 'opioids' – see Glossary Ref: 312-005-001
259 Ref: 220-002-014
260 Ref: WS-050/1, p.2, Q.1

cause for concern.[261] Raychel did not require any drugs in recovery as she was not in pain and did not feel sick.

156. It is unclear why that explanation for the delay could not have been given to Mr. and Mrs. Ferguson to ease their concerns.

157. Whether nursing staff and clinicians made sufficient effort to communicate appropriately with Raychel's parents during the period when Raychel was in "*recovery*" is an issue to be considered at the Oral Hearings.

X. Responsibility for Post-Operative Fluid Management

158. Raychel returned to Ward 6 at approximately 01:55,[262] and her intravenous fluids are shown as having recommenced at that time.[263]

159. The investigation conducted by the Legal Team has revealed that amongst those who had responsibility for caring for Raychel, a great deal of confusion and uncertainty surrounded the arrangements for fluid management in the post-operative period.

160. This is not necessarily an uncommon problem. Dr. Haynes has explained that the boundaries of responsibility for post-operative fluid management "*to this day are a little vague in this respect in most hospitals.*"[264]

The Approach of the Anaesthetists

161. Dr. Gund explains in his Inquiry witness statement that he had actually written a prescription for Hartmann's solution for Raychel's post-operative fluids.[265] This prescription has been described by Dr. Haynes in his report as "*appropriate*".[266] However, he considers that the rate of 80 ml/hr was "*a little excessive*".[267]

162. Dr. Gund also says that he was told by his colleague, Dr. Jamison, to 'cross the prescription off' because fluid management on the paediatric ward was managed by ward doctors.[268] Dr. Gund has said that until this discussion with Dr. Jamison he had not been informed that post-operative fluid management was a matter for ward doctors.[269] However, he had been working in

261 Ref: 020-014-022
262 Ref: 020-027-064
263 Ref: 020-020-039. It is Mrs. Ferguson's recollection at Ref: 098-001-002 that Raychel was brought back to the Ward at 02:10 hrs.
264 Ref: 220-002-013
265 Ref: 020-021-040.
266 Ref: 220-002-014
267 Ref: 220-002-014
268 Ref: WS-023/1, p.2, Q.1
269 Ref: WS-023/2, p.5, Q.5(i)

Altnagelvin for only four weeks or so when he was asked to provide anaesthetic care for Raychel.

163. Dr. Gund also comments in his Inquiry witness statement that this approach to post-operative fluid management, whereby it would be addressed by ward doctors, was confirmed to him at the time by a nurse who he believes to have been Nurse McGrath.[270]

164. Dr. Jamison cannot recall discussing with Dr. Gund how Raychel's fluids were to be managed post-operatively. She says in her Inquiry witness statement that it would have been usual for fluids to have been managed on the paediatric ward,[271] although in general terms she has said that "*if the anaesthetic team felt it necessary to prescribe post op fluids then they would have done so.*"[272]

165. Clearly, Dr. Gund was of the view that it was necessary to prescribe fluids for Raychel, hence his decision to write a prescription. At the Oral Hearings, it will be necessary to examine in greater detail the reasons behind his decision to delete the prescription.

166. When Raychel left 'recovery', Dr. Gund discarded the remaining Hartmann's solution. He states in his PSNI statement that he left fluids on "*ward protocols.*"[273] i.e. he was leaving Raychel's further fluid management to be dealt with in accordance with the usual paediatric ward arrangements at that time.[274]

167. Dr. Gund's reference to "*ward protocols*" does not mean that post-operative fluid management was the subject of a written procedure. Dr. Gund was unaware of any written protocol,[275] and others have confirmed that written procedures did not exist at that time.[276] Rather, it was his understanding that once Raychel was established back on the ward a nurse would ask a paediatrician to prescribe for Raychel's ongoing fluid needs.[277]

168. However, contrary to Dr. Gund's understanding, there was no further medical input in the post-operative period to assess Raychel's fluid needs and fluid balance until Mr. Zafar saw her on the morning ward round, some 7-8 hours after surgery was finished.

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270 Ref: WS-023/2, p.5, Q.5(j
271 Ref: WS-024/2, p.7
272 Ref: WS-024/2, p.7
273 Ref: 012-033-163
274 Ref: WS-023/2, p.6, Q.7(b)
275 Ref: WS-023/2, p.7, Q.7(b)(iv)
276 See for example the evidence of Dr. Brian McCord (Consultant Paediatrician, Altnagelvin) Ref: WS-032/1, p.4, Q.4
277 Ref: 012-033-163, and WS-023/1, p.2, Q.2

169. Dr. Scott-Jupp states in his report that the lack of written protocols in 2001 was not uncommon, as the same situation would have not have been different in most National Health Service hospitals at the time.[278]

The Approach of the Nurses

170. The recovery area care record written by Nurse McGrath indicates *"[fluids] to be recommenced in ward."*[279] She says in her Inquiry witness statement that this record was based on the anaesthetist's verbal instructions which stated that the Solution No.18 that was in progress pre-operatively should be re-commenced on Raychel's return to the ward,[280] and that this was the "*normal practice*"[281]. Nurse McGrath states that the anaesthetist who gave her the verbal instruction did not advise her in relation to the rate of infusion.[282]

171. Dr. Gund recalls in his Inquiry witness statement a conversation with Nurse McGrath from which he formed the "*impression"* that fluids would be commenced only on the prescription from the ward."[283] Dr. Gund says that he was told by the recovery nurse that fluids would be "*prescribed on the ward*."[284]

172. Dr. Jamison has said that she is not aware of who prescribed fluids for Raychel post-operatively.[285] It appears to be implicit in what each of the doctors have said that they do not accept that they issued a verbal instruction to Nurse McGrath with regard to post-operative fluids. The tension between the accounts given by the anaesthetists and the account given by Nurse McGrath will be further examined at the Oral Hearings.

173. Nurse McGrath's description of the "*normal practice*" of post-operative fluid management in terms of recommencing the fluids which had been prescribed pre-operatively has also been provided by Nurse Patterson,[286] Nurse Noble,[287] and Staff Nurse Fiona Bryce.[288] Each of these nurses was on duty when Raychel returned to the Ward after theatre.

174. Nurse Patterson describes her understanding of post operative fluid management on Ward 6 at the time of Raychel's treatment in her Inquiry witness statement:

> "*Pre 2001 any instructions regarding post operative fluid management would have been verbal advice provided by senior nursing staff in ward 6. The advice given was*

278 Ref: 222-004-018
279 Ref: 020-014-022
280 Ref: WS-050/1, p.3
281 Ref: WS-050/2, p.5, Q.4(d)
282 Ref: WS-050/2, p.5, Q.4(a)
283 Ref: WS-023/2, p.5, Q.5(k)
284 Ref: WS-023/2, p.5, Q.5(k)
285 Ref: WS-024/2, p.7
286 Ref: WS-048/2, p.5/6, Q.5
287 Ref: WS-049/2, p.5, Q.5(a)
288 See List of Persons Ref: 312-003-001

that it was standard ward practice for surgical doctors to prescribe the intravenous fluids preoperatively and these fluids were recommenced post operatively"[289]

175. Nurse Patterson reconnected the intravenous fluids for Raychel on her return to the Ward in accordance with the prescription that had been written pre-operatively,[290] namely Solution No.18 at a rate of 80 ml/hr. A new prescription for fluids was not written and the nurses did not consult with a doctor about Raychel's fluid needs, nor was any review carried out in relation to them.

176. The nurses have therefore described a process for the administration of post-operative fluids which was at least clear to them and which appears on their account to have been firmly embedded in the practice of Ward 6. This practice differed in significant respects to the understanding which Dr. Gund has said was conveyed to him. It is clear that Dr. Gund's misunderstanding of the actual situation was not an isolated one.

The Understanding of the Surgeons

177. The Inquiry's investigation has identified other misunderstandings of the process for post-operative fluid management that was in place at the time of Raychel's surgery. Mr. Gilliland's understanding is captured by the following description in his Inquiry witness statement:

"Initial post-operative fluids are usually a continuation of fluids prescribed intra-operatively. This prescription would be started by the anaesthetist in theatre and taken over by the surgical team on return to the ward. Thereafter, the prescription of intravenous fluids is usually the responsibility of the Pre-registration House Officer…"[291]

178. Of course, Raychel's management differed from that described by Mr. Gilliland as the post-operative fluids administered to her reflected the pre-operative fluid regime prescribed by Mr. Makar, rather than the intra-operative regime. His understanding appears to be at odds with nursing custom and practice. Whether Mr. Gilliland ought to have been aware of the ward practice, and whether he ought to have taken steps to address that practice is an issue to be considered at the Oral Hearings

179. Mr. Makar's account suggests that he was also unaware of how post-operative fluids were actually managed. He says in his Inquiry witness statement that he understood the anaesthetist would write the recovery post-operative fluids which would cover the period post-surgery until the morning surgical ward round, when the surgeons would take over.[292] He understood

289 Ref: WS-048/2, p.3, Q.3
290 Ref: WS-048/2, page6, Q.5(b)(vii)
291 Ref: WS-044/1, p.4, Q.3
292 Ref: WS-022/2, page 5 Q.4(e), & page p11 Q.8(b)

that the anaesthetist would actually write a prescription.[293] The anaesthetist would be responsible for this period, according to Mr. Makar's understanding of the arrangements in place, because the fluid to be given post-operatively depended on what had been given intra-operatively and whether there had been a fluid deficit or overload.

180. At the Oral Hearings, it will be necessary to further examine how the key participants in Raychel's surgery – the surgeon and the anaesthetists – could have arrived at such a different understanding of how her post-operative fluids were to be managed.

The Understanding of the Paediatricians

181. Dr. Brian McCord[294] was appointed Consultant Paediatrician at Altnagelvin Hospital in 1989.[295] His understanding of the responsibility for post-operative fluid management at the time of Raychel's treatment broadly accords with that of Mr. Gilliland and is again at odds with the description of the custom and practice which had been inherited and implemented by the nursing team on Ward 6.

182. Dr. McCord explains in his Inquiry witness statement that in the immediate post-operative period it was his understanding that there might be some sharing of responsibility between anaesthetic staff and the surgeons, but that ultimately responsibility would rest with the surgical staff.[296]

183. It was Dr. McCord's understanding that at that time no formal protocol existed to set out the procedures and responsibilities governing fluid administration.[297] However, he "*presumed*" that some formality attached to the process in the sense that a written fluid balance and IV fluid prescription sheet would accompany the patient back from theatre.[298]

184. In Raychel's case, this clearly did not happen so that nursing staff continued to work off the prescription written up before Raychel went to theatre, and without further medical input until the morning ward round.

Experts' Views

185. Dr. Haynes states that it is the anaesthetist who should have been responsible for the initial fluid prescription (both rate and type of fluid) on return to the ward, with the surgical team taking over the role either at the next ward round, or if the patient's condition changed.[299]

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293 Ref: WS-022/2, p.12, Q.8(d)
294 See List of Persons Ref: 312-003-001
295 Ref: WS-032/1, page1
296 Ref: WS-032/1, p.4, Q.4
297 Ref: WS-032/1, p.4, Q.4
298 Ref: WS-032/2, p.5, Q.4(a)
299 Ref: 220-002-014

186. Dr. Haynes adds that the anaesthetist should carry this responsibility because he will have had the opportunity to assess the fluid status of the patient pre-operatively and intra-operatively, and should be able to predict the patient's likely fluid requirements during the immediate few hours following the operation.[300]

187. Dr. Haynes has described as "*completely inappropriate*" the decision of Dr. Gund to leave post-operative fluids on 'ward protocols'.[301] He explains that this was not necessarily the fault of Dr. Gund, but rather this was the position he was left to work in because there was "*no clear structure [and] no acceptance of responsibility between the senior staff in the three specialities*".[302] He adds that the lack of demarcated lines of responsibility meant that post-operative fluids were being dictated to junior medical staff by nursing staff on the basis of custom and practice, rather than by reference to patient observation or informed by individual patient need.

188. Dr. Haynes has commented that it would have been "*unusual*"[303] for a junior surgeon to have taken responsibility for the initial post-operative fluid prescription after a straightforward appendicectomy, but that it would have been an integral part of the surgical ward round on the morning of 8th June 2001 to assess Raychel's fluid and electrolyte status and to confirm that appropriate intravenous fluids were being administered.

189. Dr. Scott-Jupp describes the situation in which Dr. Gund wrote a prescription for post-operative fluids only to be told that this was a matter that would be addressed on the ward by paediatric doctors, as an "*important point of confusion.*"[304] In his experience, in most hospitals, when children return to the ward from theatre, the fluids prescribed by the anaesthetist are continued for up to 6 hours or until the bag runs out, at which point it becomes the responsibility of the surgical team to issue a further prescription if required.

190. Ms. Ramsay agrees that were no clear lines of responsibility regarding prescription of IV fluids, with the doctors responding to nursing requests.[305] In addition, there does not appear to have been a protocol to guide medical staff in their prescribing, particularly post-operatively.

191. Ms. Ramsay states that a prescription for intravenous fluids <u>should</u> have been written before Raychel returned to the ward following the appendicectomy *"in order to take account of post-operative fluid requirements."*[306] She interprets the note on the recovery area care record written by Nurse McGrath ("*[fluids] to be recommenced in ward*") as indicating that "*the infusion was to recommence on the*

300 Ref: 220-002-013
301 Ref: 220-002-019
302 Ref: 220-002-019
303 Ref: 220-002-017
304 Ref: 222-004-005
305 Ref: 224-002-011
306 Ref: 224-004-017

ward, not that a ward doctor should prescribe it,"[307] the very approach to fluid management which Nurse Patterson has described, but contrary to the understanding apparently conveyed to Dr. Gund.

192. Whether an anaesthetist ought to have led on post-operative fluid management, with subsequent fluid needs being assessed by the surgical team are matters that will be pursued during the Oral Hearings. So too will the question of whether such an arrangement ought to have been in place at the time of Raychel's treatment and the implications of any failure to do so. Moreover, the absence of a common understanding of the procedures governing post-operative fluid management is also a matter that will be considered.

XI. Details of Post-Operative Fluid Management

Fluid Balance Chart

193. The fluid balance sheet is used to record the fluid input and output for patients who are receiving intravenous fluid. It is a tool used by nurses and clinicians to assist with achieving fluid balance in patients. Thus, the sheet provides a simple method by which all input (oral or intravenous) and output (urine, stools or vomit) can be recorded.

194. When she returned to Ward 6 Raychel was recommenced on Solution No.18 at the same rate of 80 ml/hr as had been administered pre-operatively.[308] She remained on 80ml/hr until her seizure at 03:00 on 9th June 2001, over 24 hours after her return from surgery.

195. A new fluid balance sheet was then opened at 08:00 on 8th June 2001. It recorded the administration of intravenous fluids as well as other data relevant to fluid balance from that time and into the early hours of 9th June 2001.[309] Oddly, 'Neo-natal Intensive Care Unit Fluid balance for IV fluids' charts were used to record fluid balance despite the fact that Raychel was aged 9 years at the time. There is no note of any fluid administration at Altnagelvin Hospital after 04:00 on 9th June 2001.

196. It would seem from the recording on the fluid balance chart that Raychel consistently received 80 ml each hour prior to her fluids being checked. Ms. Ramsay indicates it is unlikely that the nurse read the fluid at precisely the same time every hour. She would have expected to see the associated variations reflected in the chart.[310] She considers the entries made on the chart

307 Ref: 224-004-017
308 Ref: 020-020-039
309 Ref: 020-018-037
310 Ref: 224-004-019

suggest that it was completed with expected volumes infused, rather than the actual volumes infused. [311]

197. There is no note on the chart of any oral fluid intake, despite Ms. Ramsay indicating that it is "*important*"[312] to do so. Mrs. Ferguson describes Raychel as drinking a small amount of 7-Up[313] and Nurse McAuley recorded at 17:00 on 8th June 2001 that Raychel was tolerating small sips of water.[314]

198. Likewise, there is no measurement of any urine output or any note of oral fluid intake. The only recording of any urine output was the "*PU*" recorded at 10:00 on 8th June 2001 by Nurse McAuley. Ms. Ramsay believes that the failure to note oral intake and urine output were omissions in nursing care.[315]

199. Mr. Foster states that the importance of accurate measurement of urine output in a child with repeated vomiting was unrecognised.[316] Mr. Foster adds that there was seemingly no attempt to record accurate volumes of vomits and there was a "*complete inconsistency in recording*"[317] given the varied use of '++' to the use of subjective words such as 'small' and 'large'. Ms. Ramsay is less critical of this stating that it would not be usual in her experience to measure vomit exactly, unless it was copious in nature and that the descriptions used by the nurses in Raychel's case were common.[318]

200. Dr. Haynes agrees that it is "*obvious*"[319] that documentation of fluid balance in the hospital was "*not of a high standard*" prior to Raychel's death. He concedes that it "*can of course sometimes be difficult to measure how much is lost*".[320] His general view is that:

> "*the precision of the documentation of Raychel's fluid balance is less important than the recognition that she was continuing to vomit significant amounts throughout the day and into the evening of June 2001, and that this persistent vomiting was not a normal course of events after appendicectomy.*"

201. Dr. Sumner has commented that the fluid balance chart completed by the nursing staff involved with Raychel's care is *"confusing"* as *"the IV input is in the wrong column"* and he has said that he was not sure of the significance of "*AMT*" (noted as 150 ml every hour)..[321] Ms. Ramsay has suggested that the 150 ml was the volume in the chamber of the infusion administration set. She has explained, however, that normal practice would be to check the level of

311 Ref: 224-004-019
312 Ref: 224-004-020
313 Ref: 012-028-147
314 Ref: 020-027-057
315 Ref: 224-004-020
316 Ref: 223-002-014
317 Ref: 223-002-014
318 Ref: 224-004-012, 013
319 Ref: 220-002-006
320 Ref: 220-003-012
321 Ref: 012-001-003

fluid in the chamber hourly and deduct it from the 150 ml to give the actual amount infused rather than assume the pump had infused the required amount.[322]

202. There is no evidence that the fluid balance charts were examined by anyone who would have appreciated the significance of Raychel's deterioration and its association with an electrolyte imbalance prior to Raychel's major seizure at or about 03:00 on 9th June 2001.

Type of Fluid

203. Raychel received a continuous infusion of Solution No.18, hour on hour, from 02:00 on 8th June 2001 until 04:00 on 9th June. Working from the entries contained on each of the two fluid balance charts it would appear that Raychel received a total volume of 2160 ml[323] of Solution No. 18 in that period, with the infusion of 60 ml before she was brought to theatre giving an overall total of 2220 ml.

204. Dr. Gund explains in his Inquiry witness statement that, prior to his involvement in Raychel's case it was typical of his approach to prescribe Hartmann's solution for use in the initial post-operative period since he was experienced in using it and because *"it is isotonic in [the] intravascular compartment."*[324] He has no recollection of ever prescribing Solution No.18 as a post-operative fluid prior to his involvement with Raychel's care.[325]

205. Dr. Haynes considers that Dr. Gund's initial decision to prescribe Hartmann's solution for Raychel was *"appropriate".*[326] Indeed, he considers that had Dr. Gund had *"confidence in his own knowledge to ensure that his prescription was followed by the ward staff,"* Raychel might well have survived.[327]

206. Dr. Haynes points out that by 2001 there was what he calls "*an increasing awareness in the medical literature of the dangers of using hypotonic fluids for maintenance during the post-operative period*".[328] Nevertheless, he recognises that Altnagelvin Hospital would not have been unique at that time in continuing to use 0.18% saline as a maintenance fluid in paediatric cases. However, he adds that it is "*standard practice*" that the fluid lost in vomit during 8th June 2001 should have been replaced with 0.9% saline and that this was not done.[329]

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322 Ref: 224-004-020

323 Ref: 020-018-037. Various commentators have reached different calculations. Dr. Warde has referred to a total input of 2160 mls at Ref: 317-009-008 whereas Dr. Jenkins has referred to a total input of 2080 at Ref: 317-009-002

324 Ref: WS-023/2 p.5

325 Ref: WS-023/2 p.5

326 Ref: 220-002-015

327 Ref: 220-002-015

328 Ref: 220-002-005

329 Ref: 220-002-004

207. Dr. Scott-Jupp states that "*with hindsight one might surmise that if Raychel had continued to receive Hartmann's solution she may not have developed hyponatraemia.*"[330] However, he is of the view that no fault attaches to the decision to administer Solution No.18 post operatively, since this was standard ward practice. He emphasises that it would not have been usual at that time to continue with Hartmann's solution after the initial few hours (perhaps 4 to 6 hours or until the bag runs out) following completion of surgery.[331]

208. Mr. Foster considers that the use of Solution No.18 is "*totally inappropriate*"[332] in the presence of vomiting or diarrhoea, as these involve the loss of electrolyte rich fluids. Again, he states that this is "*core knowledge*"[333] that should be well known to any surgical trainee.

209. While the Oral Hearings will examine whether Solution No.18 was or was not the correct type of fluid to be prescribed for Raychel, considerable attention will also be paid to the steps, if any, which were taken to monitor Raychel's electrolyte balance.

Rate of Fluids Prescribed

210. The decision to continue to administer Solution No.18 at 80 ml/hr has been viewed critically by those experts who have examined the issue.

211. Mr. Foster states that it would be usual post-operatively to reduce the standard hourly maintenance rate of intravenous fluid infusion to take account of a post-operative increase in secretion of anti-diuretic hormone (ADH)[334]. He considers that the hourly volume would normally be reduced post-operatively by around 20%.[335]

212. I have already explained the Inquiry Experts' view that the calculation of pre-operative fluids should have led to a maximum hourly rate of around 65 ml/hr, yet 80 ml/hr was the rate prescribed. Post-operatively, if Mr. Foster's view is accepted, Raychel should have been receiving fluids at a rate of about 52 ml/hr.

213. Summarising his view, Mr. Foster states:

> *"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."*[336]

330 Ref: 222-004-005
331 Ref: 222-004-005
332 Ref: 223-002-011
333 Ref: 223-002-012
334 'Anti-diuretic hormone' and 'ADH' – see Glossary Ref: 312-005-001
335 Ref: 223-002-013
336 Ref: 223-002-013

214. He adds that the fact that an over-prescription of fluids was given for many hours is "*a sign of less than a good level of care*"[337] from the staff on the paediatric ward. Indeed, he states that "*it is inexplicable why the calculation remained unchanged for 24 hours.*"[338]

215. Dr. Haynes acknowledges that because of a known propensity for patients to retain fluid following surgery, many clinicians would argue for a reduction in rate of administration. He is certain that Raychel should not have been given more than 65 ml/hr.[339]

216. Ms. Ramsay considered the findings of Davies et al (2008) following a survey conducted in 2008 in which it was discovered that standard maintenance rates or greater were prescribed for children post-operatively by over 80% of doctors who responded.[340] In contrast to the views expressed by Mr. Foster, she has concluded that it was "*not usual practice to restrict fluids post-operatively.*"[341]

217. Even if it was not necessarily common to restrict fluids post-operatively, Mr. Foster is concerned that there was a failure on the part of experienced paediatric nurses to identify the fact that Raychel was receiving 15 ml/hr more than the appropriate maintenance rate.[342] However, Ms. Ramsay has suggested that "*the continuation of pre-operative fluids may not have seemed unusual to nursing staff*"[343] and she has noted that the excessive rate was not in fact queried by a paediatric SHO (Dr. Mary Butler) who wrote a further prescription for Raychel later on 8th June 2001.

218. Whether the rate of fluid was excessive will be considered at the Oral Hearings, which will also examine why any excess was not detected and corrected.

XII. Raychel's Condition Overnight until the Morning Ward Round

219. Nurse Patterson brought Raychel back to Ward 6 at 01:55. She was responsible for notifying Raychel's parents of their daughter's condition and the findings of the operation.[344]

220. The night nurses on Ward 6 maintained a record of Raychel's vital signs (temperature, pulse and blood pressure) on an untitled chart.[345] Vital signs

337 Ref: 223-002-014
338 Ref: 223-003-009
339 Ref: 220-002-014
340 Ref: 224-004-018
341 Ref: 224-004-018
342 Ref: 223-002-013
343 Ref: 224-004-018
344 Ref: WS-048/1, p.3, Q.1
345 Ref: 020-015-029

were also recorded on a four hourly "TPR Chart" (temperature, pulse, respiration).[346]

221. Ms. Ramsay observes that it has been her experience that observations of vital signs are commonly plotted on a graph so "*trends can be easily observed*."[347] She considers that the use of an untitled chart by the nurses in Ward 6, while a practice used in other hospitals in Ireland, nonetheless makes variations in the condition of the patient more difficult to observe.[348]

222. Raychel's nursing care post-surgery was entered by Nurse Patterson into the Episodic Care plan at 23:00.[349] Nursing actions included vital signs every quarter of an hour for the first 2 hours, half-hourly for the following 2 hours, hourly for the following 2 hours, and every 2-4 hours until stable. The plan also states "*observe/record urinary output*".[350]

223. The nurses who completed the entries during this initial post-operative period were Nurse Patterson, Nurse Noble and Staff Nurse Joanne Hewitt.[351] It can be seen from this record that these observations were initially completed every 20 minutes or so, but from 03:00 they were completed half hourly, and then at longer intervals from 04:00.

224. Ms. Ramsay considers that between 01:55 and 09:00 "*the observations made and recorded were appropriate*".[352] Ms. Ramsay notes that while the care plan which had been formulated for Raychel required recordings to be made every 15 minutes for a two-hour period,[353] such regularity was not in fact necessary.[354]

225. It can be seen from the comments written into the untitled chart that Raychel appeared to be recovering well from her surgery, at least initially. She slept through the night and there was no complaint of pain.[355]

226. Mrs. Ferguson went home at around 06:00 and returned by 10:00.[356] Mr. Ferguson remained at the hospital.

227. Nurse Patterson has recalled that at 07:05 she administered PR Diclofenac (for pain-relief) and PR Flagyl (an antibiotic) when Raychel complained of

346 Ref: 020-015-028
347 Ref: 224-002-013
348 Ref: 224-002-013
349 Ref: 020-027-060
350 Ref: 020-027-060
351 See List of Persons Ref: 312-003-001
352 Ref: 224-002-013
353 Ref: 020-027-063
354 Ref: 224-002-013
355 Ref: 020-015-029
356 Ref: 095-002-005

abdominal pain.[357] The administration of these medicines is documented.[358] The medications were checked with Nurse Hewitt.[359]

228. There is no record of Raychel passing urine at any time overnight, and this was specifically noted by Nurse Patterson at 05:00.[360] The fluid balance record shows that Raychel had an episode of vomiting at 08:00.[361]

Nursing Handover

229. Nurse Noble was responsible for delivering the nursing handover to Sister E. Millar[362] when she came on duty on the morning of 8th June 2001. Sister Millar was in charge of Ward 6 from 07:50 until she went off duty at or about 18:00. According to Sister Millar, 23 of the 43 beds on Ward 6 were occupied on 8th June 2001.[363]

230. The handover was completed at 08:30.[364] At the handover, Nurse Noble informed her nursing colleagues that Raychel had not yet micturated. She also advised them that Raychel had been given medication at 07:00, but that she appeared comfortable.[365]

231. Sister Millar has recalled that Raychel had enjoyed "*an uneventful post-operative night"* and that *"her observations were within normal limits.*"[366]

232. Raychel was accommodated in Room I of Ward 6, and Staff Nurse Michaela McAuley (nee Rice)[367] and Staff Nurse Avril Roulston[368] were allocated responsibility for Rooms A-J.[369] At some point during the morning, Nurse Roulston was given responsibility for the Infant Unit which meant that she worked on the ward only when covering Nurse McAuley's breaks.[370] The nurses were allocated to their roles by Sister Millar.[371] It is Sister Millar's recollection that Nurse McAuley was "*the main carer for Raychel that day*."[372]

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357 Ref: WS-048/1, p.3, Q.1
358 Ref: 020-017-033, 020-017-036
359 Ref: WS-048/1, p.3
360 Ref: 020-027-064
361 Ref: 020-018-037
362 See List of Persons Ref: 312-003-001
363 Ref: 064-002-018
364 Ref: WS-056/1, p.3
365 Ref: WS-049/1, p.2, Q.1
366 Ref: WS-056/1, p.3
367 See List of Persons Ref: 312-003-001
368 See List of Persons Ref: 312-003-001
369 Ref: 098-240-573. For an explanation regarding the compilation of the sraff allocation book see Ref: 098-239-569
370 Ref: WS-052/2, p.4, Q.4(d)
371 Ref: WS-051/2, p.6, Q.5(e)
372 Ref: WS-056/2, p.4, Q.4(a)

Medical Handover

233. Mr. Gilliland, the Consultant Surgeon under whose care Raychel was admitted, states in his Inquiry witness statement that there was no provision for a formal handover between a surgeon who performed the surgery (such as Mr. Makar) and a surgeon conducting the ward round (such as Mr. Zafar).

234. Mr. Foster states that it is regrettable that no formal arrangements for handover existed. In his experience, a ward round would take place composed *"of the team that was on call the night before plus the new team for the day ahead"*.[373]

235. In the case of Raychel's management, it is clear that there was no conversation between Mr. Zafar and Mr. Makar before the ward round for the purposes of discussing the surgery that was conducted, and her progress since the surgery.[374]

236. Mr. Gilliland also *explains that that "it would have been common practice*" for discussions to take place to update the on-call surgeon of overnight admissions.[375] However, he cannot recall the mechanism by which he was informed that Raychel was under his care.[376]

237. It appears that although Mr. Gilliland, was Raychel's named Consultant, he did not see Raychel at any point during the time when she was a patient in Altnagelvin Hospital.

238. Mr. Foster states that it is "*of concern*"[377] that Mr Gilliland did not know details of his patients admitted on 7th June 2001 as this suggests "*serious vertical communication problems*" at Altnagelvin Hospital.[378]

239. Dr. Haynes considers the lack of senior involvement prior to Raychel's seizure to have been "*completely unsatisfactory.*"[379] He considers that, as the Consultant responsible for overseeing her care, Mr. Gilliland should "*at the very least*"[380] have seen her at some point during 8th June 2001. Indeed, he states that it would be "*unusual*"[381] for a Consultant Surgeon not to review a patient the next day following an emergency admission overnight. Although he concedes that it may not have altered subsequent events, he does consider it to have been a "*significant oversight*".[382] That is a matter which will be further explored in the context of hospital management and governance.

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373 Ref: 223-003-010
374 Ref: WS-022/2, p.9, Q.6(i)
375 Ref: WS-044/2, p.11, Q.20(a)
376 Ref: WS-044/2, page 5, Q.2(c)
377 Ref: 223-002-007
378 Ref: 223-002-007
379 Ref: 220-002-003
380 Ref: 220-002-003
381 Ref: 220-002-008
382 Ref: 220-002-003

240. Whether the arrangements which were in place in the absence of a formal handover were sufficient to provide for adequate continuity of care, and whether Mr. Gilliland should have seen Raychel during the 8 June, are matters to be considered during the Oral Hearings.

XIII. Surgical Ward Round

Mr. Zafar's Attendance Before 09:00

241. At around 08:30, Mr. Ferguson recalls Raychel waking up and talking to him.[383] She got out of bed and was walking around the ward, and into the corridor, pushing her drip. She then walked back and got back into bed.

242. Mr. M.H. Zafar[384], Surgical Senior House Officer, states that he conducted a morning ward round in Ward 6 on 8th June 2001. He does not recall whether Mr. and Mrs. Ferguson were present and whether he had any discussion with them when he attended Raychel.[385]

243. In fact Mrs. Ferguson was not in the hospital at that time[386] and Mr. Ferguson says in his Inquiry witness statement that sometime after 08:30 he left for about 15 minutes to get colouring books and pens for Raychel.[387] He also confirms that he did not discuss Raychel's condition with any other doctor.[388] Accordingly, it may have been that Mr. Ferguson was not on the ward when Mr. Zafar reached Raychel during the ward round. However, there is no record or mention by him of enquiring about the whereabouts of Raychel's parents so that he could discuss her condition and treatment plan with them.

244. Mr. Zafar was the first of five doctors who attended with Raychel during 8th June. No doctor saw Raychel more than once, and there is no evidence available to the Inquiry to suggest that the doctors who saw her spoke to each other about her condition.

245. Sister Millar recalls that she was present when Mr. Zafar carried out the ward round. It is her recollection that Mr. Zafar's ward round took place between 08:30 and 10:00.[389]

246. Mr. Zafar made a short untimed note in respect of his attendance:

"Post appendicectomy. Free of pain. Apyrexial. Continue observations."[390]

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383 Ref: 095-005-016
384 See List of Persons Ref: 312-003-001
385 Ref: WS-025/2, p.8 Q.4(c)(l)
386 Ref: 095-001-002
387 Ref: WS-021/1. pgs.4-5 Q(5)
388 Ref: WS-021/1, p.5 Q(6)(b)
389 Ref: WS-056/2, p.4, Q.5(a)
390 Ref: 020-007-013

During the remainder of the 8 June doctors made entries in the drug administration sheet in respect of Raychel, but Mr. Zafar's note was the only entry of substance made by any doctor in the clinical file from the conclusion of the surgery until Raychel suffered a seizure at or about 03:00 hours on 9th June 2001.

247. Apart from this written instruction to continue observations, Mr. Zafar says that he also provided verbal instructions during the ward round. He says in his first Inquiry witness statement that he advised the attending nurse (whose name he cannot now recall)[391] to *"start [Raychel on] sips of oral fluids and gradually reduce the IV fluids"* and that the *"plan was to stop IV fluids as soon as she was tolerating the oral fluids"*.[392] Mr. Zafar develops that in his second Inquiry witness statement to say that he *"had advised that the rate of fluid should be reduced"*[393] but he acknowledges that he took no steps to check the type of fluid that Raychel was receiving nor did he provide any advice on the period over which the IV fluids should be reduced, the amount by which they should be reduced or indeed the factors that would determine when and by how much they should be reduced. [394]

248. No prescription was written up to reflect Mr. Zafar's view that the rate at which fluid was to be administered should change, nor was his instruction recorded in the clinical notes. Mr. Zafar states that verbal advice on the ward round is not always recorded[395] and indeed that it was not regular practice to document in the medical notes all verbal advice given. [396]

249. Mr. Foster comments that Mr. Zafar's instruction to nursing staff to start oral fluids in small quantities at first "*was in line with standard practice.*"[397]

250. Ms. Ramsay states that *"it would have been common nursing knowledge to reduce intravenous fluids as oral intake increased therefore, specific instructions were not essential"*.[398] However, she acknowledges that *"a more detailed record would have made the expectations clear"*. [399]

251. Mr. Zafar says in his Inquiry witness statement that he found Raychel to be "*bright and alert*".[400] He also recalls that there was no complaint of pain, nausea or vomiting. He makes no reference to the fluid balance sheet for IV fluids which records a vomit at 08:00 that morning[401] and therefore shortly before his ward round. However, he says that he would have arranged for a

391 Ref: WS-025/2, p.9 Q.5(f)
392 Ref: WS-025/1, p.3
393 Ref: WS-025/2, p.9 Q.5(c)
394 Ref: WS-025/2, p.9 Q.5(c)
395 Ref: WS-025/2, p.9, Q.q.5(c)(ii)
396 Ref: WS-025/2, p.10, Q.5(h)
397 Ref: 223-002-039
398 Ref: 224-005-002
399 Ref: 224-005-002
400 Ref: WS-025/1, p.3, Q.1
401 Ref: 020-018-037

blood test (urine and electrolytes) if he had been aware that Raychel had vomited post-operatively.[402]

252. It is not clear from his statement whether the single vomit recorded at 08:00 would have been sufficient for him to have taken such action, and this is a matter which will be pursued further during the Oral Hearings.

253. Sister Millar has a different recollection. She is "*sure*" that she informed Mr. Zafar of the fact that Raychel had vomited at 08:00 and she states that he would have had access to the fluid balance sheet in which a record had been made of Raychel's episode of vomiting at 08:00.[403] She believes that her recollection is consistent with a note which she made in the 'Ward Treatment Book' which states, "*allow sips later.*"[404] If Mr. Zafar had not been aware of the vomiting, Sister Millar reasons that there would have been no reason to delay offering oral fluids until "*later*".

254. Sister Millar's note also records in the treatment book, "*if drinking↓ IV fluid.*"[405]

255. Therese Brown[406], Risk Management Director, describes the treatment book as *"a ward held book which provides a guide to patient layout and allocation"* and used to provide *"general information for all staff on the ward and … as a prompt for required action."*[407] She also says that the treatment book is *"used by Nursing staff during the Consultant ward round when a brief summary of action required and the treatment plan is recorded"*.[408]

256. Mr. Chairman, there appears to be a significant factual dispute between Mr. Zafar and Sister Millar about whether the former was concerned to reduce the rate of intravenous fluids, or whether instead he was concerned to emphasise that the use of oral fluids should be delayed. This factual dispute, and whether it is capable of resolution, will be the subject of further consideration at the Oral Hearings.

257. Dr. Scott-Jupp observes, from his analysis of the materials, including the observation charts and statements made by witnesses, that by the time of the morning ward round "*it is possible to deduce that [Raychel's] progress and her care was straightforward and as would be expected in a routine post-operative appendicectomy case.*"[409] He concludes that, even if Mr. Zafar had appreciated that Raychel had vomited at 08:00, "*he would probably still have suggested starting oral fluids, unless the vomiting persisted*".[410]

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402 Ref: WS-025/2, p.8, Q.4(p)
403 Ref: 020-018-037
404 Ref: WS-056/2, p.5, Q.5(j)
405 Ref: WS-056/2, p.29
406 See List of Persons Ref: 312-003-001
407 Ref: 098-238-568
408 Ref: 098-238-568
409 Ref: 222-004-006
410 Ref: 222-004-006

Who Should Have Taken the Ward Round

258. An issue which does arise for consideration at the Oral Hearings is whether Mr. Zafar should have been taking the ward round at all.

259. Mr. Gilliland has indicated that, on 8th June 2001, he "*would have been available for consultation or direct clinical care*" of patients such as Raychel, had this been "*deemed necessary*."[411] In terms of Consultant involvement in the conduct of ward rounds, he has said that the Consultant "*often took the lead in seeing patients*"[412] but that, in 2001, "*it was not normal clinical practice*" for all patients to be reviewed by a Consultant or specialist Registrar if they had already been seen by an experienced member of staff.[413] However, there was an expectation that, where a ward round was conducted by anyone other than the consultant, the clinician would report "*any clinical concerns to a more senior member of the team who was competent to deal with those concerns.*"[414]

260. Mr. Makar explains that normally, a post-operative child is seen by the surgical team (Registrar, SHO and JHO) attached to the on-call Consultant who formulate the management plan based on the clinical assessment.[415] However, the personnel of the surgical team included in the ward round could change based on what was happening that morning and the clinical priorities of the patients whom the surgical team were caring for.

261. Mr. Zafar, who carried out the ward round, states in his Inquiry witness statement that the "*junior surgical team (SHO, JHO and Staff Grade/SpR) [were] responsible for doing ward round for post-operative patients as well as providing further care*".[416] However, he goes on to say that the "*morning ward round was always conducted by the SHO and JHO*" albeit that "*sometimes [during it] the Consultant or SpR [specialist Registrar] would have attended*", which could be the case regardless of whether the patient had "*issues*".[417]

262. It is not clear whether Mr. Zafar was intending to distinguish the ward round practice for a post-operative patient from a 'normal' morning ward round. That issue, and its possible implications, will be addressed during the Oral Hearings.

263. Mr. Foster states that "*[t]here is no question*"[418] that a 'post-take' ward round should have been conducted by at least a Specialist Registrar or ideally by the Consultant himself, as such a round is "*an important part of the day*".[419] In addition, he is clear that it should have been conducted by members of the

411 Ref: WS-044/2, p.3, Q.1(g)
412 Ref: WS-044/2, p.13, Q.21(c)
413 Ref: WS-044/2, p.12, Q.20(c)
414 Ref: WS-044/2, p.13, Q.21(d)
415 Ref: WS-022/2, p.8 Q.6(c)
416 Ref: WS-025/2, p.6, Q.4(a) and (c)(ii)
417 Ref: WS-025/2, p.7, Q.4(i) and p.8, Q.4(j)
418 Ref: 223-002-010
419 Ref: 223-002-010

surgical team which had admitted Raychel on the evening of 7th June 2001 as "*continuity of care is only assured*"[420] by approaching the ward round in this way. He notes that Mr. Zawislak had been on call until 09:00 on 8th June, and Mr. Bhalla was on call between 8th and 9th June, yet neither of these Specialist Registrars attended Raychel during the ward round.[421]

264. Mr. Foster considers that it was inappropriate for Mr. Zafar to carry out the ward round since he had only just commenced a 24 hour on call period and "*would have had little time to look at the details of her case.*"[422] Mr. Foster highlights, for example, the fact that Mr. Zafar was apparently unaware of what he says were the abnormal urine tests which had been obtained the night before.[423]

265. Moreover, Mr. Foster notes Mr. Zafar's limited experience of working with children (4 months as a SHO).[424] He considers that it was "*entirely unsatisfactory and unsafe*" that a clinician with such limited experience was left to conduct a ward round of such importance in the absence of a Specialist Registrar or Consultant.

266. Mr. Foster has "*no doubt*"[425] that had a senior member of the team conducted the ward round on a 'post take' basis, the reasoning behind the surgery would have been challenged, the abnormal urine tests would have been noted and further investigations directed. In other words, "*Raychel would not have been seen as a straightforward post-operative appendix and more care might have been taken with post-operative observations*." [426]

267. Dr. Haynes agrees that all inpatients should be seen, examined and the results of appropriate investigations scrutinised on at least a daily basis during the course of a formal ward round, "*ideally supervised directly by the responsible Consultant.*"[427] He was "*surprised*"[428] that Mr. Gilliland did not do a ward round of surgical patients admitted under his care in the 24 hours prior to 09:00 on 8th June 2001 as this was "*standard practice*".[429]

268. Mr. Gilliland states that since Raychel's death there have been various developments concerning the conduct of ward rounds.[430] A memo, which was introduced on 2nd May 2003, provided for the on-call surgical team to attend Ward 6 first thing each morning to review the paediatric patients. However, it would appear that this arrangement was discontinued because in practice

420 Ref: 223-002-010
421 Ref: 223-003-009
422 Ref: 223-002-010
423 Ref: 223-002-010
424 Ref: 223-003-011
425 Ref: 223-002-010
426 Ref: 223-002-010
427 Ref: 220-002-008
428 Ref: 220-003-005
429 Ref: 220-003-006
430 Ref: WS-044/1, p.5, Q.4

there was a need for the on call team to prioritise "*much sicker patients*."[431] Subsequently, a "*surgeon of the week*" arrangement was introduced which, in his opinion, allowed for paediatric patients to be reviewed more promptly.[432]

269. The adequacy of the ward round that took place and whether it provided an appropriate basis for continuity of care, are matters to be considered during the Oral Hearings.

Attendance by Mr. Makar at 09:00

270. Mr. Makar, who had operated on Raychel, may have been in the vicinity at the time of the ward round. He says in his Inquiry witness statement that he saw Raychel at around 09:00 and spoke to her father.[433] Mr. Makar also says that the nurse told him that Raychel *"had just been seen by the surgical Registrar"*.[434]

271. Mr. Ferguson agrees in his statement for the PSNI that Mr. Makar spoke with him and that Sister Millar was also present: "*The doctors came into the ward soon after doing their rounds. Doctor Makar was there … I recall the ward sister Nurse Millar was also present. I do not recall the identities of any of the other doctors but I know that there were other doctors present*".[435] The identity of those doctors is unclear and a matter to be pursued further.

272. Sister Millar states that Mr. Makar came shortly after Mr. Zafar and that both were in the ward at the same time.[436]

273. Accordingly, it may have been possible for Mr. Makar to have participated in the ward round as indicated by Mr. Foster, or alternatively to have discussed Raychel with the 'day-team'. However, Mr. Makar says that he considered it unnecessary do discuss her with them (let alone participate in the ward round) as he had written up accurate contemporaneous operative notes which would have informed the doctors about Raychel's pre-operative assessment, medical history and the operative finding.[437]

274. Mr. Makar's reference to Raychel having been seen by another surgical team comprising a Registrar and a SHO[438] is confusing. Neither Mr. Zafar nor Sister Millar have mentioned the presence of a Registrar during the ward round. It is unclear whether a Registrar was on the ward at all during the ward round, although it seems that if a Registrar was there then he or she did not examine Raychel.

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431 Ref: WS-044/1, p.5, Q.4
432 Ref: WS-044/1, p.5, Q.4
433 Ref: WS-022/1, p.2
434 Ref: WS-022/2, p.7, Q.6(c)
435 Ref: 095-004-016
436 Ref: WS-056/2, p.5, Q.5(c)
437 Ref: WS-022/2, p.9, Q.6(i)
438 Ref: WS-022/1, p.2, Q.2

275. Mr. Makar says in his Inquiry witness statement that the purpose of him going to the ward that morning was to explain the operative findings to Raychel's father[439] and to see whether her pre-operative pain had settled.[440] He recalls explaining that the operation had been straightforward and that she would probably be able to go home by the next morning. Raychel's father recalls Mr. Makar stating that the appendix was "*slightly inflamed*".[441]

276. Mr. Makar states that he did not examine Raychel who was sitting on the chair beside her bed.[442] Raychel's father has described her sitting at the table colouring in a book that he had bought her.[443] Mr. Makar recollects that Raychel looked well and comfortable,[444] and was pain-free.[445] He has no recollection of being aware that Raychel had vomited by that time, although, undoubtedly she had.[446]

277. Mr. Makar makes it clear that he was not involved in Raychel's post-operative management.[447] He did not examine her or check the fluids that she was receiving because she had already been seen by his surgical colleague (Mr. Zafar).[448] Mrs. Ferguson arrived in the hospital some time between 09:30 and 10:00.[449] She states in her deposition to the Coroner that Raychel was in bed colouring.[450] In her subsequent Inquiry witness statement, she recollects Raychel sitting at a small table and chair colouring. She remembers Raychel throwing her arms around her and said "*Guess what mummy, I've been sick*."[451]

Ward Practice

278. Mr. Gilliland has explained that the consultant under whose care a patient is admitted *"would oversee the totality of the patient's care."*[452]However, he explains that the delivery of that care is often *"delegated to other members of the surgical team who are deemed by the consultant to be competent to deliver the care."*[453]

279. As will be described below, when nurses required medical input for Raychel they contacted a Junior House officer on the surgical team. One of those Junior House officers was Dr. Michael Curran. He has described his duties on the 8 June 2001.[454] He has explained that "if ward staff had concerns about

439 Ref: 012-045-217
440 Ref: WS-022/2, p.7, Q.6
441 Ref: 095-005-015
442 Ref: WS-022/1, p.2, Q.2
443 Ref: 095-005-016
444 Ref: WS-022/1, p.2, Q.2
445 Ref: WS-022/2, p.7, Q.6
446 Ref: WS-022/1, p.2, Q.2
447 Ref: 012-045-217
448 Ref: WS-022/2, p.9, Q.7
449 Ref: WS-020/1, p.6, Q.8(a)
450 Ref: 095-001-003
451 Ref: 095-002-005
452 Ref: WS-044/2, p.13, Q.21(a)
453 Ref: WS-044/2, p.5, Q.2(e)
454 Ref: WS-028/2, p.2, Q.1(e)

any surgical patients they would contact the Surgical Junior House officer in the first instance."[455]

280. Dr. Brian McCord (Consultant Paediatrician) has explained that in 2001 if a patient (such as Raychel) was admitted to the paediatric ward by a specialty team (such as general surgery) she would remain the responsibility of the Consultant within that team whilst she remained an inpatient. He adds, however, that *"paediatric medical advice or assistance is readily available at both senior and junior level, upon request."* [456]

281. Mr. Foster has examined the ward practice and arrangements for patient care which were in place when Raychel was a patient in Altnagelvin. .[457] He notes that paediatric patients were looked after by the paediatric staff and surgical patients by surgical staff. He is concerned that the first level doctor to be consulted about surgical patients was routinely a JHO (e.g. Dr. Devlin or Curran). Mr. Foster comments that it is likely that at that time they would have had little experience in 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.

282. Mr. Foster adds that the care of surgical patients on Ward 6 was left, to all intents and purposes, to the nursing staff on the ward. No doctor more senior than a JHO attended the ward after 09:00 on 8th June 2001. These doctors simply complied with requests from the nursing staff and, as very junior trainees, "*could not have been expected*"[458] to make clinical decisions on postoperative children. Mr. Foster states that, 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 SHOs on the ward.

283. Mr. Foster comments that to place pre-registration JHOs who had never done a paediatric job in a position of being first on call for post-operative children was "*unsatisfactory*".[459] He questions how the authorities at Altnagelvin managed to get this arrangement past the scrutiny of the Postgraduate Deanery.[460] This is an issue which will be further examined as part of the hospital management and governance hearings.

455 Ref: WS-028/2, p.4, Q.4(d)
456 Ref: WS-032/1, p.2, Q.1
457 Ref: 223-002-011
458 Ref: 223-002-011
459 Ref: 223-002-011
460 Ref: 223-002-037

XIV. Post-Operative Nausea and Vomiting (PONV)

284. The fluid balance record shows the following episodes of vomiting by Raychel during 8th June 2001:[461]

(i) 08:00 – *"vomit"*

(ii) 10:00/10:25[462] – *"large vomit"*

(iii) 13:00 – *"vomited ++"*

(iv) 15:00 – *"vomited ++"*

(v) 21:00 – *"vomiting coffee grounds ++"*. Nurse Gilchrist has stated that this was approximately 150 mls[463]

(vi) 22:00 – *"small amount x3"*

(vii) 23:00 – *"small coffee ground vomit"*

285. In addition, Mrs. Ferguson personally recalls vomiting at the following times:

(i) 11:00

(ii) 12:00

(iii) Two vomits between 12:00 and 15:00

(iv) Two vomits after 15:45

286. Mrs. Ferguson also recalls in her Inquiry witness statement Raychel being *"sick all the time and heaving continually."*[464] Mr. Ferguson also remembers Raychel vomiting and recalls in his PSNI statement: *"Raychel remained in bed whilst I was there and vomited several times. I recall taking several kidney trays filled with vomit out to the nurses"*.[465]

287. Their account does not accord with that of Sister Millar who, whilst agreeing with Mr. Ferguson in her Deposition for the Coroner that Raychel was generally bright and happy in the morning, walked with her father and sat up colouring, she states that as she *"vomited undigested food at 10.30 am and again at 1.00 pm and 3.00 pm but not large amounts. Raychel continued to be stable and in good form and gave no cause for concern"*.[466]

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461 Ref: 020-018-037

462 Ref: 020-015-027 – this is not noted on the fluid balance chart and it is therefore unclear whether this is the vomit referred to as the 10:00 "*large vomit*" on the fluid balance chart or a separate vomit entirely.

463 Ref: 012-044-212

464 Ref: WS-020-1, p.18, Q.37

465 Ref: 095-005-017

466 Ref: 012-041-202

288. There is therefore a factual conflict between Raychel's parents and the ward sister in charge of her care, which is a matter to be pursued further during the Oral Hearings.

289. The significance of that conflict is reflected in Dr. Jenkins' report prepared for Altnagelvin Trust, and which he has characterised as follows: *"Whilst it is possible in retrospect to form the opinion reached by Dr. Sumner that Rachel must have suffered severe and prolonged vomiting, this does not seem to have been the assessment of her condition made by experienced staff at the relevant time."*[467]

290. The incidence, volume and nature of Raychel's vomiting, and the accuracy of recording, is a matter to be addressed further at the Oral Hearings.

Causes

291. Dr. Haynes has explained that PONV is "*a problem in children and is one of the most frequent causes of complaint from parents.*"[468] He adds that at least 40 per cent of children aged 3 years and over will vomit during the post-operative period.[469] It is more common following certain operations, including appendicectomy. According to Dr. Haynes post-operative vomiting related to the anaesthetic and operation *per se* usually settles within the first 6 hours, but it is sometimes troublesome for up to 24 hours. In addition, some opioid drugs used for pain relief have nausea and vomiting as possible side effects.[470] That analysis is largely in agreement with the views of both Dr. Sumner, the expert paediatric anaesthetist engaged by the Coroner and the PSNI, and Dr. Warde, the expert in the same discipline engaged by the Altnagelvin Hospitals Trust.

292. Dr. Sumner states that PONV is very common with a variety of causes including reaction to anaesthetic agents particularly the opioids such as fentanyl[471] and morphine but also after interference with the peritoneum.[472] Dr. Warde is also of the view that PONV following appendicectomy is very common and is in agreement with Dr. Sumner that its causes include the administration of opioid drugs, traction on the peritoneum during surgery as well as the side-effects of certain anaesthetic agents.[473]

293. Ms. Ramsay states that the highest incidence of PONV occurs in the 5-12 age group.[474]

294. Dr. Scott-Jupp identifies the factors which can contribute to vomiting after surgery:[475]

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467 Ref: 317-009-002-3
468 Ref: 220-002-012
469 Ref: 220-002-012
470 Ref: 220-002-012
471 'Fentanyl' – see Glossary Ref: 312-005-001
472 Ref: 012-001-004
473 Ref: 317-009-010
474 Ref: 224-004-012

(i) Anaesthetic drugs can sometimes cause nausea and vomiting.

(ii) Drugs which are given for pain relief (eg. Cyclimorph) whether intra or post operatively, or to reduce the risk of post-operative infection (e.g. Metronidazole/Flagyl) can also cause nausea and vomiting. Raychel received both types of drugs.

(iii) Vomiting can be a consequence of the illness that caused the patient to attend hospital in the first place. Dr. Scott-Jupp explains that children are often admitted to hospital and treated for suspected appendicitis when, as in Raychel's case, it transpires that something else must have caused the abdominal pain. That 'something else' might be a virus that can trigger vomiting and nausea which, while not strictly categorised as PONV, may be difficult to distinguish from it.

(iv) The process of having an operation in which the surgeon will necessarily come into contact with intra-abdominal tissue can cause vomiting, particularly in the early post-operative stages.

(v) Anxiety, particularly in the case of children, can contribute to symptoms of nausea and vomiting.

(vi) Any of these factors interacting with each other.

295. Dr. Scott-Jupp considers that since Raychel did not vomit until some eight hours after she left theatre, it seems unlikely that the anaesthetic agents or the operation itself caused the vomiting.[476] However, he says that any of the other identified factors could have interacted to produce the vomiting.

296. Mr. Foster considers that Raychel's initial postoperative vomiting may have been a postoperative ileus due to handling of the intestine intraoperatively (i.e. interface with or traction on the peritoneum as considered by Dr. Sumner and Dr. Warde), or the administration of opiates.[477] Dr. Haynes agrees that it is likely that the drugs given during the course of the anaesthetic (such as cyclimorph) were a factor in the initiation of the vomiting in Raychel's case.[478] Whilst he notes that Raychel was initially well and mobilising, she gradually became drowsy and non-communicative, and both he and Mr. Foster[479] consider that the initial causes of PONV was likely to have been progressively overtaken by the onset of hyponatraemia, which itself was likely to have been caused "*partly by electrolyte loss in vomit and partly by SIADH.*"[480]

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475 Ref: 222-004-007
476 Ref: 222-004-008
477 Ref: 223-002-036
478 Ref: 220-002-018
479 Ref: 223-002-036
480 Ref: 220-002-018

XV. **Post-Operative Hyponatraemia**

297. In their reports, Dr. Haynes[481] and Mr. Foster[482] explain the following as the main causes of hyponatraemia during the post-operative period:

(i) The administration of hypotonic (low-sodium) fluid resulting in a dilutional effect on the serum sodium

(ii) Low urine output, which can be caused by SIADH. The effect of Anti-Diuretic Hormone (ADH) which is released from the posterior pituitary as part of a normal physiological response to surgery or any stress. The amount of ADH released is variable, but can be inappropriately and idiosyncratically large. When inappropriate ADH production (SIADH) occurs, excessive free water is reabsorbed into the blood by the kidneys, thus diluting the serum sodium concentration. As well as trauma and surgery, SIADH can also be stimulated by nausea, vomiting, pain, anxiety and some drugs.

(iii) Sodium depletion after chronic losses from the gastrointestinal tract (e.g. vomiting or diarrhoea)

Medical/Surgical Knowledge

298. Mr. Foster refers to ADH secretion following any stressful event such as trauma or surgery being a physiological fact that is "*core knowledge*",[483] which should be understood by any appropriately trained doctor and nurse. He explains that it is taught as part of the medical curriculum in the UK and Ireland and reinforced during teaching for examinations in surgery or anaesthesia.[484]

299. In his report, Mr. Foster cites three standard surgical textbooks which emphasise the *"potentially serious combination of a low urine output, vomiting and the administration of hypotonic fluids"*: Pye's Surgical Handicraft (1969); Textbook of Surgical Physiology (1964); Essentials of Fluid Balance (1969)[485] He explains that these text books, which would have been familiar to surgical trainees and their tutors in the 1990s when the clinicians involved in Raychel's case would have been receiving their training, demonstrate the expected knowledge base of a reputable surgical SHO, registrar and certainly a consultant as to the risks of hyponatraemia and SIADH following surgery.[486] Mr. Foster also comments that nursing staff should have a basic understanding of this area and its potential seriousness.[487]

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481 Ref: 220-002-011
482 Ref: 223-002-012
483 Ref: 223-002-012
484 Ref: 223-002-012
485 Ref: 223-002-012
486 Ref: 223-002-012
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300. Dr. Haynes is also of the opinion that fluid and electrolyte physiology is part of the undergraduate medical curriculum, and that knowledge is "*certainly expected*"[488] in the first part of surgical and anaesthetic postgraduate examinations. He believes it is "*clear*"[489] that Mr. Makar and Dr. Gund knew what was correct, but "*neither felt empowered to insist on what they knew to be a correct course of action*".

301. Dr. Scott-Jupp states that it "*should be borne in mind*"[490] that postoperative hyponatraemia is "*very rare*". He would expect a junior surgical doctor in a district general hospital to have "*a very limited understanding*",[491] if any, of the risks of hyponatraemia. He adds that more experienced surgeons and paediatricians may be more familiar with it, but experience would be very limited.[492]

302. Dr. Devlin (Junior House Officer, Surgical) in his witness statement for the Inquiry has explained that in 2001 he was *"aware of some factors that could cause electrolyte imbalance in postoperative patients."* [493] He then lists a number of factors including infection, vomiting, diarrhoea, fluid administration and hormonal response to surgery as factors which could all cause an electrolyte imbalance. He believed that Raychel was suffering from post operative vomiting at the time he saw her and he thought Solution No. 18 was an appropriate choice of fluid in those circumstances.[494]

303. Dr. Curran (Junior House Officer, Surgical) in his witness statement for the Inquiry states that at the time of treating Raychel he does not believe that he had any experience or awareness of the condition of hyponatraemia or other electrolyte imbalance in a post-operative paediatric patient.[495] Since he was unaware of the risk of hyponatraemia at the time he did not give consideration to the type of fluid being administered to Raychel and he didn't consider checking her electrolyte profile.[496]

304. Mr. Gilliland in his deposition to the Coroner stated that he only *"became aware of hyponatraemia after Raychel's death."*[497] When asked by the Inquiry about the evidence which he gave to the Coroner, he answers by explaining it in terms of: "*Dilutional hyponatraemia is rare. At the time of Raychel's death I had never encountered a case and there were no regional policies on its prevention or treatment*".[498] He then states that he only became aware that dilutional hyponatraemia was an issue in Raychel's case, after her death following

488 Ref: 220-003-014
489 Ref: 220-003-014
490 Ref: 222-004-014
491 Ref: 222-004-020
492 Ref: 222-004-020
493 Ref: WS-027/2, p.15, Q. 18
494 Ref: WS-027/2, p.15, Q.19
495 Ref: WS-028/2, p.9, Q.7
496 Ref: WS-028/2, p.10, Q.8
497 Ref: 012-038-178
498 Ref: WS-044/2, p.27, Q.34

discussions between doctors in Altnagelvin and the RBHSC.[499] The note taken of Mr. Gilliland's evidence to the Coroner is slightly more detailed:

"Mr. Gilliland made it clear that he had not been directly involved in Raychel's case, being the head of surgery. He was not aware previously of the dangers of Hyponatraemia developing in such cases, but the new protocol now forms part of JHO and SHO training and medical and surgical practitioners are aware of it. He said he had never encountered the condition before in either training or practice, nor had any colleague."[500]

305. However, elsewhere in his answers, he indicates that was well aware of issues relating to physiology, including fluid and electrolyte balance and the causes of hyponatraemia.[501] Certainly, this is in keeping with the understanding of Mr. Foster who states that "*most surgeons are aware of fluid balance and its relation to surgical physiology*" and that "*the question of electrolyte imbalance is taught and tested during surgical training and…is familiar to the majority of reputable surgeons in practice.*"[502]

306. Mr. Gilliland's appreciation of hyponatraemia generally and dilutional hyponatraemia in particular, as well as that of the Junior House Officers who attended Raychel, and the implications of any lack of knowledge for the treatment and well-being of Raychel, will be addressed during the Oral Hearings.

Nursing Knowledge

307. Ms. Ramsay agrees with Mr. Foster that nurses should also hold a basic knowledge of the dangers:

"I do not think the nurses could have identified hyponatraemia as the likely problem [in Raychel's case] as this required laboratory tests. However, they should have known that persistent vomiting can cause dehydration and electrolyte imbalance. In addition they should have known that fluid lost through vomiting needed to be replaced. I believe this is basic nursing knowledge of which all nurses who care for children should be aware."[503]

308. Indeed she states in her initial report in relation to the maintenance of a 'fluid balance chart':

"Descriptions and volume in relation to vomit are always subjective as there is no effective way to catch and measure sudden vomit. However, I would expect a registered nurse to be aware of the potential consequences of repeated vomiting i.e. dehydration and electrolyte imbalance and to <u>seek advice</u>" (emphasis added).[504]

499 Ref: WS-044/2, p.27, Q.34
500 Ref: 098-036-114
501 Ref: WS-044/2, p.33 Q.47
502 Ref: 223-002-028
503 Ref: 224-004-015
504 Ref: 224-002-012

309. Professor Hanratty's Report, 'Chronology of Nurse Education in Northern Ireland', sets out in detail the curriculum guidance documents relating to intravenous fluid management with specific reference to hyponatraemia from 1973.[505]

310. However, the picture which emerges from analysis of the statements provided to the Inquiry by the nurses who cared for Raychel is that they had little knowledge of the circumstances which could give rise to electrolyte imbalance post-operatively.

311. Sister Millar was an experienced paediatric nurse. She had qualified in 1971. She was in charge of the Ward where Raychel was cared for during 8th June 2001. She says that she did not know the factors that could give rise to an electrolyte imbalance in a paediatric patient following surgery.[506]

312. Nurse Patterson qualified as a nurse in 1988. She also says that she would not have known the factors that could cause electrolyte imbalance in children who were receiving intravenous fluids following surgery.[507] It will be recalled that Nurse Patterson was Raychel's named nurse and was responsible for formulating her care plan.

313. Nurse Noble qualified as a nurse in 1985. She cared for Raychel on the night she was admitted to Altnagelvin and she took charge of the Ward on the night after the surgery. It will be recalled that she was the nurse who corrected Mr. Makar when it was indicated that he wished to prescribe Hartmann's pre-operatively.

314. Like Sister Millar and Nurse Patterson, Nurse Noble says that she was unaware in June 2001 of the factors that could cause an electrolyte imbalance in a paediatric patient following surgery.[508] Moreover, she says that she considered that the administration of Solution No.18 was providing adequate replacement for Raychel's gastric losses.[509]

315. Nurse Noble is not alone in expressing the view that she was not particularly concerned about Raychel's vomiting because intravenous fluids were in progress: Nurse Noble,[510] Nurse McAuley,[511] Nurse Roulston,[512] Nurse Gilchrist[513] and Nurse Bryce[514] also express that view. Sister Millar has also

505 Ref: 308-004-037 to Ref: 308-004-044
506 Ref: WS-056/2, p.8, Q.6(i)
507 Ref: WS-048/2, p.8, Q.7(h).
508 Ref: WS-049/2, p.12, Q.12(a)
509 Ref: WS-049/2, p.8, Q.8(a)(vi)
510 Ref: WS-048/2, p.12, Q.18
511 Ref: WS-051/2, p.12, Q.9(b)(v)
512 Ref: WS-052/2, p.6, Q.5(d)(iii)
513 Ref: WS-053/2, p.13, Q.9(c)
514 Ref: WS-054/2, p.10, Q.10

expressed the view that she was reassured because intravenous fluids were being administered.[515]

316. Ms. Ramsay has examined what she has characterised as "*the assumption that when an infusion is in place the child is getting adequate hydration regardless of their intake and output*." She says that this lack of understanding is *"surprising"* for a group of registered children's nurses.[516]

317. It would appear that only the theatre nurse, Nurse McGrath, appreciated that a child receiving hypotonic intravenous fluids would require urgent medical intervention if she was experiencing prolonged vomiting.[517]

318. At the Oral Hearings, consideration will be given to this apparently widespread failure amongst the nursing staff to understand that Raychel was not receiving adequate replacement fluids, and the consequences of this.

XVI. Raychel's Condition During 8th June 2001

319. The nurses who saw Raychel in the early part of 8th June 2001 – Sister Millar, and Nurses Roulston and McAuley – have each explained that they were not unduly concerned about her because the vomiting was not unusual following surgery and that, in any case, Raychel was receiving IV fluids.

320. As has been mentioned previously, there are a number of factual conflicts between witnesses in regards to Raychel's condition as 8th June progressed, particularly in relation to the frequency and severity of her vomiting, and her general level of activity. These will be considered further during the course of the Oral Hearings.

10:00 to 12:00

321. At about 10:00[518]/10:25[519], Raychel is recorded as having vomited. This was a "*large vomit*".

322. Raychel's mother recalled in her deposition for the Coroner that at about 10:30/11:00, Raychel became quiet, did not talk to her and stopped colouring in.[520] Mrs. Ferguson states that she spoke to the nurses and indicated that Raychel did not look too well. The nurse suggested that Raychel could be given a capful of '7-Up' to drink. Mrs. Ferguson also recalls that prior to

515 Ref: WS-056/2, p.11, Q.7(p), and p.23, Q.21
516 Ref: 224-006-001
517 Ref: WS-050/2, p.7
518 Ref: 020-018-037
519 Ref: 020-015-027 – this is not noted on the fluid balance chart and it is therefore unclear whether this is the vomit referred to as the 10:00 "*large vomit*" on the fluid balance chart or a separate vomit entirely.
520 Ref: 098-008-018

midday, Raychel did not actually vomit in the bed, but "*she was retching a lot.*"[521]

323. Mrs. Ferguson recalls that, at around 11:00, Raychel had a small vomit which was "*more like slime*"[522] which Mrs. Ferguson cleaned with a tissue. Mrs. Ferguson recalls her husband mention the 'slime' vomit to the nurses on the ward[523] at about 11:00[524] as he went home to get washed.[525] Nurse McAuley has said that she did not report the second recorded episode of vomiting "*as it seemed that it was a normal vomit post surgery.*"[526]

324. Raychel's mother recalled in her deposition for the Coroner that:

> "*At about 12.00 hours I took Raychel to the toilet and as she was about to leave the toilet she began to vomit which was large in volume, she was bright red and came out in a cold sweat. She returned to bed and I informed a nurse that she had been sick but the nurse said that this was normal.*" [527]

325. Mrs. Ferguson recalls the nurse that she spoke to after the toilet visit was "*small with dark hair*"[528] and said that someone would be along to look at Raychel.[529]

326. It should also be noted that Mrs. Ferguson has stated that she again carried Raychel to the toilet at 14:00.[530] However, neither of these episodes of passing urine was recorded on the fluid chart by the nurses.

Attendance by Dr. Butler at 12:10

327. At 12:00, Nurse McAuley asked Dr. Mary Butler[531], Paediatric Senior House Officer, to prescribe a further bag of Solution No.18 as the earlier overnight bag had run out.[532] Dr. Butler was not a member of the surgical team who had care of Raychel, but was one of two paediatric SHOs who would normally be present in Ward 6 throughout the day.[533] The new infusion commenced at 12:10.

328. No note was made by Dr. Butler in the clinical notes of her attendance, although she signed the prescription sheet.[534] She has little recollection of the event, but is certain that no concern was expressed by nursing staff regarding

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521 Ref: 095-002-006
522 Ref: WS-020/1, p.8, Q.9(a)
523 Ref: WS-020/1, p.8, Q.9(a)
524 Ref: WS-020-1, p.8, Q.9(c)
525 Ref: 095-002-006
526 Ref: WS-051/2, p.11, Q.7(g)
527 Ref: 012-028-146
528 Ref: WS-020/1, p.9, Q.9(g)
529 Ref: WS-020/1, p.9, Q.9(h)
530 Ref: 095-003-012
531 See List of Persons Ref: 312-003-001
532 Ref: WS-051/1, p.3, Q.1
533 Ref: WS-026/2, p.7
534 Ref: 020-019-038

Raychel's condition, and that, had she been aware of any concerns, she would have examined her.[535] It should be noted that Raychel had vomited at least twice by this stage.

329. Unfortunately, Dr. Butler did not question either the rate or type of fluid, nor is there any record of her having examined Raychel. Moreover, Dr. Haynes notes that Dr. Butler did not perform a calculation to check the fluid administration rate for Raychel when she prescribed fluid to be continued at 80mls/hr.[536] It is apparent that Dr. Butler relied upon the calculation which had been performed pre-operatively by Mr. Makar.

330. It is the opinion of Dr. Haynes that Dr. Butler should have performed a calculation before renewing the intravenous fluids prescription. He is of the view that "*the majority of paediatric trainees would always check the weight of the patient and ensure that the correct rate of fluid administration was in order and that she should have done so.*"[537]

331. However, Dr. Scott-Jupp is not critical of Dr. Butler, stating that it is a normal situation on any children's ward for a passing doctor to be asked by nursing staff to write up routine prescriptions, either for IV fluids, analgesia, or antibiotics, and that this is a very common practice throughout the NHS.[538] According to Dr. Scott-Jupp, "*in the real world*", doctors do not have the opportunity to assess and examine every patient for whom they are asked to prescribe, and that any doctor who insisted on doing so would be seen by nursing staff as "*overly cautious*" and "*obstructive*" to the running of a busy ward.

332. Whether Dr. Butler should have taken steps to check the appropriateness of the intravenous fluids which had been prescribed for Raychel before continuing the prescription of Solution No. 18 at a rate of 80mls/hr is a matter to be considered during the Oral Hearings.

13:00 to 15:00

333. At 13:00, Raychel is recorded as having "*vomited* ++".[539]

334. Nurse McAuley states that she gave no consideration to seeking medical advice following the third recorded episode of vomiting at 13:00 because, since "*Raychel already had IV fluids in progress [she] had no concerns about her vomiting*."[540] She has said that she was not aware of any episodes of vomiting other than those that were recorded on the fluid balance chart.[541]

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535 Ref: 223-002-015
536 Ref: 220-003-009
537 Ref: 220-003-009
538 Ref: 222-004-009
539 Ref: 020-018-037
540 Ref: WS-051/2, p.12, Q.9(b)(v)
541 Ref: WS-051/2, p.14, Q.9(d)(vii)

335. Mrs. Ferguson recalls that as the day progressed Raychel "*became sick more often and at one point she was vomiting bile on the bed and a nurse said that her stomach was empty and that she would not be sick anymore*."[542]

336. Mr. Ferguson returned to the hospital between 13:00 and 13:30.[543] He recalls "*taking several kidney trays filled with vomit out to the nurses. The vomit seemed very watery*".[544] Mrs. Ferguson agrees[545] and recalls Raychel vomiting at least twice, perhaps three times, after the vomit which occurred during the visit to the toilet, before Mr. and Mrs. Ferguson went home at 15:00 as their other children were getting out of school. [546] Each vomit was "*slimy*" and there was "*plenty of it*".[547] Mrs. Ferguson says that "*she seemed to be going downhill.*" Raychel was not vomiting at the time that they left.[548]

15:00 to 18:00

337. At 15:00, Raychel was again recorded as having "*vomited ++*".[549]

338. After the fourth recorded episode of vomiting at 15:00, Nurse McAuley was still unconcerned about Raychel's condition – she simply wanted a doctor to come to give Raychel an anti-emetic "*to stop her from being sick*."[550] Hence, she reported the vomiting to Sister Millar who prompted her to contact a JHO to see Raychel.

339. Raychel's godmother Margaret Harrison[551] visited her between 15:00 and 15:45.[552] She found her to be unusually quiet, never speaking to her even when prompted. She noted that Raychel was moving freely between the bedside chair and her bed.

340. Mrs. Ferguson returned at 15:45, and Mr. Ferguson remained at home to mind their other children.[553] Mrs. Ferguson recalls that on her return Raychel "*appeared listless and [was] not her lively self*".[554] She was not talkative or interested in what she was saying.[555] Mrs. Ferguson felt that she was "*much worse*" than she had been at 10:00. Mrs. Ferguson recalls her vomiting at around 17:00.[556] She recalls starting to panic at that stage because Raychel was "*like a zombie*".[557]

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542 Ref: 012-028-146
543 Ref: 095-005-017
544 Ref: 095-005-017
545 Ref: WS-020/1, p.10, Q.10(d)
546 Ref: 095-002-006
547 Ref: WS-020/1, p.9 Q.10(b)
548 Ref: WS-020/1, p.11
549 Ref: 020-018-037
550 Ref: WS-051/2, p.13, Q.9(c)(vi)
551 See List of Persons Ref: 312-003-001
552 Ref: 095-006-020
553 Ref: 095-002-006
554 Ref: 012-028-146
555 Ref: 095-002-007
556 Ref: WS-020/1, p.12, Q.11(e)
557 Ref: WS-020/1, p.12, Q.11(e)

341. At the Inquest in relation to Raychel's death, Sister Millar was asked to address Mrs. Ferguson's account of Raychel appearing "*listless*" by late afternoon on 8th June 2001. There is a record which appears to show that Sister Millar accepted that description.[558] However, Sister Millar has clarified her position for the Inquiry. She does not accept that Raychel could properly be described as "*listless*" on 8th June when she was on duty. She has explained that when questioned about this matter by the Ferguson's legal representative her response was

> "*that I would be prepared to agree with Mrs. Ferguson's description of Raychel as 'listless'….because I believe that parents often know their children best and it would have been wrong of me to disagree with Mrs. Ferguson. However, I am firmly of the belief that Raychel did not display signs of listlessness during my time on duty.*"[559]

342. Nurse McAuley has no recollection of Raychel vomiting during the period when she was trying to contact a JHO. It is her recollection that Raychel was asleep at that time.[560] The contemporaneous records indicate that Raychel was sleeping when checked at 17:00.[561]

343. Sister Millar referred in her deposition to the Coroner that Raychel was "*in good form and gave no cause for concern*"[562] and that although she was vomiting it was "*not large amounts*"[563] despite the descriptions on the fluid chart. She recalled that Raychel remained "*bright and alert despite the vomits, [and that] she was giving no other cause for concern.*"[564] While Sister Millar appreciated the need to obtain input from a doctor to administer an anti-emetic, she did not understand there to be any urgency in the situation since Raychel's vital signs were "*stable*" and IV fluids were in situ.[565]

344. Nurse Roulston was also aware that Raychel had episodes of vomiting. However, like her colleague Nurse McAuley, she was not concerned about Raychel's condition:

> "*As Raychel was on IV fluids and it was not unusual for post operative children to vomit and as her observations were satisfactory I was not concerned.*"[566]

345. In their PSNI statements, visitors to the hospital such as Mr. Stephen Duffy[567] and Mrs. Elaine Duffy[568] have given their accounts of witnessing the severity of Raychel's vomiting.[569] Other witnesses who visited Raychel at the hospital

558 Ref: 098-018-044
559 Ref: WS-056/2, p.19, Q.13(a).
560 Ref: WS-051/2, p.17, Q.10(j)(i)
561 Ref: 020-015-029
562 Ref: 098-017-038
563 Ref: 098-017-037
564 Ref: WS-056/2, p.7, Q.6(e)
565 Ref: WS-056/2, p.11, Q.7(j)(viii)
566 Ref: WS-052/2, p.9, Q.6(b)(vi)
567 See List of Persons - Ref: 312-003-001
568 See List of Persons Ref: 312-003-001
569 Ref: 095-007-022 and Ref: 095-008-025

have commented on how unresponsive she was to attempts to stimulate her into conversation.[570]

Nursing Care Plan and Notes

346. There was no change to Raychel's nursing care plan to reflect the fact that Raychel was still vomiting more than 12 hours after the completion of her surgery. The entry for 17:00 completed by Nurse McAuley recorded that Raychel had no complaints of pain, was tolerating small sips of water and had vomited three times that morning.[571]

347. Nurse McAuley states that, in 2001, care plans were not updated daily and that this was usually done on discharge of a patient or when problems identified in the care plan were marked achieved.[572] However, Nurses Roulston and Bryce disagree, stating that care plans were updated and revised daily or at the end of a shift.[573]

348. There are four main sources of nursing observations from the notes:

(i) 'Observation Sheet' for 7th and June 2001, first entry at 20:00, last entry at 20:20[574]

(ii) 'Episodic Care Plan', first entry at 23:00 on 7th June 2001, last entry at 06:00 on 9th June 2001, [575]

(iii) A sheet entitled 'Paediatric Unit, Altnagelvin Area Hospital', first entry 21:50 on 7th June 2001, last entry at 21:15 on 8th June 2001. This chart records 4 hourly observations after 09:00 on 8th June 2001. Nurse Gilchrist explained at the Inquest that this sheet was used after an operation, then a patient would be moved to a 4 hourly observation sheet if observations were stable.[576]

(iv) 'Observation Sheet for 9th June 2001, first entry at 03:05, last entry at 04:30[577]

349. Mr. Foster is "*concerned*" at the lack of written nursing notes for 8th June 2001.[578] He adds that:

"*any critical reader of the file could only conclude that the true severity of the vomiting suffered by this child was seriously underestimated by the nursing staff on ward 6.*"[579]

570 Ref: 095-006-020 and Ref: 095-009-028
571 Ref: 020-027-057
572 Ref: WS-051/2, p.25, Q.20(c)
573 Ref: WS-052/2, p.13, Q.12(b), Ref: WS-054/2, p.8 Q.8(c)
574 Ref: 020-016-031
575 Ref: 020-027-056
576 Ref: 020-015-029
577 Ref: 020-016-032
578 Ref: 223-002-019

350. Mr. Foster is also critical of the lack of mention anywhere in the nursing notes of the fact that junior medical staff were summoned on 3 occasions during 8th June 2001.[580] He is of the view that clinical or nursing notes ought to have been made to record the fact of these visits and the outcomes from them. He adds that *"more detailed records throughout the 8th would have assisted the nursing staff to detect an ongoing deterioration throughout the afternoon and evening of the 8th."*[581] In the absence of adequate notes, verbal communication would have had a role to play, but Mr. Foster surmises that this form of communication was "*lacking*" also.

351. Whether record keeping and observations were of an appropriate standard on 8th June 2001 is a matter to be considered during the Oral Hearings.

Attendance by Dr. Devlin at 18:00

352. Medical staff were first *"bleeped"* at 16:30 to attend Ward 6, but there seems to have been some difficulty in obtaining a doctor. According to Sister Millar,[582] Nurse McAuley attempted to contact the Surgical SHO, but did not receive a response. Nurse McAuley states that she bleeped the Surgical JHO, not the SHO. In her statement to the Inquiry, Sister Millar mentioned difficulties in contacting surgical doctors "*as they were in theatre and did not answer their bleeps*."[583] Mr. Foster had described this as a "*very unsatisfactory situation*"[584] and "*quite unacceptable practice*"[585] for an SHO or a JHO on call in a busy hospital to have made no arrangements for someone to answer their bleep.

353. Ms. Ramsay says that the delay in obtaining medical intervention for Raychel was "*excessive*." [586] She is concerned that Raychel "*had been experiencing vomiting and associated discomfort for 10 hours,"* from the time of her first episode of vomiting at 08:00 until Dr. Devlin attended, and that during this time Raychel's "*nausea and vomiting was not controlled and any sodium loss was not replaced*."[587]

354. Ms. Ramsay explains that if a doctor does not answer a bleep it is incumbent upon a nurse to "*make a judgment on who to contact instead*."[588] There is no evidence to suggest that an alternative solution was sought to cover for the non-attending surgeon. This is an issue which will be further considered at the Oral Hearings.

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579 Ref: 223-002-019
580 Ref: 223-002-021
581 Ref: 223-003-002
582 Ref: 021-068-159
583 Ref: WS-056/1, p.3, Q.1
584 Ref: 223-002-015
585 Ref: 223-002-040
586 Ref: 224-004-014
587 Ref: 224-004-014
588 Ref: 224-004-015

355. Mrs. Ferguson believes that a vomit before Dr. Devlin attended seemed to her to have blood in it and she thinks that is what it took to get the nurse to summon the doctor.[589] She believes that this occurred between 17:30 and 18:00 and that she informed a nurse who told her that it was "*only natural*".[590]

356. In any event, it was not until between 17:30 and 18:00 that Dr. Joe Devlin,[591], Junior House Officer in Surgery, attended to administer an anti-emetic (Ondansetron or 'Zofran') to Raychel. Dr. Devlin had come on to the ward to see another patient. He was not the JHO who Nurse McAuley had been seeking to contact using the bleeper system.[592]

357. No note was made by Dr. Devlin of his attendance, although he did sign off on the drug sheet.[593] Sister Millar has said that she cannot explain why no notes or records were made in relation to the attempts to contact a JHO, the attendance of Dr. Devlin and the steps taken by him.[594] Both Nurses McAuley and Roulston state that the care plan should have been updated to record this administration, and neither of them can provide an explanation for why that was not done.[595]

358. There is, however, a handwritten note added to a computer printout of a 'Summary Care Plan' which was printed at 16:39 on 8th June 2001[596], though the timing is unclear as it includes a typed entry by Nurse McAuley at 17:00. The handwritten entry, which is not timed and whose authorship is unknown reads:

"*Vomiting this pm + IV Zofran given with fair effect*"

359. In his statement for the Inquiry, Dr. Devlin recalls that he was told that Raychel was less than 24 hours post-appendicectomy, and that she had had a large morning vomit and two small vomits that afternoon.[597] He was aware that she had been drinking fluids earlier in the day. It is unclear who provided this history to Dr. Devlin: Nurse McAuley cannot recall whether she spoke to Dr. Devlin or whether it was Sister Millar[598], and Sister Millar has said that she had no dealings with Dr. Devlin because she had gone off duty or was going off at that stage.[599] In the statement which she made for her employer on 15th June 2001, Sister Millar made it clear that she had only gone off duty after Dr. Devlin had administered the Zofran.[600]

589 Ref: WS-020/1, p.14, Q.29
590 Ref: 012-028-146
591 See List of Persons Ref: 312-003-001
592 Ref: WS-051/2, p.17, Q.10(k)
593 Ref: 020-017-035
594 Ref: WS-056/2, p.12, Q.7(q)
595 Ref: WS-51/2, p. 26, Q.20(g) and WS-052/2, p.15, Q.12(f)
596 Ref: 063-032-076
597 Ref: WS-027/122, p.266, Q.4(r)
598 Ref: WS-051/2, p.17, Q.10(k)
599 Ref: WS-056/2, p.12, Q.7(t)
600 Ref: 021-068-159

360. When Dr. Devlin saw Raychel, she was vomiting, although this vomiting is not recorded on the fluid balance chart, or in any of the notes or records made available to the Inquiry.[601] He thought it reasonable for a child to vomit within 24 hours of surgery. He was aware she was on Solution No.18, but did not check Raychel's rate of administration[602] as "*JHOs were not responsible for writing up fluids for children*".[603]

361. Nurse McAuley[604], Nurse Roulston[605] and Sister Millar[606] have all said that they were not in attendance when Dr. Devlin administered the anti-emetic or cannot recall having dealings with him.

362. Ms. Ramsay comments that in her experience "*it was usual for a nurse to accompany a visiting doctor in order to ensure correct information was imparted and to learn the outcome of their assessment.*" She adds that this was of particular importance when, as was the case here, the doctor was not based on the ward being visited.[607] The concern that a nurse may not have attend with Dr. Devlin when he dealt with Raychel is a matter which will be examined at the Oral Hearings.

363. Dr. Devlin has stated that Raychel did not otherwise appear to be dehydrated or distressed, and he therefore thought it appropriate to administer IV Zofran[608], and to advise the nurses to contact the on-call team if there was any further deterioration.

364. Mr. Foster says that Dr. Devlin "*acted appropriately in the circumstances*"[609] by administering the anti-emetic as requested. He states that "*it is much to be regretted*"[610] that nursing staff did not insist that Dr. Devlin contact a senior colleague, as he has "*no doubt*"[611] that if he had consulted a senior surgical or paediatric colleague, blood tests would have been ordered and any electrolyte abnormalities revealed. However, it was "*unacceptable practice*"[612] for him not to make a note in the clinical file.

365. Mrs. Ferguson repeats her assertion that Raychel was "*zombie like*"[613] at the time of Dr. Devlin's attendance. Although she remembers him attending, she does not recall Dr. Devlin examining Raychel or reading any notes.[614] She recalls being told that Raychel would not be sick anymore as her stomach was

601 Ref: WS-027/1, p.2, Q.1
602 Ref: WS-027/2, p.6, Q.4(r)
603 Ref: WS-027/2, p.7, Q.4(s)
604 Ref: WS-051/2, p.18, Q.10(l)
605 Ref: WS-052/2, p.11, Q.9(j)
606 Ref: WS-056/2, p.17, Q.7(t)
607 Ref: 224-006-002
608 Ref: 020-017-035
609 Ref: 223-002-041
610 Ref; 223-002-016
611 Ref: 223-002-016
612 Ref: 223-002-042
613 Ref: WS-020/1, p.14, Q.17
614 Ref: WS-020/1, p.14, Q.21(c)

empty.[615] However, she does not recall Raychel's condition changing, and believes that Raychel began vomiting again within the hour.[616]

366. Plainly, if Mrs. Ferguson and Dr. Devlin are correct in their recollection that there were episodes of vomiting that occurred between 15:00 and 21:00 hours, then the fluid balance chart cannot be regarded as a reliable record of Raychel's vomiting. Moreover, Nurse Bryce observed that Raychel vomited a mouthful at 00:35 hours on 9th June. Again, no record was made of this episode of vomiting.

Nursing Handover at 20:00

367. Mr. Ferguson returned to the hospital at about 18:45 with their other children and a friend of Raychel's.[617] Again, Raychel "*appeared disinterested*"[618] in them, which they say was "*not like Raychel*".[619]

368. Nurse McAuley went off duty at approximately 19:30. Before going off duty, she says that she observed Raychel in the corridor showing two small boys some pictures on the wall.[620] She did not talk to Raychel at that time but she assumed that she must have obtained some relief from the anti-emetic administered by Dr. Devlin.[621]

369. Mr. and Mrs. Ferguson have both denied that Raychel was in the corridor at that time.[622] Mrs. Ferguson states that at no time during the day did she see Raychel walking about.[623]

370. Mrs. Ferguson left the hospital at around 19:45[624]/20:00.[625] Mr. Ferguson remained in the hospital.

371. A nursing handover took place at approximately 20:00. Staff Nurse Gilchrist[626], Noble, Bryce and Auxiliary Nurse Lynch[627] came on for the night shift. Nurse Patterson also worked on the night shift but she says that she was allocated to duties in the infant unit, and did not receive a handover report in respect of any of the patients in the main part of Ward 6.[628]

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615 Ref: WS-020/1, p.15, Q.24
616 Ref: WS-020/1, p.15, Q.27
617 Ref: 095-005-017
618 Ref: 098-008-019
619 Ref: 098-008-019
620 Ref: WS-051/1, p.3, Q.1
621 Ref: WS-051/2, p.19, Q.12(g)
622 Ref: 098-008-018, Ref: 095-005-019
623 Ref: 095-002-007
624 Ref: 095-002-007
625 Ref: 098-008-018
626 See List of Persons Ref: 312-003-001
627 See List of Persons Ref: 312-003-001
628 Ref: WS-048/2, p.7, Q.6(d)

372. It is the recollection of Nurse Noble that during the handover she was advised by Nurse McAuley that Raychel had micturated during the day but had vomited a few times, she had been prescribed Zofran for this, she was receiving 80ml/hr Solution 18 and her parents were present.[629]

373. Nurse Gilchrist recalls that, after the handover report and at some time after 20:00, Raychel's father asked her to change his daughter's bed as she had vomited on it.[630]Auxiliary Nurse Lynch assisted her in doing so.[631]

'Coffee Ground' Vomiting at 21:00

374. At around 21:00, Mr. Ferguson recalls that Raychel sat up in bed and complained that her head was sore.[632] He recalls that her face was bright red and that she was holding on to her head with both hands. He remembers her saying "*Daddy, daddy, my head's wild sore*"[633] and then "*vomited blood*" on the bed. The nurses changed the bed and Mr. Ferguson noted that, as they did so, "*Raychel could hardly stand*".[634] He states that Raychel got back into bed, but within minutes, she "*vomited blood all over the bed again*". This time, Mr. Ferguson indicated to the nurses that Raychel could hardly stand, lifted Raychel out of the bed and put her on his knee. The bed was changed again, and Mr. Ferguson put Raychel back into bed. Mr. Ferguson believes that Nurse Gilchrist put pillowcases around Raychel so that if she vomited again they would not have to change the bed.[635]

375. Mr. Ferguson adds that he does not recall Raychel talking from about 13:30 until her complaining of a sore head at 21:00.[636]

376. The vomit at 21:00 is recorded as "*vomiting coffee grounds ++*".[637] Nurse Gilchrist has stated that this was approximately 150mls.[638]

377. Dr. Scott-Jupp explains that 'coffee ground vomiting' occurs when there is a leak of a small amount of blood from the lining of the stomach or the oesophagus which then remains in the stomach for long enough for the stomach acid to change it from red liquid to black particulate matter.[639]

629 Ref: 012-043-208
630 Ref: WS-053/1, p.3,
631 Ref: WS-053/1, p.3 (Nurse Gilchrist) and Ref: WS-055/1, p.3 (Nurse Lynch). Nurse Gilchrist's Inquiry witness statement differs on this point from her Deposition to the Coroner in which she states that it was Staff Nurse Bryce who assisted her. – Ref: 012-044-212.
632 Ref: 095-005-017
633 Ref: 095-005-017
634 Ref: 095-005-017
635 Ref: WS-021-1, p.9, Q.16(d)
636 Ref: 095-005-018
637 Ref: 020-018-037
638 Ref: 012-044-212
639 Ref: 222-004-012

378. According to Mr. Foster, 'coffee ground' vomiting is an indication of significant or severe and prolonged vomiting and retching.[640] He states that it should have attracted "*serious attention*"[641] as it results from bleeding caused by trauma to the gastric mucosa.

379. Dr. Scott-Jupp disagrees that 'coffee ground' vomiting is necessarily diagnostic of severe or prolonged vomiting, and states that he has not infrequently seen it in children with a mild vomiting illness, who have vomited only two or three times previously.[642] He stresses that it is the frequency and severity of vomiting which is critical, not the occurrence of coffee-grounds.

380. Nevertheless, Dr. Scott-Jupp considers that Raychel's symptoms at, and from, 21:00 were indicative of a need to do more than simply administer a second anti-emetic. He notes that the lack of response to the administration of two rounds of anti-emetics, particularly the second, "*should have prompted more concern and discussion by the more junior medical staff with more senior colleagues.*"[643]

381. In his report to the Coroner, Dr. Edward Sumner[644], Consultant in Paediatric Anaesthesia expresses similar views to those now expressed by Mr. Foster, stating that "*there is no doubt*"[645] that the presence of coffee grounds at 21:00 ("*which is a sign of gastric bleeding*"[646]) and the petechiae seen on her neck suggested "*Raychel suffered severe and prolonged vomiting.*"[647]

382. At 21:15, Nurse Gilchrist noted that Raychel's colour was "*flushed → pale*", she had been "*vomiting++*" and was complaining of a headache.[648] She noted a normal pulse, respiratory rate and temperature. Mr. Ferguson recalls Nurse Gilchrist checking Raychel's records and stating that she thought "*a doctor had been up and given Raychel something but that he hadn't signed for it*".[649] She told him that she would get another doctor to give Raychel "*more stuff to stop her from being sick.*"[650]

383. Nurse Noble says that she and Nurse Gilchrist discussed Raychel's coffee ground vomiting. Nurse Noble believed Raychel may have had a Mallory Weiss tear (a tear in the lining at the junction of the stomach and the

640 Ref: 223-002-016
641 Ref: 223-002-016
642 Ref: 222-004-012
643 Ref: 222-004-011
644 See List of Persons Ref: 312-003-001
645 Ref: 012-001-004
646 Ref: 012-001-004
647 Ref: 012-001-004
648 Ref: 020-015-029
649 Ref: 095-005-018
650 Ref: 095-005-018

oesophagus).[651] They felt that the Zofran anti-emetic administered previously had not worked and that another anti-emetic might be more beneficial.

384. At 21:30, Nurse Noble administered paracetamol 500mg per rectum in response to Mr. Ferguson's complaint that Raychel was experiencing headaches.[652] Nurse Noble recorded this event and the fact that Raychel "*settled to sleep*" as an entry in the episodic care plan at 06:00 on 9th June 2001[653], after Raychel's seizure and when Raychel was found to have evidence of brain stem injury.[654] Mr. Foster notes that the entry made by Nurse Noble bore "*no relationship to the reality of the situation at that time.*"[655]

385. Mr. Foster also considers it noteworthy that at a meeting with Raychel's family on 3rd September 2001, Nurse Noble is recorded as stating that she was not aware of blood in the vomit or of Raychel's sore head.[656] Nurse Noble stated in her deposition to the Coroner that Raychel was "*easily roused*" and was "*fully cooperative*".[657]

386. Ms. Ramsay states that a headache, particularly combined with pallor and persistent vomiting, were symptoms of which a doctor should have been made aware.[658]

387. Mrs. Ferguson stated at the Inquest that she recalls her husband phoning her in a panic at 21:30, saying that Raychel was vomiting blood and complaining of pain in her head.[659] He added that he was "*sick telling the nurses*" about Raychel and that the "*sweat was running down his back.*"[660] Mr. Ferguson also recalls telling her that the nurses were not listening to him.[661] As previously stated, the adequacy of communications with and interaction between nursing staff and Raychel's parents is an issue to be considered at the Oral Hearings.

388. Mrs. Ferguson therefore returned to the hospital at 22:00 and found Raychel lying in bed, looking "*very pale*"[662]. She was "*very restless*"[663], her eyes were not open and there was fluid ("*blood or slabber*"[664]) trickling from the side of her mouth. She also describes the presence of blood on her pillow.

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651 Ref: WS-049/2, p.8
652 Ref: 012-043-208
653 Ref: 020-027-057
654 Ref: 223-002-020
655 Ref: 223-002-020
656 Ref: 095-010-046k, paragraph 9
657 Ref: 012-008-101, 102
658 Ref: 224-004-028
659 Ref: 098-008-020
660 Ref: 095-002-007
661 Ref: 095-005-018
662 Ref: 098-008-020
663 Ref: 098-008-020
664 Ref: WS-020/1, p.17, Q.34

389. At 22:00, Raychel is recorded as having vomited ""*small amount x3*".[665]

Attendance by Dr. Curran at 22:00

390. Dr. Michael Curran[666], Surgical Junior House Officer, was contacted by Nurse Gilchrist and he agreed to come to see Raychel. Dr. Curran was working as a Paediatric JHO at the time, but was covering the on-call overnight surgical JHO shift.[667] This shift was "*extremely busy*".[668] Overnight, the on call surgical team would cover the surgical wards, which encompassed the 6th (paediatric), 7th, 8th and 9th (adult) floors and a separate wing (2 orthopaedic wards).

391. Nurse Gilchrist has said that she explained to Dr. Curran "*about Raychel's nausea and vomiting*."[669] She recalls that he arrived at 22.00 and administered 25mg IV Cyclizine (Valoid) at 22:15. Dr. Curran "*suspects*"[670] he was present for approximately 10 minutes.

392. As was the case when Dr. Devlin attended Raychel earlier, Dr. Curran did not make a note in the clinical file regarding his attendance but merely signed off on the drug chart.[671] Again, a contemporaneous nursing note was not made[672], although an entry was made in the episodic care plan at 06:00 the next morning.[673]

393. Nurse Gilchrist has explained that she contacted Dr. Curran to assess Raychel and to administer an anti-emetic.[674] She was not present when he attended Raychel and she did not speak to him when he attended.[675] It would appear that no other nurse attended with Dr. Curran when he was with Raychel or spoke to him about his assessment.

394. As has been noted above in relation to Dr. Devlin's attendance, the failure of a nurse to accompany a visiting doctor in order to ensure that correct information was provided and to learn the outcome of the doctor's assessment is regarded by Ms. Ramsay as unusual and it is a concern that will be further examined at the Oral Hearings.

395. In his statement to the Inquiry, Dr. Curran states that he would have assessed Raychel and palpated her abdomen and found it to be soft.[676] He looked at the bedside chart and noted her observations including pulse, temperature and respiratory rate which were normal. He recalls that she was not actively

665 Ref: 020-018-037
666 See List of Persons Ref: 312-003-001
667 Ref: WS-028/2, p.3, Q.1(e)
668 Ref: WS-028/2, p.9, Q.5(t)
669 Ref: WS-053/1, p.3
670 Ref: WS-028/2 , p.6, Q.5(b)
671 Ref: 012-044-212 and Ref: 020-017-034
672 Ref: WS-049/2, p.10, Q.8(e)
673 Ref: 020-027-064
674 Ref: WS-053/2, p.6, Q.5(a)
675 Ref: WS-053/2, p.7, Q.5(c)&(d)
676 Ref: WS-028/1, p.2, Q.1, & WS-028/2, p.6, Q.5(e)

vomiting or distressed when he assessed her.[677] He believes that he would have looked at her clinical notes but cannot specifically recall doing so.[678] Raychel's case had not been discussed with him before he was contacted by Nurse Gilchrist.[679] She provided him with the history that Raychel was a post-operative appendicectomy patient who was vomiting, but he cannot recall the specifics of the history that was given to him.[680]

396. It is not clear whether Dr. Curran was aware or took cognisance of the fact that Raychel had been receiving intravenous fluids for almost 24 hours, had started vomiting at 08:00 that morning and had vomited regularly thereafter, that her vomit was now blood stained and had not been controlled by an earlier anti-emetic, that there had been limited urinary output and that she had recently been complaining of headache. Dr. Curran states that he would have noted that Raychel had several bouts of vomiting during the day but concluded that the vomiting was attributable to her abdominal surgery.[681] He did not consider changing Raychel's fluids which he believed were standard and "*appropriate*".[682] His plan was to treat Raychel's nausea and to make her comfortable.[683] He did not consider taking steps to have Raychel's electrolytes checked, and nor did he think it necessary to seek advice from a senior colleague.[684] He appears to have reached the view that this was a common case of post-operative vomiting, with which he was familiar which usually settled with anti-emetics.

397. Dr. Curran states that as a JHO he would learn most aspects of the job from SHOs and nurses. As previously explained, he says that he had no experience of hyponatraemia or electrolyte balance in a post-operative paediatric patient.[685] He states that he did not detect from the paediatric nurse any indication of "*grave concerns regarding Raychel at that time*."[686] Indeed Nurse Gilchrist confirms in her Inquiry witness statement that, based on her observations of Raychel and her state of alertness, "*I did not think her condition was serious as her observations were stable and post-operative vomiting was not unusual*".[687]

398. Ms. Ramsay is of the view that Raychel's condition over the period 21:00 and 23:00 should have caused concern as she had vomited five times with evidence of blood stains.[688] Whilst she acknowledges that it is not the function of nurses to make medical diagnoses, she maintains that it is basic nursing

677 Ref: WS-028/1, p.2, Q.1
678 Ref: WS-028/2, p.6, Q.4(m)
679 Ref: WS-028/2, p.4, Q.4(e)
680 Ref: WS-028/2, p.5, Q.4(k)
681 Ref: WS-028/2, p.6, Q.5(f)
682 Ref: WS-028/2, p.6 Q. 5(f)
683 Ref: WS-028/2, p.7, Q.5(k)
684 Ref: WS-028/2, p.8, Q.5(o)
685 Ref: WS-028/2, p.9, Q.7
686 Ref: WS-028/2, p.8, Q5(o)
687 Ref: WS-053/2, p.7, Q.5(b)(i)
688 Ref: 224-004-015

knowledge that persistent vomiting can cause dehydration and electrolyte imbalance. It is clear that this concern was not passed on to Dr. Curran. Ms. Ramsay is concerned that both Dr. Curran and the nurses "*missed the signs that warranted further investigation.*"[689]

399. Mr. Foster concludes that "*clearly*" Dr. Curran did not recognise the "*serious significance*"[690] of the vomiting that had been ongoing throughout the day and which had recently contained blood. He adds that, even as a JHO, Dr. Curran should, "*without doubt*",[691] have understood the seriousness of the continued vomiting and blood loss in a 9-year-old child and called his senior colleague.

400. Mr. Foster also considers that the nurses should have insisted on this. To have not done so is "*evidence of substandard practice*"[692] and is "*much to be regretted*", particularly as he considers the situation was still retrievable at this time.[693] In addition, he is of the view that it was "*unacceptable practice*" for neither Dr. Devlin nor Dr. Curran to have made any note, save for a drug chart entry, into Raychel's clinical file.".[694]

401. Dr. Haynes notes that, during the afternoon and evening of 8th June, Raychel had symptoms of headache, emesis, nausea and lethargy and had been receiving hypotonic fluids. In the presence of these factors, Raychel ought to have had blood taken for electrolyte assay.[695] He notes, however, that the first tier of response to Raychel's condition was the on-call JHO who would have had no formal paediatric experience at postgraduate level. He remarks upon the fact that inexperienced doctors such as Dr. Devlin and Dr. Curran were placed in a "*difficult situation*" where nurses expected them to prescribe an anti-emetic "*rather than give thought to the possible reasons why Raychel was still vomiting*".[696] He believes that more experienced medical input was required during the afternoon and evening of 8th June.

402. Dr. Scott-Jupp considers that the lack of response to the first anti-emetic after 4 hours, and the lack of response to the second one (in the sense that Raychel had further episodes of vomiting after Dr. Curran had administered Cyclizine) should have prompted more concern by junior medical staff and discussion with senior colleagues.[697]

403. Dr. Scott-Jupp states that Raychel's condition by that time necessitated a thorough examination for signs of reduced consciousness, infection and for evidence of surgical complications. Moreover, he shares the view expressed by Dr. Haynes that blood tests were mandated because Raychel had been

689 Ref: 224-004-023
690 Ref: 223-002-017
691 Ref: 223-002-017
692 Ref: 223-002-017
693 Ref: 223-002-041
694 Ref: 223-002-042
695 Ref: 220-002-004
696 Ref: 220-003-006
697 Ref: 222-004-011

receiving intravenous fluids for 24 hours, and given the degree of vomiting and the lack of significant oral intake. He considers that such blood tests should have included her electrolytes as well as a full blood work up to check for infection and other possible signs of persistent vomiting.[698] Dr. Scott-Jupp also thinks that if a urine sample was available, then it should have been tested for a possible urinary tract infection as that can also cause vomiting. [699]

404. At the Oral Hearings, consideration will be given to whether the nursing staff, as well as Dr. Curran, acted appropriately during this period. In particular, given the information which was available at that time, the Inquiry will consider whether a more senior member of the surgical team should have been directed to attend Raychel, and whether she should have been afforded a thorough examination including blood tests to check her electrolytes and for signs of infection.

23:00 to 03:00

405. Despite receiving the anti-emetic at 22:15, Raychel is recorded as having a "*small coffee ground vomit*" at 23:00.[700] Nurse Patterson recalls walking through the main hall and meeting Mr. Ferguson, who gave her a vomit bowl containing a small coffee ground vomit.[701] She was not caring for Raychel that night, but reported this to the nursing staff caring for Raychel that night.[702] By 23:30, Raychel was asleep.

406. At 00:35, Raychel vomited a "*small mouthful*" which was observed by Nurse Bryce and reported to Nurse Gilchrist[703] but not recorded in the records. Her pyjama top was changed.[704] Nurse Gilchrist says that Raychel said to her that she "*just wanted to lie down and sleep*". [705] Raychel was apparently restless but settled to sleep.[706]

407. Nursing staff did not contact Dr. Curran again when Raychel had further vomiting at 23:00 and at 00:35.

408. Mr. and Mrs. Ferguson recall that they left the hospital at about 00:40, advising hospital staff to ring if Raychel woke up.[707] Mr. Ferguson recalls that they were told that Raychel was settled and would sleep for the rest of the night.[708] Nurses Noble and Gilchrist recall that they left a little earlier at approximately 23:30.[709]

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698 Ref: 222-004-011
699 Ref: 222-004-011
700 Ref: 020-018-037
701 Ref: WS-048/1, p.4
702 Ref: WS-048/1, p.4
703 Ref: 012-044-213
704 Ref: 012-044-213
705 Ref: 012-044-213
706 Ref: 098-019-047
707 Ref: 098-008-017
708 Ref: 095-005-018
709 Ref: 012-043-209 and Ref: 012-044-212

409. At 00:00, Nurse Patterson reset Raychel's IV pump and checked her IV site.[710]

410. Then at 02:00, Nurse Gilchrist checked Raychel and found that her vital signs were unremarkable, and that she was asleep but rousable.[711]

411. According to Raychel's fluid balance chart, by 02:00 she had received a total of 2060 ml of Solution No.18 since her admission., which includes the initial 1000 ml that Mr. Makar prescribed on admission and the additional 1000 ml prescribed by Dr. Butler at 12:15.[712] By the time the Solution No.18 was stopped, she had received a total of 2220 ml since her admission. This suggests that a third bag of Solution No.18 was erected between 01:00 and 02:00 on 9th June 2001. However, there is no note of this having been done, nor is the identity of the clinician who prescribed the bag known.

412. As previously noted, Raychel's fluid balance chart does not record any urine output between 10:00 on the morning of 8th June 2001 and her seizure at 03:00 on 9th June 2001, nor does it record oral input.[713] Mr. Foster believes that Raychel's urine output was low secondary to dehydration and SIADH.[714]

XVII. Communication between Nursing and Medical Staff

413. Upon analysis, it appears to the experts who have considered how Raychel's condition was managed that the seriousness and urgency of the situation was not appreciated by the nursing staff, nor was it communicated to either Drs. Devlin or Curran. Neither doctor received more than a perfunctory request to administer an anti-emetic. There was no indication in the requests that Raychel's condition was anything other than routine.

414. Mr. Foster considers that the records and events of that day show "*all too clearly how a team can be locked into a mindset of what they expect to happen*".[715] He says that by the afternoon Raychel should have been mobile, drinking, beginning to eat and talking about going home. Indeed, the vast majority of children after mild appendicitis would have been fit for discharge by the morning of 9th June 2001. Mr. Foster "*cannot understand*"[716] why nursing staff did not recognise this. He explains that nursing staff ought to have acted as a "safety net" in a ward where Junior House officers were first on call. It is his view that this "safety net was seriously defective" and that this was due to a "universal complacency that all was well until Raychel had a seizure..."[717]

710 Ref: WS-048/1, p.4
711 Ref: 012-044-213
712 Ref: 020-019-038
713 Ref: 020-018-037
714 Ref: 223-002-015
715 Ref: 223-002-017
716 Ref: 223-002-017
717 Ref: 223-003-003

415. Given the parents' concerns, Mr. Foster feels that this should have alerted nursing staff to ask for senior surgical assistance or, "*at the very least*" discuss her condition with the paediatric staff on the ward.[718] He notes that paediatric staff were available on the ward *"almost at all times."*[719]

416. Dr. Scott-Jupp agrees and states that any assessment should have included blood tests.[720] He states that the continued post-operative vomiting would normally have been considered the responsibility of the surgical team, rather than the anaesthetists.[721]

417. As mentioned previously, Ms. Ramsay says that nurses could not have been expected to identify that hyponatraemia was a problem affecting Raychel.[722] However, the nurses who cared for Raychel ought to have known that vomiting can cause other medical difficulties:

> *"…they should have known that persistent vomiting can cause dehydration and electrolyte imbalance. In addition they should have known that fluid lost through vomiting needed to be replaced. I believe this is basic nursing knowledge of which all nurses who care for children should be aware."*[723]

418. Therefore, it is important for the Inquiry to understand the role of the nurse when a child is persistently vomiting, and how this differs from the role of the doctor. Ms. Ramsay offers this perspective:

> *"[it was] to monitor the patient's progress and to advise medical staff of any changes or variations from the expected pathway. In practice, many experienced nurses helped junior doctors in making decisions regarding treatments. However, the responsibility for medical management rests with the doctor caring for the child who should be under the direction and supervision of a Consultant."*[724]

419. If nurses are to be viewed, at least in part, as the "*eyes and ears*" of the doctor caring for the child, they must, it seems, be sensitive to any evidence of departure from the usual post-operative recovery pathway. Ms. Ramsay accepts that it was "*initially reasonable*" for the nurses to expect a normal recovery,[725] but the second vomit at or about 10:00 ought to have caused the responsible nurse to make contact with the Surgical Senior House Officer,[726] who should have been advised of the vomiting and an anti-emetic should have been prescribed and given.[727] In addition, in view of the continuing IV

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718 Ref: 223-002-018
719 Ref: 223-003-003
720 Ref: 222-004-008
721 Ref: 222-004-019
722 Ref: 224-004-015
723 Ref: 224-004-015
724 Ref: 224-004-010
725 Ref: 224-004-011
726 Ref: 224-004-014
727 Ref: 224-004-013

therapy and vomiting, observations of pulse, respiratory rate and blood pressure should have been recorded more frequently than 4 hourly.[728]

420. Ms. Ramsay's opinion that there was a need for medical intervention after the second vomit is shared by others. Dr. Sumner in his report for the Coroner indicated that there was a need to administer fluid supplements at that time. He also expressed the view which is held by Dr. Haynes and Dr. Scott-Jupp that as the vomiting did not settle down it was necessary to check the electrolytes by the evening of 8th June.[729]

421. Mr. Gilliland told the Coroner he would have expected a member of the surgical team to be told if a child vomited more than twice, a position which is broadly in keeping with Ms. Ramsay's views.[730] However, in his statement for the Inquiry, he has explained that he does not consider that what has been recorded in the deposition is a fair reflection of his views. His position is that medical staff should be informed where there is concern about the level of vomiting, and whether there should be concern about the vomiting depends upon the circumstances of the case.[731] He has further explained that since nursing staff had not expressed concerns to the JHOs about the extent of the vomiting, he considers that a blood test for urea and electrolytes was not indicated at the time of their respective attendances, although he notes that the position would be different now.[732]

422. Dr. Warde states in his report for the Altnagelvin Hospitals Trust that "*vomiting as severe and sustained as that experienced by Raychel is rare*"[733] and identifies rising intracranial pressure as a possible contributory factor. He described Raychel's vomiting as "*severe and protracted*"[734] and advises that in his opinion "*appropriate fluid and electrolyte management in the postoperative period in a patient with abnormal losses cannot … be achieved without electrolyte measurement and accurate estimation of fluid balance*."[735]

423. For reasons that are not presently clear, the Altnagelvin Hospitals Trust did not disclose Dr. Warde's report to the Coroner or seek to have him called as a witness. Instead, it disclosed one of the reports prepared by Dr. John Jenkins[736] and obtained permission from the Coroner for him to give evidence. That report omits the references to vomiting and its possible significance discussed in the earlier report as well as the acknowledgement that Dr. Sumner's opinion that Raychel "*must have suffered severe and prolonged vomiting*" may in retrospect have been correct.[737]

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728 Ref: 224-002-018
729 Ref: 012-001-004
730 Ref: 012-038-177
731 Ref: WS-044/2, p.21, Q.30(a)
732 Ref: WS-044/2, p.22/23, Q.31
733 Ref: 317-009-010
734 Ref: 317-009-011
735 Ref: 317-009-011
736 Ref: 317-009-002 *et seq*
737 Ref: 022-010a-040

424. Dr. Haynes comments that a member of medical staff (most likely the surgical Registrar[738]) should have examined Raychel when it became apparent that vomiting was still troublesome.[739] In the end, interventions by the medical staff prior to 03:00 on 9th June 2001 were "*minimal*" and "*largely ineffective*".[740]

425. Dr. Haynes explains that the anti-emetics cyclizine and ondansetron[741] (both of which Raychel received at different times) are among the most widely used drugs to prevent and treat post-operative nausea and vomiting.[742] He states that in cases of persistent vomiting the patient should be examined to determine the cause (e.g. drugs) and gastric losses evaluated to be replaced with 0.9% saline.

426. Dr. Haynes further comments that the significance of Raychel becoming very withdrawn, uncommunicative and unexpressive as the day progressed during 8th June 2001 was not appreciated, or was unnoticed, by either the medical or nursing staff.[743]

427. Given his later response, Mr. Foster has "*no doubt whatsoever*"[744] that had either the surgical JHOs or the nurses taken steps to involve Dr. Jeremy Johnston[745], Paediatric Senior House Officer, at an earlier stage, he would have taken the situation of continued vomiting seriously. Mr. Foster believes that involvement by an SHO, registrar or Consultant at 18:00 (the time of Dr. Devlin's attendance) or 22:00 (the time of Dr. Curran's attendance) would have resulted in:[746]

    (i) Urgent blood tests

    (ii) Catheterisation to measure urine output accurately

    (iii) Passing of a naso-gastric tube

    (iv) Assistance from Paediatrics and Anaesthesia

    (v) Correction of hyponatraemia with saline fluids

    (vi) Correction of water overload with diuretics to accelerate urine output of water and reverse the effect of ADH

428. Dr. Scott-Jupp's conclusions in relation to the action which was required during the afternoon of 8th June 2001 are informed by the factual dispute regarding the severity of Raychel's condition. He says that if Raychel's

738 Ref: 220-002-017
739 Ref: 220-002-004
740 Ref: 220-002-019
741 'Cyclizine' and 'Ondanestron' – see Glossary Ref: 312-005-001
742 Ref: 220-002-012
743 Ref: 220-002-005
744 Ref: 223-002-013
745 See List of Persons Ref: 312-003-001
746 Ref: 223-002-017

condition was as severe as Mrs. Ferguson has described, in so far that she was vomiting very frequently and was generally listless, then nurses should have alerted medical staff to this, and arrangements should have been made for a more detailed examination including blood tests.[747]

429. However, if medical staff were not notified of severe and frequent vomiting or of the non-specific symptoms such as listlessness, Dr. Scott Jupp is of the view that "*they cannot be held responsible for lack of action at that stage*."[748]

430. It is not at all clear that the nurses apprised Dr. Curran of any greater concern. Ms. Ramsay concludes that what was required at the time of his attendance was a "*medical review*" and she says that the symptoms exhibited by Raychel at that time should have concerned the nurses enough to prompt such a review. She is concerned that both the nurses and the doctor "*missed the signs that warranted further investigation.*"[749]

431. Ms. Ramsay considers that the period between 21:00 and 23:00 represented the critical time during which "*Raychel's condition should have caused concern.*"[750] Raychel complained of a headache during that period.[751] Her colour was described as fluctuating between "*flushed*" and "*pale*".[752] Moreover, she vomited five times during that period, and the presence of "*coffee grounds*" was detected.[753] All of this was occurring in a context in which she had been vomiting regularly since 08:00, and in which an earlier anti-emetic had not resolved the problem.

432. The Oral Hearings will consider whether the nursing and surgical teams responded adequately to Raychel's condition throughout 8th June 2001 and up until she suffered her collapse at 03:00 on 9th June. In addition, what should have been done in that period, including whether Drs. Devlin, Curran or any other member of medical staff should have initiated any particular investigation and the implications of any failure to do so are matters to be considered during the Oral Hearings.

XVIII. Electrolyte Testing

433. A blood sample was not taken from Raychel during 8th June 2001 for the purposes of electrolyte testing, despite the fact that IV fluids were administered on a continuous basis during the day following her return to the Ward from theatre at 01:55.

747 Ref: 222-004-008
748 Ref: 222-004-009
749 Ref: 224-004-023
750 Ref: 224-004-015
751 Ref: 020-015-029
752 Ref: 020-015-029
753 Ref: 020-018-037

434. Dr. Haynes considers this to have been "*a significant omission*",[754] since she had vomited significant amounts throughout the day. He states that whilst intravenous fluids are being administered the expectation is that daily blood electrolyte testing would be performed to ensure that no electrolyte abnormality developed.[755] He adds that if a sample had been taken and tested it would have highlighted hyponatraemia at a much earlier stage and corrective action could have been taken to avoid Raychel's subsequent death.[756]

435. Dr. Haynes states that the failure to acknowledge the severity of the vomiting and to monitor Raychel's electrolytes is a more significant criticism than the inappropriate use of Solution No. 18 which was still commonly used in practice in 2001. [757] He highlights the following sections of Arieff's paper:[758]

> "*Headache, nausea, emesis*[759]*, and lethargy are consistent symptoms of hyponatraemia in children. If the condition is untreated, there can follow an explosive onset of respiratory arrest, coma, and transtentorial cerebral herniation. [...] When a paediatric patient receiving hypotonic fluids begins to have headache, emesis, nausea or lethargy the serum sodium concentration must be measured.*"[760]

436. Dr. Haynes adds that Raychel experienced all of these symptoms during the afternoon and evening of 8th June 2001.[761] His opinion is that at any point in time from late afternoon onwards, the correct course of action was to take a blood sample for electrolyte testing.[762] He considers that if a suitably experienced doctor (a paediatric or surgical registrar or consultant) had seen Raychel, this would have occurred, and Raychel would have survived. Instead, surgical JHOs, who "*did not fully understand and appreciate the need for careful fluid and electrolyte management*"[763] saw her.

437. Dr. Haynes considers that, "*regardless*"[764] of the initial cause of her vomiting, Raychel became progressively debilitated and drowsy as 8th June 2001 progressed in that she was initially mobilising, but later drowsy and non-communicative. His opinion is that it is "*very likely*" that the debility in association with persistent vomiting was related to the onset of hyponatraemia, caused partly by electrolyte loss in vomit and partly by SIADH.[765]

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754 Ref: 220-002-004
755 Ref: 220-002-008
756 Ref: 220-002-004
757 Ref: 220-002-004
758 Arieff AI, Ayus JC, BMJ 1992: 304, 1218-1222. Hyponatraemia and death or permanent brain damage in healthy children
759 i.e. vomiting
760 Ref: 220-002-204
761 Ref: 220-002-004
762 Ref: 220-003-015
763 Ref: 220-003-015
764 Ref: 220-002-018
765 Ref: 220-002-018

438. Mr. Foster agrees that Raychel's deterioration from the early afternoon of 8th June 2001, with continued vomiting and listlessness, was consistent with the onset of electrolyte abnormalities due to persistent vomiting and the continued administration of intravenous hypotonic saline (Solution No.18).[766] He believes it was likely that increasing intracranial pressure was, by the evening of 8th June, itself a factor in vomiting and retching, and that, by 03:00, cerebral oedema was leading to brain stem damage, and the time for reversal of events was past.[767] He considers the lack of any formal protocols for postoperative blood tests in children to have been less than satisfactory.[768]

439. However, it does not appear that Dr. Curran or any other doctor was advised by nurses that following the administration of the second round of anti-emetic at or about 22:15, Raychel suffered some further vomiting.

440. Dr. Scott-Jupp states that most hospitals at that time had a policy of checking blood electrolytes only when a child had been on IV fluids for 24 hours.[769] However, he considers that, by 21:00, blood tests should have been taken due to Raychel's failure to respond to the first anti-emetic and continued vomiting resulting in this 'coffee ground' vomit.[770] In addition, it was coming up to the point at which she would have been on IV fluids for 24 hours. As well as checking electrolytes, blood and urine tests would also have indicated any other possible causes of persistent vomiting e.g. infection.

441. Dr. Scott-Jupp states that had a low sodium been discovered at 21:00 and treated appropriately, then it is possible, although "*by no means certain*", that the subsequent cerebral oedema could have been avoided, or at least mitigated.[771]

442. Dr. Sumner has stated that,

> *It would have been very prudent to check the electrolytes in the evening of that day [8th June] as the vomiting had not settled down by that stage. [...] There is no evidence of any attempt to measure the gastrointestinal losses or the urine output – both essential for correct fluid therapy.*[772]

443. The failure to test Raychel's electrolytes at any point during 8th June 2001, and the failure to recognise the possible symptoms of hyponatraemia are matters to be considered during the Oral Hearings.

766 Ref: 223-002-018
767 Ref: 223-002-019
768 Ref: 223-002-037
769 Ref: 222-004-012
770 Ref: 222-004-011
771 Ref: 222-004-011
772 Ref: 012-001-004

XIX. Seizure at 03:00

444. At 03:00, Nursing Auxiliary Lynch reported to Nurse Noble that Raychel was fitting. Nurse Noble attended Raychel and found that she was lying in a left lateral position, was not cyanosed, but had been incontinent of urine and was in a tonic state with her hands and teeth tightly clenched.[773] At that time, Raychel's pulse rate was 76 and her temperature was 37.6◦C.

Attendance by Dr. Johnston at 03:05

445. Despite Raychel being a surgical patient, Nurse Noble asked Dr. Jeremy Johnston, Paediatric Senior House Officer, who was nearby admitting another patient, to attend to Raychel urgently.[774]

446. Dr. Johnston has made a detailed note of his attendance with Raychel and the steps that he took.[775] He noted that Raychel was incontinent of urine and unresponsive. He administered 5mg rectal diazepam, but seizure activity continued, and so he followed this up with 10mg IV diazepam. Oxygen was provided by facemask.

447. Raychel's fit would appear to have lasted about 15 minutes in total.[776] On examination, Dr. Johnston found Raychel apyrexial, with a normal pulse and clear chest. He noted that she was unresponsive due to the administration of diazepam.[777]

448. Mr. Foster believes that Raychel was probably unresponsive due to brain damage caused by continued increasing intracranial pressure, but states that Dr. Johnston's theory was "*quite reasonable*".[778]

449. At 03:10, Nurse Noble found Raychel's pupils to be equal and to be reacting briskly to light. Raychel's oxygen saturation was in the high nineties and she was attempting to push the mask away from her face.[779]

450. Dr. Johnston called Dr. Curran at 03:19[780] and asked him to contact his surgical Registrar and SHO. He directed Dr. Curran to obtain an ECG and blood samples urgently for investigation and to send the samples to the laboratory because he suspected that an electrolyte abnormality was a likely cause of the fit, given that Raychel was post surgery, afebrile and had no history of epilepsy, although he did not (apparently) have hyponatraemia specifically in mind.[781]

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773 Ref: 012-043-209 & Ref: 020-016-032
774 Ref: 098-025-070
775 Ref: 020-007-013
776 Ref: 020-016-032
777 Ref: 020-007-013
778 Ref: 223-002-022
779 Ref: 012-043-209
780 Ref: WS-028/1, p.2 Q.2
781 Ref: 098-026-077

451. Dr. Curran acted on Dr. Johnston's instructions by taking a blood sample (timed by the laboratory at 03:30)[782] and contacting Mr. Zafar. It is unclear when the latter occurred – Dr. Curran says it happened at 03:44 according to his pager records,[783] but Dr. Johnston believes it occurred at 03:15.[784] Mr. Zafar could not attend immediately because he was in the Accident and Emergency Department with a patient. Dr. Johnston has stated that Mr. Zafar did not arrive until 04:45, at least an hour after attempts were made to contact him, and during this period, a JHO (Dr. Curran) was the only member of the surgical team present.

452. 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 to speed things up. He performed a 12 lead ECG to rule out a cardiac cause[785] while awaiting the senior members of the surgical team and the biochemistry results.[786] The observation sheet shows that, at 03:30, Raychel was cool to the touch (temperature 36.6) and that she remained agitated.[787] At 04:10, Raychel's pulse measured 124 and blood pressure was 104/73.[788]

453. Mr. Foster praises Dr. Johnston for acting "*commendably and quickly*"[789] and showing those qualities "*expected of a good clinician*". He also points out that Dr. Johnston's realisation that this could be an electrolyte abnormality displays that knowledge of hyponatraemia and its effects were within the core knowledge expected of junior clinicians.

454. Dr. Scott-Jupp agrees that Dr. Johnston's treatment was "*appropriate*".[790] He also does not think that Dr. Johnston should have pre-empted the blood result by restricting or changing fluids.[791]

455. However, Dr. Haynes notes that since Dr. Curran was unable to secure the attendance of senior surgical staff and since Dr. Johnston's more experienced colleague (Dr. Trainor) was otherwise deployed in another area of the hospital "*it would have been perfectly reasonable for either Dr. Johnson (sic) or the nursing staff on his behalf to have contacted Dr. McCord at an earlier juncture to have asked him to attend.*"[792] Dr Haynes is of the view that senior input was necessary because "*not unreasonably [Dr. Johnston] was unsure of how best to manage the problem.*"

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782 Ref: 020-022-044
783 Ref: WS-028/1, p.2, Q.2
784 Ref: 098-026-077
785 Ref: 098-025-076
786 Ref: 012-040-199
787 Ref: 020-016-032
788 Ref: 020-016-032
789 Ref: 223-002-022
790 Ref: 222-004-013
791 Ref: 222-004-014
792 Ref: 220-003-018 & 019

456. At the Oral Hearings, further consideration will be given to whether Dr. Johnston or the nursing staff ought to have promptly taken steps to notify a senior doctor such as Dr. McCord about Raychel's condition and to secure his attendance.

Involvement of Dr. Trainor

457. Nurse Noble attempted to contact Raychel's parents and got a response at approximately 03:45.[793]

458. At or about 04:00, Dr. Johnston noted that Raychel was stable clinically and that there were no signs of seizure activity. He therefore went to the neonatal intensive unit to discuss the case with Dr. Bernie Trainor[794], Second Term Paediatric Senior House Officer. He asked Dr. Trainor to review Raychel. As he concluded his conversation with Dr. Trainor, he was contacted by nursing staff to be advised that Raychel looked more unwell.

459. Dr. Trainor advised Dr. Johnston to finish off the admissions she had been processing and she proceeded to Ward 6 to attend to Raychel.[795] Dr. Trainor made a retrospective note in respect of her attendance with Raychel.[796]

460. Mr. Ferguson arrived back at the hospital at about 04:00.[797] He states that it was "*complete chaos*".[798] He recalls Raychel "*shaking*"[799] and "*trembling*".[800] This is confirmed by Nurse Noble, who says that, at this point, Raychel remained the subject of intermittent tonic episodes. Raychel's pupils were found to be sluggish but still reacting to light.[801] Mr. Ferguson telephoned his wife, who immediately made her way to the hospital by taxi.[802] Mrs. Ferguson recalls her husband crying and stating that Raychel's heart had stopped and that the staff were working with her.

Electrolyte Results on 9th June 2001

461. Upon her attendance to Ward 6, Dr. Trainor saw Dr. Curran who was checking Raychel's blood results on the computer. She noted that Raychel's sodium was low.[803] Nurse Gilchrist times her attendance at approximately 04:20.[804]

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793 Ref: 012-044-213
794 See List of Persons Ref: 312-003-001
795 Ref: 012-040-199
796 Ref: 020-015-025
797 Ref: 095-005-018
798 Ref: WS-021/2, p.12
799 Ref: 095-005-018
800 Ref: 095-005-019
801 Ref: 012-043-210
802 Ref: 098-008-020
803 Statement Number 30, IHRD Statements File
804 Ref: 012-044-213

462. The first set of results (lab number 1742) showed a serum sodium concentration of 119 mmol/L, a serum potassium of 3.0 mmol/L and a serum magnesium of 0.59 mmol/L.[805] The sample time is noted as 03:30.

463. Dr. Trainor confirmed that the blood sample had not been taken from the same arm where the drip had been positioned. She directed Dr. Curran to repeat the electrolytes urgently, to do blood cultures and a venous gas.[806] Raychel's fluids were not changed at this point.

464. The second (repeat) set of results (lab number 1747) showed a serum sodium concentration of 118 mmol/L, and a serum potassium of 3.0 mmol/L.[807]. The sample time is noted as 04:35.

465. Following receipt of the second result, Raychel's fluids were restricted to half the original infusion rate, and changed to 0.9% Saline.

466. Dr. Scott-Jupp comments that the difference between the two samples is "*insignificant*"[808] and within the limits of laboratory error.

Examination by Dr. Trainor

467. When Dr. Trainor examined Raychel at about 04:15, she found Raychel to be unresponsive and her pupils dilated and unreactive.[809] Dr. Trainor says that she examined the medical notes and noted that Raychel had vomited seven times.[810] In her retrospective note, Dr. Trainor recorded that when she examined Raychel she looked very unwell, her face was flushed, there was petechiae on her neck, and her chest was rattly (although she was maintaining saturations at 97% with a face mask). Raychel's heart rate was 160 beats per minute, temperature was normal and Haemacue had been checked and was 9. Raychel's limbs were found to be flaccid. Raychel was placed on her side and the oxygen concentration was increased.[811]

468. Dr. Trainor set out her differential diagnosis in the following terms: "*Imp ? seizure 2◦electrolyte problem ? cerebral lesion.*"[812] She asked Dr. Curran to repeat the electrolytes, which according to Mr. Foster, is "*standard practice*"[813] when a result is very abnormal.

469. Dr. Trainor has been asked by the Inquiry whether she gave consideration to administering a hypertonic solution at the point when she established from Dr. Curran that the lab results were showing that Raychel's serum sodium

805 Ref: 020-022-044
806 Ref: 012-035-166
807 Ref: 020-022-043
808 Ref: 222-004-014
809 Ref: 020-015-023
810 Ref: 098-027-079
811 Ref: 020-015-024 & 025
812 Ref: 020-015-024
813 Ref: 223-002-024

was abnormally low. She has explained that her thinking was to query whether the sodium reading was accurate and to await the results of the repeat sample.[814] She was concerned that Raychel could have meningococcal septicaemia and, following a discussion with Dr. McCord, she commenced her on antibiotics.

470. Shortly after she first assessed Raychel, Dr. Trainor asked Nurse Noble to contact Dr. McCord who was the Consultant Paediatrician on call.[815] During the telephone conversation Dr. Trainor explained Raychel's condition and asked Dr. McCord to come in immediately. Nurse Noble times the phone call to Dr. McCord at 04:35 to 04:40.[816]

471. Dr. McCord has recalled that during the telephone conversation he was told that Raychel had suffered an epileptiform episode which required rectal and intravenous Diazepam, and that she remained "*inexplicably unwell and had petechiae.*"[817] He advised Dr. Trainor to commence high dose intravenous antibiotics (meningitis treatment dose), and to refer to the Anaesthetist if there was further deterioration. He then made his way to the Hospital.

472. The nurses had transferred Raychel from the ward bed to the recovery/treatment room and connected her to a 'Pro-Pak' monitor while Dr. Trainor was on the telephone.[818] Dr. Trainor explained to Mr. Ferguson that Raychel had suffered a seizure, and while at that time she was unsure of the cause, a consultant (Dr. McCord) was coming in to assess Raychel.[819] Dr. Trainor asked Dr. Johnston (who had returned to assist Dr. Trainor at approximately 4:40[820]) to set up a line so that antibiotics could be administered. She records that approximately 5 minutes later Raychel desaturated to 70% and went apnoeic.

473. Dr. Aparna Date (Specialist Registrar in Anaesthesia) was fast bleeped and arrived at Ward 6 within 5 minutes.[821] She found Raychel to be cyanosed, apnoeic and with oxygen saturations at 70%. Dr. Trainor had commenced artificial ventilation using bag and mask. Dr. Date proceeded to intubate Raychel and copious dirty secretions were sucked out.[822] Now on ventilation Raychel's colour improved and saturations rose to above 90%.

474. Mr. Foster praises Dr. Trainor for reacting with "*commendable speed*".[823]

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814 WS-030/2, p.5, Q.8(d)
815 WS-030/1, p.2, Q.1
816 Ref: 012-035-167
817 WS-032/1, p.2, Q.1
818 WS-030/1, p.2, Q.1
819 Ref: 012-035-167
820 098-025-072
821 WS-031/1, p.2, Q.1
822 Ref: 020-023-048
823 Ref: 223-002-025

475. Dr. Haynes agrees that staff responded quickly, recognised at an early stage that an electrolyte abnormality was likely to be the cause of her fit, and intubated and ventilated Raychel without delay.[824]

476. However, Dr. Haynes also expresses the view that he would have "*expected*" Dr. Trainor to have taken steps to obtain hypertonic solution and to have made some attempt to correct the electrolyte abnormality.[825] He nevertheless accepts that even if hypertonic saline had been in the room and immediately administered by Dr. Trainor at the time of her attendance (when Raychel's pupils were found to be fixed and dilated) it was already "*likely*" that the situation was "*irretrievable.*"[826]

477. Some degree of support for Dr. Haynes' view is to be found in the addendum to the report which Dr. Warde (Consultant Paediatrician) provided to the Altnagelvin Hospital Trust:

> "*Raychel's medical management from the time she began fitting was, in my opinion, in most respects entirely appropriate. I believe that many doctors of Dr. Johnston's relative lack of seniority would not have suspected from the outset that an electrolyte abnormality was the root cause of the problem. One could question why, upon receipt of the initial electrolyte results (revealing sodium 119 mmol.l), Dr. Trainor did not immediately alter the i.v. fluid therapy to 0.9% sodium chloride but instead asked for a repeat estimation. Whether or not this would have made a difference to the ultimate outcome we do not know, but it may have been beneficial. Some would argue that faced with a symptomatic patient with acute severe hyponatraemia it would have been appropriate to be more aggressive and to commence treatment with hypertonic (3%) sodium chloride combined with a diuretic such as frusemide. However this solution may not have been readily available and once again one can only speculate as to the possible effect.*"[827]

478. Dr. Haynes identifies a number of factors which would have impeded attempts to obtain and promptly administer hypertonic solution at or about 04.15 on 9th June 2001 even if Dr. Trainor had reached the view that it was appropriate to prescribe it:

(i) the solution was not available on the ward but could only have been obtained from the Hospital Pharmacy which necessarily would have caused delay;

(ii) if the solution had been obtained from the Pharmacy, it would have been necessary to make a search in a textbook or by using the internet in order to establish an appropriate dose.

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824 Ref: 220-002-005
825 Ref: 220-003-018
826 Ref: 220-003-017
827 Ref: 317-009-012

(iii) Dr. Haynes acknowledges that it is "*unlikely that any of those attending would have had to deal with acute hyponatraemia before*."[828]

479. Dr. Haynes goes on to say that when Dr. McCord was contacted by telephone, and assuming that he was informed about the abnormal electrolyte results from the first set of tests, he could have instructed Dr. Trainor to make an attempt to administer hypertonic saline.[829] It is clear that no such instruction was given to Dr. Trainor. However, it is also unclear whether the electrolyte results were communicated to Dr. McCord. This is an issue which will be further explored at the Oral Hearings.

480. By contrast with the views expressed by Dr. Haynes, Dr. Scott Jupp says that it was "*clearly appropriate*"[830] to do second blood tests, and it was "*appropriate*" to wait until the repeat result came back before acting upon it (due to the risks of taking action on a false result) and "*appropriate steps*" were taken after receipt of the repeat results, but that unfortunately it was probably too late for any change in treatment to make much difference.

481. It is apparent that various appropriate steps were taken in the early hours of 9 June 2001 by Dr. Trainor, Dr. McCord and others. The question which is raised by Dr. Haynes is whether anything more should have been done and whether, even if it wasn't, any criticism is warranted in the circumstances.

482. Accordingly, at the Oral Hearings the Inquiry will examine whether hypertonic saline ought to have been administered by Dr. Trainor, either on her own initiative or under the direction of Dr. McCord.

XX. Examination by Dr. McCord

483. Dr. McCord arrived after Raychel had been intubated. She was being manually ventilated. He found Raychel to be perfused and unresponsive, and her pupils remained fixed and dilated. He has remarked in his deposition that Raychel had *"a marked electrolyte disturbance with profound hyponatraemia and low magnesium."*[831]

484. Dr. Haynes states that, by the time Dr. McCord arrived at the Hospital, Raychel's situation was certainly irretrievable since her pupils were fixed and dilated and she required manual ventilation.[832]

485. Mr. Zafar and Mr. Naresh Kumar Bhalla[833], Surgical Registrar, also arrived at Ward 6 at or about the same time as Dr. McCord. Mr. Foster is disappointed

828 Ref: 220-003-017
829 Ref: 220-003-018
830 Ref: 222-004-014
831 Ref: 012-036-170 and 171
832 Ref: 220-003-018
833 See List of Persons Ref: 312-003-001

that these doctors were absent during the period following Raychel's seizure, particularly as responsibility for the surgical patients seemed to rest with the surgical staff, although he appreciated that they had duties elsewhere in the hospital.[834]

486. A further issue relates to the absence of the Consultant Surgeon on-call. Mr. Foster has "*no doubt whatsoever*"[835] that the Consultant Surgeon on-call (seemingly a Mr. Neilly[836]) should have come in to note events, make a clinical note and "*above all*"[837] see the parents. However, Mr. Bhalla states that he did not contact his Consultant Surgeon as his initial assessment of Raychel "*strongly suggested a metabolic / septic cause of her deterioration*".[838]

487. Mr. Foster "*cannot believe*"[839] that Mr. Zafar and Mr. Bhalla would not have contacted the on-call surgical Consultant, and if they did not do so, he considers this to be a "*very serious issue*."[840]

488. The fact that the surgical department was "*scarcely represented*"[841] (as Mr. Foster puts it) at this crucial time is a matter to be considered during the Oral Hearings.

489. While we have not been provided with a specific time, it would appear that shortly thereafter, probably at about 05:00, the repeat electrolyte results (which Dr. Trainor had asked Dr. Curran to obtain) confirmed the presence of hyponatraemia.[842] Once these results had been seen the IV fluids were changed to 0.9% saline at a restricted rate of 40 ml/hr (2/3 of the calculated normal maintenance rate)[843]. As has been noted previously, although there is a handwritten note of this prescription, there are no entries on the fluid balance charts for the administration of any fluid after 04:00 on 9th June 2001.

490. At 05:00, intravenous cefotaxime and benzylpenicillin were given (to cover any possible meningitis), and an intramuscular injection of magnesium sulphate (1ml)) was administered by Dr. Trainor.[844] Arrangements were made for an urgent CT scan.[845]

491. Both of Raychel's parents were in attendance and Nurse Noble spoke to them to advise that doctors were stabilising her condition and arranging for further investigations and tests.[846]

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834 Ref: 223-002-025
835 Ref: 223-002-026
836 See List of Persons Ref: 312-003-001
837 Ref: 223-002-026
838 Ref: WS-034/2, p.5, Q4(h)
839 Ref: 223-002-026
840 Ref: 223-002-026, Ref: 223-003-014
841 Ref: 223-002-026
842 Ref: 020-022-043
843 Ref: 020-019-038
844 Ref: 020-017-034
845 Ref: 012-035-167 and Ref: 020-015-024 and Ref: 020-025-054
846 Ref: 012-043-211

XXI. CT Scans and Transfer to Intensive Care Unit at Altnagelvin

First CT Scan

492. At or about 05:30, Dr. Trainor accompanied Raychel to the x-ray department for the CT scan.[847] Dr. G.A. Nesbitt[848], Clinical Director, and Consultant Anaesthetist, had come into the hospital at the request of Dr. Date. He attended Raychel while the CT scan was being conducted.[849]

493. The scan was conducted by Dr. C.C.M. Morrison[850], Consultant Radiologist. It began at 06:03 and concluded at 06:06. He reported that "*there is evidence of subarachnoid haemorrhage with raised intracranial pressure*" and that "*no focal abnormality [was] demonstrated*."[851]

494. Dr. W. St. C. Forbes[852], the Inquiry's Expert in Neuroradiology, has prepared a report for the Inquiry in which he comments on the quality of the reporting on the CT images, particularly the report on the first scan.

495. Dr. Forbes is not critical of Dr. Morrison for erroneously suggesting the presence of a subarachnoid haemorrhage.[853] He states that CT scans demonstrating severe cerebral oedema are "*not infrequently misdiagnosed*"[854] as a subarachnoid haemorrhage by inexperienced radiologists in training or even general Consultant radiologists who have had a limited involvement in acute neurological illness in cases of severe brain swelling. He adds that Dr. Morrison correctly sought a second opinion from a Consultant Neuroradiologist, namely Dr. McKinstry from the Royal.

496. At the completion of the CT scan, Raychel was brought to the intensive care unit where she was anointed by a priest.[855] An evaluation sheet was completed with regard to Raychel's history which precipitated her admission to ICU.[856] Mrs. Ferguson recalls Dr. McCord stating that the brain was clear and that "*if he could get her sodium it would be better*"[857], but that the Neurological Unit at the Royal Victoria Hospital, with whom clinicians at the Altnagelvin Hospital were in contact, needed another scan.

847 Ref: 012-035-168
848 See List of Persons Ref: 312-003-001
849 Ref: 012-037-173 and Ref: 012-018-122
850 See List of Persons Ref: 312-003-001
851 Ref: 020-015-026
852 See List of Persons Ref: 312-003-001
853 Ref: 225-002-005
854 Ref: 225-002-005
855 Ref: 012-035-168 and Ref: 012-028-146
856 Ref: 020-023-051
857 Ref: WS-020/1, p.18, Q.40

Second CT Scan

497. Another CT scan of Raychel's brain, this time contrast enhanced, was performed at 08:51.[858] The purpose of the scan is recorded as being to rule out "*abscess in the brain*." A note records that the CT scan produced "*no new findings*"[859] but the scan was later reported as suggesting raised intracranial pressure due to cerebral oedema, and as excluding a subdural collection or a subarachnoid haemorrhage.[860] It is apparent that Dr. Morrison discussed the scan with Dr. Charles McKinstry, Consultant Radiologist at the RBHSC.

498. Dr. Forbes considers that the reasons for carrying out a second enhanced scan were "*reasonable*" and that the second scan was reported "*adequately.*"[861] He considers that there were "*no further steps that could have been taken from a radiological perspective after each scan was conducted in order to demonstrate the underlying abnormality which was biochemical and not structural in origin.*"[862]

499. Mrs. Ferguson states that following the second CT scan, they were told by Dr. McCord that the doctors at the RBHSC had seen "*a trickle of blood*"[863] on the outside of Raychel's brain, and another doctor told them that there was a lot of pressure inside Raychel's head and that they would operate to reduce the pressure. It was indicated that this would take place at RBHSC.[864]

500. Raychel was returned to ICU. At about 09:00, another blood sample (lab number 5380) was taken showing that Raychel continued to have severe acute hyponatraemia with a serum sodium level of 119 mmol/l.[865] Urinary electrolytes showed a sodium concentration of 90 mmol/l and a urinary osmolality of 382 mOsm/l.[866]

501. At 09:10, following discussions between clinicians at the Altnagelvin and the RBHSC, it was decided that Raychel should be transferred to the PICU of the RBHSC.[867] The referring Consultant was named in the transfer referral sheet as Dr. Nesbitt and the receiving Consultant was named as Dr. Peter Crean[868], Consultant in Paediatric Anaesthesia and Intensive Care.

502. Dr. Scott-Jupp considers the decisions to admit her to ICU at Altnagelvin and subsequently transfer her to PICU at RBHSC were "*appropriate*".[869]

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858 Ref: 020-023-049
859 Ref: 020-023-049
860 Ref: 020-026-055 and Ref: 020-015-026
861 Ref: 225-002-006
862 Ref: 225-002-007
863 Ref: 098-008-017
864 Ref: WS-021/1, p.13, Q.26(a)
865 Ref: 020-022-042
866 Ref: 012-019-027
867 Ref: 020-024-052
868 See List of Persons Ref: 312-003-001
869 Ref: 222-004-016

XXII. Transfer to the RBHSC

503. Raychel was taken to the RBHSC by 'blue light' ambulance at 11:10. She was accompanied on this transfer by Dr. Nesbitt. She arrived at the PICU at 12:30 after an uneventful journey, where her condition remained stable but unchanged.[870] A transfer record sheet[871] recorded Raychel's condition during the transfer process, and a transfer letter was compiled by Dr. Trainor and provided to the RBHSC.[872]

504. On arrival, the PICU nurses noted that Raychel's temperature was 35 °C and her blood glucose concentration was 5.8 mmol/L.[873] She had no central venous or arterial lines, but a cannula in a peripheral vein in the right antecubital fossa. A heating blanket was subsequently used to achieve and maintain normal core temperature.

505. On arrival, Raychel's urine bag contained 1340 ml of urine[874]. As a catheter had been inserted at 04:00, this volume equates to Raychel's urine output since the insertion of the catheter i.e. 149 ml/hr, or nearly 6 ml/kg/hr.

506. Over the next 20 hours, Raychel's urine output averaged 73.7 ml/h or 2.95 ml/kg/h. Dr. Dara O'Donoghue[875], Clinical Fellow in Paediatrics, noted at 13:50 that Raychel was "*polyuric – dilute/clear urine*".[876]

507. Raychel was admitted to the RBHSC under the care of Dr. Crean, Consultant Paediatric Anaesthetist. She was found to have no purposeful movement and her pupils were dilated and unreactive to light. She had evidence of diabetes insipidus which was causing a high urine output and she was treated for this. Her serum sodium level was 130mmol/l on admission.[877]

508. The PICU Nursing Admission Record shows that Raychel was being admitted for neurological assessment and further care.[878] The plan was to ventilate, to restrict fluid to two-thirds maintenance and for Dr. Crean and Dr. Donncha Hanrahan[879], Consultant Paediatric Neurologist to review. Raychel's parents were told that she was critically ill and that the outlook was very poor.[880]

509. Dr. Dara O'Donoghue recorded in the clinical notes that Raychel appeared "*to have coned with probably irreversible brain stem compromise.*"[881] He indicated that Raychel would require a battery of brain stem tests.

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870 Ref: 012-037-174
871 Ref: 020-024-053
872 Ref: 063-005-010
873 Ref: 063-015-038
874 Ref: 063-026-057
875 See List of Persons Ref: 312-003-001
876 Ref: 063-009-019
877 Ref: 063-009-018 and Ref: 012-032-159
878 Ref: 063-015-035
879 See List of Persons Ref: 312-003-001
880 Ref: 063-009-021
881 Ref: 063-009-023

510. Serum sodium concentrations at 14:20, and again at 17:00, was 130 mmol/L.[882]

XXIII. Brain Stem Tests and Raychel's Death

511. At 17:30 on 9th June 2001, Dr. Crean and Dr. Hanrahan performed the first brain stem test indicating brain death.[883] Blood tests at 23:30 showed a serum sodium of 138 mmol/L. A second test was performed by the same doctors at 09:45 on 10th June 2001[884]. In the notes, Dr. Hanrahan has recorded: *"Repeat brain stem testing shows no evidence of brain function, as was found on testing yesterday. She is brain dead."*[885] The Coroner's office was contacted and advised of the circumstances.[886]

512. Raychel's parents were advised that nothing more could be done for their daughter[887] and, at 11:35 on 10th June 2001, ventilation support was removed.[888] Raychel was confirmed dead at 12:09 with her parents and relatives in attendance.[889] Dr. Crean and Dr. Hanrahan spoke to her parents.[890]

513. Mr. Foster considers the care provided for Raychel at RBHSC to have been "*clearly sensitive*"[891] and "*professional*" and he has stated that in his opinion there "*is no doubt*" that they treated Raychel's distressed parents with "*all possible care and sensitivity*".

XXIV. Post Mortem Findings

514. On 11th June 2001, at the request of the Coroner, Dr. Brian Herron, Consultant Neuropathologist[892] and Dr. Al-Husaini, Pathologist carried out a post mortem examination.[893] This showed some evidence of pulmonary aspiration, although this was never a major problem clinically. All other organs examined were normal except for the brain. There was no subarachnoid haemorrhage or infarct. There was bilateral uncal swelling and necrosis and diffuse cerebral oedema. Diffuse hypoxic ischaemic necrosis was seen in the cerebral cortex and brain stem.

882 Ref: 063-034-088
883 Ref: 063-010-024 and Ref: 012-032-160
884 Ref: 063-010-024
885 Ref: 063-012-026
886 Ref: 063-012-026
887 Ref: 063-022-049
888 Ref: 063-016-040 and Ref: 063-017-042
889 Ref: 063-016-041
890 Ref: 063-022-050
891 Ref: 223-002-027
892 See List of Persons Ref: 312-003-001
893 Ref: 014-005-006 and Ref: 012-031-157

515. On 3rd September 2001, Dr. Herron sought an opinion from Dr. Clodagh Loughrey[894], Consultant Chemical Pathologist concerning the cause of the hyponatraemia in Raychel's case.[895] In a report dated 24th October 2001, Dr. Loughrey commented upon the causes of the cerebral oedema which Dr. Herron had identified at the post mortem.[896]

516. Dr. Loughrey's findings were considered by Dr. Herron. He signed off on the Autopsy Report on 20th November 2001[897] and on his clinical summary on 4th December 2001.[898] Dr. Herron concluded that the cause of death was cerebral oedema secondary to acute hyponatraemia[899] and in explaining the cause of the *"low sodium"* Dr. Herron referred to the three factors identified by Dr. Loughrey:

(i) infusion of low sodium fluids post operatively

(ii) vomiting;

(iii) inappropriate secretion of anti-diuretic hormone.

517. On 4th December 2001, Mr. John Leckey[900], Coroner for Greater Belfast engaged Dr. Sumner to investigate Raychel's death on his behalf.[901] Dr. Sumner provided Mr. Leckey with a report dated 1st February 2002 in which he concluded that Raychel died from acute cerebral oedema leading to coning as a result of hyponatraemia. [902]

XXV. Inquest Verdict

518. On 5th February 2003, Mr. Leckey opened an Inquest into the death of Raychel. He heard evidence over the course of the 5th, 6th, 7th and 10th February 2003. The Autopsy findings were not challenged. Mr. Leckey issued the following verdict on 10th February 2003:

Findings: On 7 June 2001 the deceased was admitted to Altnagelvin Hospital complaining of sudden onset, acute abdominal pain. Appendicitis was diagnosed and she underwent an appendectomy the same day. Initially, post-operative recovery proceeded normally. However, the following day she vomited on a number of occasions and complained of a headache. The next day, 9 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

894 See List of Persons Ref: 312-003-001
895 Ref: 012-063g-322
896 Ref: 014-005-014
897 Ref: 014-005-006
898 Ref: 014-005-012
899 Ref: 014-005-013
900 See List of Persons Ref: 312-003-001
901 Ref: 012-067u-365
902 Ref: 012-001-001

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 face of severe post-operative vomiting and water retention resulting from the inappropriate secretion of ADH (Anti-Diuretic Hormone).[903]

[903] Ref: 012-026-139 and 140

Appendix I – Evidence Received By the Inquiry

519. Following the establishment of the Inquiry on 1st November 2004[904], requests for information and evidence were sent out to a number of bodies including, in relation to Raychel's case:

(i) Department of Health, Social Services and Public Safety

(ii) Royal Group of Hospitals HSST

(iii) Altnagelvin Group of Hospitals Trust ("Altnagelvin Hospitals Trust")

(iv) Western Health & Social Services Council

(v) Coroner for Greater Belfast

(vi) Northern Ireland Regional Neuropathology Service

(vii) Police Service of Northern Ireland ("PSNI")

(viii) Raychel's family

Documents and Other Material

520. The call for documents has been ongoing since the establishment of the Inquiry and it is continuing. The search for relevant documents has and is being informed by guidance from the Inquiry's Advisors, from its Experts and from the responses to requests for Witness Statements.

521. The material received to date in relation to Raychel's case includes:

(i) Raychel's hospital medical notes and records[905]

(ii) Statements to and depositions[906] from the Inquest into Raychel's death and Reports commissioned by the Coroner

(iii) Documents held by Raychel's family[907]

(iv) Documents from the investigations of the PSNI including:

- Statements from witnesses

[904] Ref: 008-032-093
[905] Ref: File 20
[906] The positions of those involved is given as it was at the relevant time, unless it is relevant also to identify their position at any other time.
[907] Ref: File 68

- Reports PSNI commissioned from: Dr. Edward Sumner, Consultant Paediatric Anaesthetist at Great Ormond Street Children's Hospital[908] and Ms. Susan Chapman, Nurse Consultant for acute and high dependency care at Great Ormond Street Children's Hospital[909]

- Correspondence and other documents including documents from the Ferguson family.[910]

(v) Correspondence from Directorate of Legal Service ("DLS") providing responses to the Inquiry's requests for information[911]

Publications

522. The Legal Team has added to its bibliography any publications referred to by its Advisors, Experts, Witnesses and legal representatives of Raychel's family or any interested party. It is available on the Inquiry website and is updated as further authorities are cited.

Expert Reports & Background Papers

523. These are referred to in detail above in Section III of the Opening.

Witness Statements

524. The Legal Team requested and received a large number of Witness Statements and Supplemental Witness Statements from persons involved in Raychel's case. These requests were made with the guidance of the Advisors and arose from a number of materials including Raychel's medical notes and records, Statements/Depositions to the Coroner, PSNI Statements or Inquiry Witness Statements, Reports from the Inquiry's Experts and documents received from DLS and other sources.

525. The Legal Team has compiled a list of all those involved in the Clinical aspects of Raychel's case from all of the information received by the Inquiry.[912] It explains their position then and now, briefly summarises their role in Raychel's case, and whether they have provided a statement and if so for whom. Importantly it also indicates the witnesses that it is proposed to call to give evidence during the Oral Hearing.

908 Ref: 098-081-235, Ref: 098-081-244, Ref: 098-098-373
909 Ref: 095-092a-328
910 Ref: File 68
911 Ref: File 316
912 See List of Persons Ref: 312-003-001