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COMMENTS

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6th February 2003, 10.30am-1.00pm

Evidence of Dr. Vijay Kumar Gund

The Doctor read out his deposition. Under questioning from the Coroner, he confirmed that he had not been dealing with Raychel before the 7th of June, and did not see her again after surgery. He described the surgery as uneventful. Mr. Leckey referred to the previous day's discussion on naso-gastric tubes, Dr. Gund said it would not be his normal practice in this type of surgery.

Under cross-examination from Mr. Foster Dr. Gund said he left the fluid prescription to those on the ward and that it would be normal for a patient to be prescribed fluids, usually normal saline if a drug patient. The Coroner asked if there was a difference between adult and child patients, Dr. Gund said an adult would be prescribed Hartman's solution and normal saline. Mr. Foster continued to ask about the protocol, but Mr. Leckey was of the view that Dr. Gund could not take the matter much further as he did not create the protocol. The Doctor was asked about his knowledge of the protocol, he replied that he was informed by the nurses. If the nurses needed further guidance they would be able to ask the available paediatrician.

Under questioning from Mr. McAllinden the Doctor confirmed he was aware of the nature of the IV treatment and the use of solution 18, that that was discontinued by the patient's arrival in theatre, and that solutions administered in surgery were stopped before transfer to the ward. He reconfirmed that the nurses would have been able to refer concerns to the paediatrician.

Evidence of Dr. Clare Jamison

Dr. Jamison read her deposition aloud. Mr. Leckey asked for an explanation of cricoid *pressure*, which she explained was pressure administered by an assistant on the cartilage around the oesophagus. She confirmed the person described in her deposition as 'first on call' was Dr. Gund. Dr. Jamison also confirmed that she did not

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remain in theatre, and again that prescription of fluids was left to the paediatrician on the ward, though it could also be dealt with by the senior house officer. It was put to her that Dr. Gund said this was for the Doctor on the ward. Dr. Jamison felt it was for the discretion of the team dealing with the patient, but in any event she was not part of that team.

Mr. Foster asked about the change of an entry on page 16 of the records. The Doctor explained that this was a corrective note she had been asked to make by a senior colleague Dr. Nesbitt. She stated she had not been asked to do this before.

Mr. McAlinden questioned the Doctor whether she was clear about an entry on the 13th (which I take to be about the amount of Hartman's solution, but cannot be sure, not having a copy of the records). She confirmed that the solution was contained in a one-litre bag marked at 100ml intervals. Dr. Jamison described the use of naso-gastric tubing as very uncommon unless problems were expected afterwards. Mr. Leckey enquired that in view of what had occurred in Raychel's case whether that practice should be reviewed. Dr. Jamison was of the view that it would not be unusual in cases of major bowel surgery.

Dr. Makar had been envisioned by the Coroner as the next witness, but his attendance had not been secured by Altnagelvin Trust. The Coroner's Office hasd received no reply from him either. It appeared he was in England. There was some discussion as to what steps were taken, as it seemed he had not replied to either a witness summons or letter requesting his attendance. While this was checked it was agreed that Dr. Trainor could be taken next instead. It later transpired that the Doctor was on two weeks leave.

<u>Evidence of Dr. Bernie Trainor</u>

The Doctor read her deposition. Under questioning from the Coroner, she confirmed that Dr. McCord was her Consultant, and that her first contact with Raychel was at the request of Dr. Johnston. She outlined that the surgical team would be expected to generally look after their own surgical patients, she being responsible for medical patients. The Doctor was said she was unsure whether Dr. McCord was involved with the surgical team, but that the JHO was on the surgical team. She described that the

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JHO noticed the low sodium level of 118, and her reaction was to get him to check the sample was not taken from the arm in which the drip was in, and to urgently send it to the lab- in cases of abnormal results the tests should be rechecked. Dr. Trainor agreed that 'alarm bells' started to ring (figuratively) when the result of 118 appeared, and that the patient looked unwell. She explained that hyponatraemia was one of several possible causes to check occurring to her at that stage. She remained present when Dr. McCord arrived. When asked about the frequency of hyponatraemia in children the Doctor described it as occurring sometimes, not usually as low as 118, and she was not aware of a patient having died from it. Asked about the other possibilities the witness described meningitis as a cause for concern as Raychel had a rash, necessitating antibiotics. She agreed that the particular rash was caused by vomiting, but she was unaware of this at the time.

For the parents Mr. Foster suggested the rash was caused by vomiting, of a severe or continuous nature, the Doctor said it could be by a few incidents of vomiting and agreed she described seven being recorded. It was suggested that she might have connected the vomiting with the condition, Dr. Trainor replied that one must repeat 'funny' test results, but agreed that hyponatraemia was a concern, and the lab results were returned quickly. She described results of 118/119 as very low. She disagreed that Dr. Gund prescribed fluids for paediatric patients, and said that surgical patients were the responsibility of the surgical team, she being a paediatric SHO would sometimes be asked to assist with surgical patients, or write up fluids etc. As she dealt with medical patients she did not know Doctors Zafar and Makar personally, but did know who they were. Again, the re-testing of unusual results was reiterated, for instance to rule out the possibility of the sample coming from the 'drip' arm.
She described the demeanour of Raychel as looking very unwell, and that within five or ten minutes of seeing her she called for Dr. McCord, took advice from him and discussed saturations. Dr. Trainor spoke of the patient's breathing stopping as being extremely worrying, and she prescribed electrolytes as soon as she recognised the problem, the solutions being close to hand. She confirmed that the notes her written up by her around 6.30 am while Raychel was undergoing a CT scan, then she accompanied her to adult ICU, after which she had no further involvement. When asked whether Dr. Johnston had suggested a tonic clonic seizure to her, she replied

that Dr. Johnston had only asked her to look at Raychel which she duly did, and she added that Mr. Ferguson had left the room before his daughter became unwell.

Mr. McAllinden then took over questioning the Doctor. She described being in the neo-natal ward when first contacted, and gave her work over to Dr. Johnston to continue. She went immediately to ward six, and immediately noticed the blood test results, and called for a repeat. She confirmed that the entries were made on page 43 of the records at the noted times, that she phoned for Dr. McCord, and Raychel was transferred to the treatment room, as there were the proper facilities, lots of space and no parents present. Dr. Trainor described de-saturation as having occurred after movement to the treatment room. When Raychel stopped breathing manual ventilation was started. The anaesthetist was called for and arrived quickly. Dr. Date then intubated the patient. She agreed that she had administered magnesium at 5.20 am and signed the drug sheet (page 34 of records), and two antibiotics were given (seemingly by Dr. Date, she thought) but were not signed for, but this certainly occurred before the CT scan at 5.30 am. She explained she thought it better this be filled in than not, and estimated they were administered at about 5.00 am. She said that the antibiotics, magnesium and saline were all given before the CT scan. Antibiotics were administered by Dr. Johnston.

There was then a discussion about Dr. Zafar, who had been excused from attendance as he was sitting exams. It was discovered by this time that Dr. Makar was on leave and out of contact. Dr. McCord was therefore taken next.

<u>Evidence of Dr. Brian McCord</u>

Again Dr. McCord read his deposition and asked the following amendments be recorded.

- At line 4-"At approximately 03.45 a.m." changed to read "in the early hours of the morning". The Doctor was unsure of the exact time.

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- At line 4- "registrar" changed to read "senior SHO". Apparently, Dr. Trainor was a SHO fulfilling the functions of a registrar.

Dr. McCord confirmed to Mr. Leckey that as a Consultant paediatrician he was not involved before the surgery, and that neither he, Dr. Trainor nor Dr. Jamison was aware of Raychel before the episode of seizure. He described his team as a back up, to provide advice and nursing rather than medical assistance, and that the vast majority of patients did not need such assistance. He said he did not disagree with the evidence of Doctors Jenkins and Sumner, commending it as clear, though he thought the naso-gastric tube was not normally necessary. When asked what would happen if Raychel were admitted to hospital today, he said he would not be directly involved but would be optimistic that the types and volumes of fluids are now administered with more clarity. As to the petechical rash the Doctor was of the opinion that it could have a number of causes: anything that would raise inter-cranial pressure (I have noted *cranial* but am not sure whether this is right on reflection, the Doctor may have used a similar term I am not familiar with), for instance a cough or a tonic seizure. In this case the rash was noted after the seizure and this made identifying the predominant cause difficult. He agreed that he had diagnosed hyponatraemia, but was only sure of this when the CT scan came back confirming it.

When asked to assess how low a sodium level of 118 was Dr. McCourt described it as very low, though he had seen another child fall below this and survive. In Raychel's particular circumstances 118 was extremely low and worrying. He commented that in cases where symptoms actually develop it is a much more sinister and concerning situation. He confirmed that had Raychel survived she would have suffered serious brain damage.

Mr. Leckey enquired as to how to make other professionals aware of the dangers that had arisen in this case. Dr. McCord said he agreed with the ideas of Doctors Jenkins and Sumner, and could add little beyond informing members of staff and canvassing other hospitals.

Mr Foster began by inviting the Doctor to reconsider his description of 'some vomiting' in paragraph two of his deposition. He declined saying it was a fair reflection of his perception at the time. He agreed it was concerning, now that he had the full picture in retrospect, but said he relied on those below him including the

nurses to bring it to his attention, he had no access to medical notes. He concurred that 'some vomiting' was not appropriate, but only in hindsight. On the telephone with Dr. Trainor he could not recall whether they discussed the low sodium reading, but said if told about it he would have directed checking it. He said the symptoms could have been caused by meningitis as this was frequently encountered, and it was in his mind with hyponatraemia, both conditions could be concurrent. He said that because of this antibiotics were administered at the time as they carry few side effects. As to the low sodium, levels Dr. McCord said the picture evolved quickly, but became more obvious later on, and the standard treatment was to give reducing amounts of saline. Raychel's situation was not deemed hopeless at the time, only becoming clearly so when she reached Belfast, according to the Doctor, though he had no involvement at that stage, and Altnagelvin lacks an ICU for children. Again, he confirmed that the surgical teams look after surgical patients, but his team would assist if necessary. He said all Doctors prescribing fluids should be aware of the consequences of same. He was asked of his team's knowledge of hyponatraemia, and replied that all would be aware as there are diverse causes, though the relationship of this condition, ADH and surgery was unknown to him, his expertise being in medical patients.

Mr. McAllinden confirmed with Dr. McCord that it had taken him about five to ten minutes to travel the two miles to the hospital, arriving at about 4.45 am, just before intubation took place, Dr. Date being already there. He confirmed also that fluid correction efforts began in ward six, prior to the CT scan. The Doctor had been suspicious of a brain haemorrhage and had the scan sent through to the neurological ward in Belfast. In the Royal sodium levels had climbed to 130. He described requesting an enhanced scan but was unsure of the time. Such a haemorrhage was ruled out by the scan, but what he described as the 'fog of war' meant this took some time. He commented that low sodium could be caused by other factors such as meningitis, infection etc., all of which had to be ruled out first.

Evidence of Dr. G A Nesbitt

Dr. Nesbitt read his deposition aloud. He described himself as a Consultant anaesthetist with an interest in paediatrics. He told how he had arrived after Dr. McCord at around 5.30 am, having not been involved with Raychel previously he

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came due to the pressure on staff. He agreed that surgical patient remained in the care of the surgical team, but described care as multi-professional where needed. According to the Doctor hyponatraemia is also known in adults, but is more common in children. He had not seen a case resulting in death before, are few symptoms appear, adding that judicious treatment would bring sodium levels back. He was asked by Mr. Leckey whether a tonic seizure could cause brain damage, and said it was possible in retrospect.

As to fluids Dr. Nesbitt commented that Raychel was dealt with by Dr. Makar in the usual way in casualty, fluids not always being administered before surgery, very little having been given here pre-op. Hartman's solution was used in theatre.

He had doubts now about the safety of No. 18 solution. Practice had turned to Hartman's solution, then to half strength saline solution as the best compromise. He described the use of '+' to describe vomiting as very subjective, the appearance of ' + + ', for instance being difficult to assess, but in any event the nurses had not been unduly concerned. He agreed that a naso-gastric tube would allow fluid loss to be accurately gauged, but was not used in his practice in an uneventful case. Dr. Nesbitt agreed that hyponatraemia was more prevalent in female children, suggesting there may be a link with oestrogen. He commented that in the past there were historical reasons why children appeared in hospital being hypernataeric so hyponatrae. it was less of a concern and less expected, that surgical patients react differently than medical patients, the reaction being idiosyncratic and difficult to predict.

The Coroner asked as to whether nurses were aware of the significance of vomiting. Dr. Nesbitt said recording and measurement was very important, though here the volume had never been great, but the frequency had been. He hoped this case would raise awareness.

Mr. Foster suggested that the guidelines now apply to adults and children, the Doctor agreed but said practice is focused towards children. He said they were very prescriptive, and might be unnecessary in simple surgical cases. He described frequent testing of children difficult due to available veins being scarce. He rejected the idea that the anaesthetist should not prescribe fluids- any Doctor could do so. Fluids could then usually be reviewed twelve hours post-operatively by the surgical team. Again Dr. Nesbitt confirmed that No. 18 solution is no longer used, half strength saline being the best compromise, and that the change was prompted by Raychel's case, being appropriate as hypernatraemia is another possibility. He said

that previously No. 18 solution could be supplemented with other solutions if a sodium deficit was apparent, at reassessment at twelve hours it could be changed if a blood test suggested so. He agreed that there appeared to be no test on the 8th of June. He said that speaking to colleagues afterwards he had not asked what their practice was but had described Raychel's particular circumstances. When asked as to how he became involved the Doctor outlined that he had been called by Dr. Date, as the on call Consultant, registrar and SHO were present and under pressure, arriving at 5.30 am he thought the situation 'absolutely critical'. Several causes were still thought possible and intubation was deemed necessary. He was asked whether Dr. Gund was part of this team. Dr. Nesbitt said he was, when asked whether Dr. Gund should have prescribed fluids he answered that this was appropriate and in any event, fluids were reassessed on a twelve hourly basis. Mr Leckey ruled that this line of questioning was not relevant to his task in finding the cause of death.

The Coroner decided to break at 12.55 p.m. and Mr. McAllinden's questions would be put to Dr. Nesbitt at 2.00 p.m.

6th February 2003, 2.00 p.m.- 3.30 p.m.

Mr. McAllinden began by discussing what appeared to be a retrospective note made at page 16 of the records. Dr. Nesbitt explained that all notes are made retrospectively to some extent, this note was filled in six days later as the Doctor had noticed the omission and felt it better to fill in than to leave blank, and to provide an explanation. He asked Dr. Jamison to change it, the purpose being to show the total fluid used in treatment for clarification. He agreed that the entries on page 39 showed volumes given pre- and post- operatively, outlining that only 150ml could be given at any one time. He was of the opinion that the Doctor appearing on page 40 was Dr. Makar.

Dr. Nesbitt then outlined the Critical Incident Enquiry conducted after Raychel's death, the first meeting taking place on the 12th of June, with a view to drawing up an action plan, reviewing available evidence of electrolyte problems with IV fluids. After reviewing the journals and speaking to colleagues it appeared to Dr. Nesbitt that use of No. 18 solution was probably not good practice, and Hartman's solution was used

instead, other hospital units were still using No. 18 solution. It was later decided that half strength saline would be used. He thought that No. 18 solution was largely being phased out now for post-operative paediatric surgery. The Doctor said that other units were unaware of the dangers of No.18 solution, which may still be fine for medical but not surgical patients. Practice is now that No. 18 solution is no longer a routine fluid.

Mr. Foster asked one question resulting from previous answers; he put to Dr. Nesbitt that the journals and literature on the subject had always been previously freely available. He agreed it was but in journals not widely read by those in practice, as prescribed previously by the experts.

Finally, the Coroner asked whether the manufacturers should put any form of warning on the solution bags, Dr. Nesbitt felt this would be unfair to the manufacturers as responsibility rests with the Doctor using them.

Evidence of Mr. Robert Gilliland

Mr. Gilliland was asked to read his deposition out which he duly did. Mr Leckey asked for an explanation of McBurney's point, which transpired to be the right hand side of the lower abdomen, the classic site of appendicitis pain.

Mr. Gilliland made 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.

Mr. Foster confirmed with the witness that sickness was common after surgery. He agreed that he would expect continuous vomiting to be noted, but not necessarily brought to the attention of the surgical team, rather the medical staff. The Consultant did not agree that he would expect to be necessarily informed of 'coffee ground' vomit, though he would if it was ongoing 17-20 hours after surgery, he added that this had been done here. Mr. Gilliland was asked about the prescription of Valoid and Zofran on pages 34-35 of the notes, agreeing that they may be out of sequence but he stated that drugs are recorded once as a single entry. It was suggested that as there

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was only one entry that these drugs may have been administered more than once. The witness said he suspected only one administration, but the nursing notes might contain the timing.

It was suggested that Zofran and Valoid had failed to halt the sickness then further investigation was necessary, Mr. Gilliland replied that one drug may not stop the vomiting and others would then be tried. Mr. Foster suggested that the notation of volume and nature of vomit was important for the 'big picture', with which the witness agreed, but said the quantity is often difficult to note. The measurement of urine output was similarly difficult. He would not necessarily have expected a blood test. It was put to the Consultant that the Doctor in charge should have been more proactive in investigation when the child was described as listless, he though that at that stage prescription might be appropriate. He agreed that input and output of fluids was important in all patients, but it was not standard to try to measure urine output after an appendectomy. It was put to him that it was where no record of fluid outputs existed so long after surgery a Doctor could not assess fluid loss. Mr. Gilliland repeated the difficulty of assessing urine volumes. He said asking staff or parents about toilet visits did not assist in assessing volumes. Mr Leckey agreed that this was completely subjective and asked the questioning be moved on.

Mr Foster asked if notes of 'large vomit' and then two further episodes suggested more than a cursory glance was needed. The Consultant explained that vomiting was very commonplace after an appendectomy.

The Coroner again intervened saying that unless fluid loss was gauged accurately it cannot be properly assessed and neither patient nor parents could give any useful idea of it. Mr. Gilliland concurred, adding that if vomiting was 'continuous' then further investigation would be appropriate, but he could not say whether this was done here.

The witness outlined that Doctors Makar and Jafar were both part of the surgical team, there being a system of 1 in 4 rotation, one SHO, being Dr. Makar being on call at night, both were on duty at 9 o'clock (it is not clear whether this is am or pm). Mr. Zafar had started a 24-hour shift in the morning. It was suggested that Dr. Zafar had Raychel under his supervision and Mr. Gilliland made it clear that the Doctor was on call, this did not mean constant supervision, the nurses might call on the JHO first before calling the SHO. It was put to him that Dr. Zafar did not appear on the record, he replied that the nurses did not call him as they were not concerned enough to refer the case, nor for that matter did Dr. Delvin or the JHO. The Consultant said he could

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not be sure of who it was that prescribed Valoid at 10.15 (again it is not clear whether this is am or pm), as he did not recognise the signature, it was not Dr. Zafar. He rejected the idea that it should have been Dr. Zafar saying any Doctor on duty could prescribe it, and that it was not necessary for a JHO to specifically inform the SHO of this, nor would the SHO necessarily repeat an earlier call later on. Mr. Gilliland said the decision to allow a patient home would be made on a routine ward round, if a patient was not fit they would later be reassessed. Had Raychel recovered on the 9th of June she would have been allowed home.

Mr. Gilliland was asked whether the chart would have suggested a risk of sodium deficiency, in reply he said this risk of hyponatraemia is not widely known and he was not aware of it until after Raychel's death. Like Dr. Nesbitt he agreed that the literature was freely available on the subject, but was adamant that it was an impossible task to review all the journals to become informed of it, though he did recognise that vomiting lead to depleted sodium levels, but added most surgeons were unaware of the risk of hyponatraemia.

Mr. McAllinden had no questions.

Evidence of Dr. Raymond Fulton

Dr. Fulton, as all other before him, read out his deposition. He asked that the following amendments be made-

- At page 2, paragraph 2 '22/07/01' changed to read '22/06/01'
- At page 2, paragraph 5 '06/07/01' changed to read '26/07/01'

There was initially some discussion between the witness and the Coroner about how the medical profession can be made aware of the risk of such rare conditions, through the CMO etc. and of informing other jurisdictions e.g. England, the Republic etc. It is not included in detail here, as Dr. Fulton was only involved in the investigation and not the treatment of Raychel. I have enclosed the Doctor's deposition, as it may not have previously been made available.

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Mr. Foster began by suggesting that the action plan suggested daily U&E to be carried out (point 2). The Doctor agreed that Raychel would now fall into this category, but stated again volumes of vomit were difficult to accurately assess. He agreed that all the methodology was simple, and that though there was previously a system in place to record vomit and urine output, the '+' system, but it was somewhat subjective in nature, though the fact of vomiting was also important to record. He reminded Mr. Foster that point 6 in the action plan referred to IV fluids, and not to fluid output/input.

Finally, the Doctor agreed that point 4 information could be recorded in the form previously in use, but that form was not fully complete.

Mr. McAllinden had no questions.

At 3.30 pm the inquest was adjourned until 10.15 am the next day. Only Dr. Johnston would give evidence as Mr. Foster was in difficulty in attending for the whole day.

7th February 2003, 10.15am-11.00am

Evidence of Dr. Jeremey Johnston

Dr. Johnston read his deposition and made one amendment-

- At page 1, paragraph 1 'I am currently a Senior....' changed to read 'I was a Senior.....'
- At page 3, paragraph 1 '04.55' changed to read '04.40'
- At page 3, paragraph 2 'Mr. El-Shafie' changed to read 'Mr. Bhalla'

To the Coroner he explained that afebrile meant she had no temperature, and that the 12 lead ECG was conducted to rule out evidence of the episode having a cardiac cause. Dr. Johnston outlined that he had thought the problem might be one of

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electrolytes given the patient was post surgery, afebrile and had no history of epilepsy. Mr. Leckey asked had he considered hyponatraemia, to which the Doctor answered that he had, but that it was one of a number of possibilities. He had only become involved with Raychel case, as he happened to be on the ward at the time the emergency began. He asked for blood tests as he had thought them useful for diagnosis, not because he had hyponatraemia specifically in mind. The results showed low sodium levels.

Mr. Foster asked how he diagnosed a tonic seizure. The Doctor described it as a general tonic seizure, similar to a tonic clonic seizure but lacking the associated rhythmic movement. He said he had not seen the nursing chart but had been told the child had been reasonably well, vomiting was mentioned to him, but this may have been reference to one episode. He had read through the medical notes, and said the nursing notes would not have altered his mind at that stage. The reading of 119 on page 44 of the notes, he said became available at the same time as Dr. Trainor arrived, he had been concerned about these (biochemistry) results before her arrival.

Dr. Johnston related that the JHO, Dr. Curran had been told to get Dr. Jafar, which he set to immediately, Dr. Zafar arrived at 4.45 am, he agreed this was a delay of about an hour and a half, during which time only Dr. Curran was present. He also accepted that Raychel appeared to stabilise after diazepam was given.

The Doctor stated that the CT scanner was the only device that could check brain activity. He said Nurse Noble had not paged him, as he was present on the ward. The nurse in paragraph 2 of page 2 of his deposition, who told him the patient looked more unwell, he could not recall the identity of.

He could not recall the exact time he had started his shift at, beyond that it was late afternoon. Dr. Johnston was asked if the surgical team would request help from the paediatricians, he was of the view that they would normally look after their own patients. Mr. Foster asked if had he been told of the vomiting would he have seen Raychel, he responded that he would, had he been asked. The Coroner brought questioning to an end saying he did not want to embark on speculation.

Mr. McAllinden confirmed with Dr. Johnston that the CT scan did not show brain waves, but rather brain structures. It was clarified that the EEG scan was of the brain, the ECG was of the heart.

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He also confirmed that Doctors Trainor, McCord and Date saw the patient at around 3.05am. With reference to page 13 (bottom section of page) of the notes made at 3.15 am Dr. Johnston confirmed that he was aware there was no history of epilepsy, that there had been vomiting and there was a problem with the electrolyte balance.

At 11.00 am the inquest was adjourned until 10.30 am on the 10th of February. Mr. Leckey expected that all the nurses' evidence would be heard on that day.

10th February 2003, 10.30am-12.30pm

Evidence of Sister E. Millar

As had all witnesses preceding her the Sister read her deposition asking for the following amendments. -

- At page 1, paragraph 3, 'Dr Makar also saw Raychel shortly afterwards but made no change in her treatment' changed to read 'Dr. Makar also spoke to Mr. Ferguson.'
- At page 2, paragraph 2, 'SHO' changed to read 'JHO'.

Mr. Leckey began by confirming that Sister Millar, when she went off duty did not return to work until the following Tuesday, Raychel having died in the interim. As to hyponatraemia, she said she had seen babies with low sodium which could be corrected quickly, but in her thirty-three years of nursing she had never seen it in a surgical patient. She said hyponatraemia had not crossed her mind at the time, nor had the vomiting suggested it, as she had not seen it before. On the 9th of June, at about 9.30am, she had commented to Mr. Ferguson how well Raychel appeared to be. At 11.00am she was sitting on the bed colouring in, something most appendectomy patients would not be well enough to do at that stage. Her general appearance and observation did not suggest she was ill, though she was aware of vomiting at around

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10.00am. After Dr. Makar's examination in the morning she was on normal fluids, reduced in the afternoon to half fluids, this not being unusual in cases of minor surgery. Sister Millar had gone off-duty at 6.00pm, she was aware the last vomit was at 3.00pm, and had thought Raychel had settled. She was aware of ongoing nausea, for which she bleeped the Doctors for Zofran, which Dr. Devlin administered. The witness described Raychel as walking past the nursing station with her father at about 2.00pm, being stiff and moving slowly, but the Sister was happy with her progress.

During this answer Mr. Ferguson said audibly that this was a lie, and though Mr. Leckey was aware of this he simply moved on.

Sister Millar said all her staff had years of experience and all were shocked by Raychel's death.

Mr. Foster opened by confirming that Nurse Rice and Nurse McAuley were one and the same person, the Sister said that Nurse Rice was a Junior Staff Nurse at the time. She agreed that forms and the following of protocol were her concern, and fluids in and out were important to note. He then put to the witness that entries as regards urine were incomplete. Sister Millar answered that this was not unusual, the first passage of urine being the most important to note, every passage was not noted, for instance children would often be brought to the toilet by their parents. Raychel had not yet passed urine in the morning. She explained the notation 'PU' as meaning 'passed urine'. She agreed that if Raychel went to the toilet she would have liked that to be noted. The Coroner ruled that the point had been addressed by Doctors Jenkins and Sumner, and the nurse had already stated that policy was that not every passage was noted.

Mr. Foster then moved on to ask about the vomiting at 10.00am, 1.00pm and 3.00pm. Sister Millar said she did not see any of them personally. She described the fact that there were staff meetings in the aftermath on the subject of the fluid balance sheets and the system of 1/2/3 '+'. When asked whether the vomit at 8.00am was bigger or smaller than that at 10.00am she declined to comment as the former entry was made by the night staff. The witness said her observations on duty did not give cause for concern, that the 'large vomit' did not either.

Mr. McAllinden objected to the questioning as going beyond the remit of the inquest. After a short discussion of the '+' system. Mr. Leckey said that the witness had described having no worries about Raychel from what she saw, the vomiting did not

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cause her concern being within normal limits, not large or copious, and her observations were normal, beyond this the Coroner said the witness could not answer further.

Mr. Foster then put to Sister Millar that the Fergusons did not accept that their daughter had been walking around. The Sister said simply that she could only say what she saw. Mr. Foster only got as far as putting that there were twenty-four other patients on the ward when Mr. Leckey stopped the question on the grounds of irrelevance. Again, he put it two the witness that Raychel was in bed from 10.00am onwards and had to be carried to the toilet, and again the Coroner said this was not appropriate for his court.

Sister Millar was unable to recall who she had handed over to when she left duty, but did know that nurse noble came on at 8.00pm. Mr. Foster asked about Raychel being allowed 'small clear fluids', to which she said some were permitted by the Doctor, she thought Raychel may have been allowed a sip of '7-up' or something similar which was acceptable. If a patient was vomiting fluids were not encouraged, indeed no tolerance of fluids by the patient was not unusual, as they might develop a spasm of the gut. She agreed interaction with the patient's parents was important, for example if they brought her to the toilet. The witness recalled seeing Mr. Ferguson and speaking to him in the morning, though she did not see Mrs. Ferguson, and believed other staff had closer contact than she had had. She had been happy with condition of heart, respiration rates etc.; Dr. Zafar had examined the patient's surgical wound to satisfaction. She disagreed with the suggestion that if the chart seemed all right she would have been satisfied, describing observation of the appearance of the patient as important. When Mr. Foster asked at what stage the Sister thought the child unwell, the Coroner ruled that the matter had already been covered.

The Sister explained that at 9.00am that Raychel was doing well, and that after the large vomit at 3.00pm she thought that the child was over the worst of it, and got the Doctor to give Zofran. Mr. Foster suggested that IV levels in hindsight were clearly wrong, and again the Coroner ruled the line of questions irrelevant.

The Sister, when asked, repeated that she had only seen medical patients with hyponatraemia, and then only very small babies. Mr. Foster asked whether it was unusual for the surgical team to make an early morning round, the witness explained they could if specifically requested by the nurses, if they were worried about the child in a particular case they would also return. It was put that at 10.30am there was a

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'large' vomit, which the Sister described as 'medium to large'. Mr. Foster put it to her that at page 27 of the notes, the feed sheet, a large vomit was noted. Sister Millar said this sheet was that used for infants on bottle-feeding, she would not have used that sheet, did not who know who did, and could not explain why it was used. It was further put to her that Mrs. Ferguson had thought the child was unwell during the period the Sister had no concerns, the Sister said she would be prepared to agree with the description of Raychel as being listless.

Mr. McAllinden asked if any observation as to vomit on page 37 of the notes was out of the ordinary. The Sister said it was not normal for 'large' vomit in such cases, but was at the same time not unusual, she had seen other cases with more. Mr. Leckey felt this line of questioning was unnecessary, as it did not affect his assessment of how Raychel had died. It was therefore unnecessary for him to continue.

Evidence of Staff Nurse Rice

Staff Nurse Rice again adopted her deposition. She clarified with the Coroner that there had been no vomiting between 6.00pm and 8.00pm. The 10.30am vomit in her words was not very large though it had been described as small. The witness agreed that Raychel had appeared to be recovering, and seemed fine apart from some discomfort, was bright and alert. She specifically recalled Raychel pointing out to her the 'y' missing from her name on the chart. She said she understood that Mrs. Ferguson did not agree with that description.

Mr. Foster confirmed that Staff Nurse Rice had not been involved with the prescription of No. 18 solution. She had never come across an instance of hyponatraemia. She accepted the vomit at 10.30am had been large. She said she had not made the entries on page 27 of the notes- it was not her writing, her entries began at page 29, at 9.00am. She stated that the observations at 1.00pm on temperature and respiration had been made by nurse Rolston.

Staff Nurse Rice described Raychel as not looking pale. As Mr. Foster began to go down this road of questioning about how unwell Raychel appeared, and when, he was again stopped by the Coroner.

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The witness described starting work at 7.45am. She commented that Mr. Ferguson had been getting tea when Raychel pointed out the mistake on the chart. She noted no deterioration in the patient's condition, and she said this did not cause any concerns in her professional opinion. Again, she was aware of Mrs. Ferguson's disagreement.
With reference to the '+' system and the entries on page 37 of the notes Mr. suggested that there was a 'large' vomit at 10.00am, then two 'medium' ones. The Staff Nurse replied she had seen only one, but was aware Raychel had vomited, and that it was a 'medium' vomit from '+ +' being noted. When asked if nurse Rolston had signed for the fluids, she said she did not know, and 'maybe' it had been. As before the Corner ruled these questions could go no further as Mr. Gilliland had addressed these points.

Mr. McAllinden asked Staff Nurse Rice when it was she last saw Raychel, to which she replied that it had been about 7-8.00pm hen she was going off duty.
At this point both parents, who had been muttering throughout both nurses' evidence, shouted 'that's a lie', Mrs. Ferguson, crying, shouted 'my daughter died because of what yous did and you're lying'. Shaken, the witness began crying. Mr. Leckey strongly admonished both parents, saying they would be removed if the behaviour was repeated, specifically saying to Mrs. Ferguson that but for the fact of who she was, she would have been removed by security staff.
Mr. McAllinden asked no further questions.

<u>Evidence of Staff Nurse Noble.</u>

The Staff Nurse read her deposition with the following amendments-

- References throughout to 'committed' changed to read 'vomited'
- At page 2, paragraph 3, 'Surgical SHO' changed to read 'Surgical JHO'
- At page 4, paragraph 2, 'Staff Nurse Gillespie' changed to read 'Staff Nurse Gilchrist'

Mr. Leckey clarified that *Flagyl* was an antibiotic. Again, the witness said she was unaware of hyponatraemia. She had been a nurse for fourteen years, with four years break, ten years in total. She became involved after Sister Millar before Raychel's fit.

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She had been informed by Nurse Gilchrist of the appearance of 'coffee ground' material in the patient's vomit, she then thought an anti-emetic might be appropriate.

Mr. Foster asked the Staff Nurse if she knew the difference between saline and No. 18 solution, she replied that No. 18 solution had about a fifth the amount of sodium on it, she knew it at that time also.

Nurse McAuley (Rice) had told her Raychel had been sick, and Zofran had been prescribed. The witness was unaware of vomiting at 9.30am. When Mr. foster referred her to page 37 Mr. Leckey commented that the Nurse had stated she was unaware of hyponatraemia, and the questions depended on the witness knowing about the condition. Mr. Foster said in submission all were aware of the individual elements of the condition, but no one person put everything together.

Staff Nurse Noble had not been concerned about the vomiting as fluids were being replaced, all solutions contained saline. Mr. Foster began to ask about 'coffee ground' material, and once more the Coroner said he would not go over this again.

The witness said she was not concerned by three 'small' vomits, even up to twenty hours after surgery, she had seen patients in the same position vomit more, and this was not unusual.

Questions were not permitted regarding a what time the witness said Raychel's parents left, Mr. Leckey said this was for a civil trial if necessary.

Staff Nurse Noble said she had tried to contact by telephone Mr. Ferguson but got no answer. Nursing Assistant Lynch had informed her that Raychel was fitting, alerted by the noise she had been in the next cubicle. The Coroner again halted a question on the volume of vomit referred to in the deposition.

Mr. McAllinden had no questions.

Evidence of Staff Nurse Gilchrist

The witness read her deposition, again, as those nurses before her had, she said she had no knowledge of hyponatraemia in her personal experience, but had heard of it. It had not crossed her mind at the time. She also said she had not been concerned by the vomiting, as it was not unusual in post-operative children.

To Mr. Foster she confirmed the writing on page 37 of the notes was hers, she noted 'coffee ground, small amount x3', other references were not her writing. She did not know the length of time between vomits. The witness said one was of what she estimated to be 150ml, into a kidney shaped dish of 350-400ml capacity which happened to be on hand in the room. She agreed she had been asked to change the bed because of vomit, and agreed all vomiting should be recorded.

It was put to Staff Nurse Gilchrist that Mr. Ferguson had telephoned Mrs. Ferguson in a panic saying Raychel was very sick, she replied that Raychel had been distressed by the vomiting and nausea. The witness had thought an anti-emetic might have been appropriate, and the JHO prescribed cyclizine.

Asked whether this was the first statement she made, the Staff Nurse she had made this statement on the 10th of June, her deposition was the same. Again, questions were not permitted about dispute as to presence or absence of the parents.

It was put to the witness that there was no record of the vomit she noted at 00.35am, she said she was unaware whether it had occurred at that time or some time before. Staff Nurse Gilchrist confirmed she had not seen Raychel between 2.00am and 3.40am, she agreed no entry was made at 2.00am to suggest vomiting had taken place at 00.35am. She disagreed with the suggestion that she would be unconcerned if temperature, pulse and respiration were all normal, saying that how 'rousable' the patient appeared was also important, and that she had actually spoken to Raychel at 2.00am.

It was put that on pages 28 and 29 of the notes the last entry was at 21.15pm. The witness explained that this was a sheet used after an operation, then a patient would be moved to a four hourly observation sheet if observations were stable. She was then asked if the last entry of 'pale / flush / complaining of headache' was normal. The Coroner did not permit an answer, and Mr. Foster submitted the last entry was a critical one. Mr. Leckey agreed it might be but only in a civil trial, and there was authority to say an inquest was not to provide civil lawyers with a field day on liability issues.

Mr. Foster concluded by asking whether the witness was aware of hyponatraemia. She said she had heard of it a long time ago during her training some time from1984 to 1987, she had never seen it in practice, and it had not crossed her mind at the time.

Mr McAllinden having no questions, the Coroner rose to consider his verdict.

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VERDICT

The Coroner found that Raychel Ferguson died on the 10th of June 2001, death being caused by cerebral oedema brought about by hyponatraemia. On the 7th of June she had complained of pain, which was revealed as appendicitis. She underwent an appendectomy and postoperative observations were normal. The following day she vomited a number of times. On the 9th of June she suffered a number of tonic seizures. She was transferred to the Royal Hospital in Belfast where she died.

The hyponatraemia was caused by a combination of inadequate electrolyte replacement in the face of post-operative vomiting and water retention resulting from the inappropriate secretion of ADH.

He commented that it had been a lengthy inquest, with complex medical issues. Hyponatraemia was not widely known about. Dr. Jenkins and Dr. Sumner had described it as a 'Cinderella' area of medicine. It was most common in female children, and can have catastrophic results, including brain damage and death.

This case was the second of its kind in the last seven or eight years in Northern Ireland. It was concerning that the first child's death had not become more widely known of. Dr. Campbell (?) had set up a working party to examine practice, and a new protocol was now in place. Dr. Sumner was of the opinion that Northern Ireland was now ahead of other countries in that regard.

Mr. Leckey said he was formally writing to the Chief Medical Officer asking that the condition be brought to the attention of her counter-parts in England, Scotland and the Republic of Ireland. Doctors Fulton and Nesbitt were of the opinion the protocol might need some amendment.

Dr. Sumner had provided a very clear and understandable report, for which the court was indebted. Dr. Jenkins had also been very helpful and concurred with Dr. Sumner.

The Coroner also commented that he was grateful for the candour shown by all staff from Altnagelvin, which was essential to the inquest as it is concerned only with the facts. He was aware that certain issues were a matter of divergence in accounts for the parents. An inquest could not resolve those issues, and the Fergusons might be left with questions, but they were beyond the bounds of this hearing.

Mr. Leckey said Raychel's death was an absolutely dreadful event, for a child to die after a routine operation was terrible, the cause of her deterioration was not

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immediately apparent, though by the time she reached the Royal staff there were in no doubt as to the cause being hyponatraemia.

Mr. Leckey concluded his comments by suggesting that if any lesson emerged it was that such medical information needs to be disseminated to all medical practitioners throughout the province, and hopefully this inquest change the previous practice.

He extended his deepest sympathy to the family.

RF - ROYAL