SUPPLEMENTARY BRIEF FOR CONSULTANT PAEDIATRIC NEUROLOGIST

RAYCHEL FERGUSON

1. The Inquiry gratefully acknowledges receipt of your report (8 February 2012) on the neurological issues arising from the case of Raychel Ferguson.

2. The Inquiry understands that your report is preliminary in nature and should be considered as a 'work in progress'.

3. We note that you consider that you require the following further materials/information before you can finalise your report:

   - Raychel's GP notes
   - Her neonatal notes
   - A report from an expert in fluid balance
   - A report from a neuroradiologist
   - A report from a neuropathologist.

   GP Notes and Neonatal Notes

4. In due course the Inquiry may have need to explain to Raychel's family why it was considered necessary to obtain her GP notes and neonatal notes.

5. We understand that you will wish to consider those records in order to view her earlier history and family history.

6. It will assist the Inquiry if you could explain precisely why Raychel's earlier history and family history might be relevant to the issues which you have been asked to address. In particular it will be helpful if you could set out in writing at this stage the particular lines of investigation which may be advanced by the provision of those records.

As the severity of Raychel's vomiting was unusual for a child post-appendectomy, especially as the pathology did not demonstrate appendicitis, other causes of her vomiting, headache and acute coma should have been considered. It would have been helpful to have had the GP and neonatal notes to have known whether Raychel had any significant past medical history, e.g. of vomiting, or whether there was a family history, e.g. of metabolic conditions or early death, which might not have been elicited during an emergency admission for appendectomy.

Consultant Neuroradiologist

7. In relation to a report from a consultant neuroradiologist, you should already be in possession of such a report. The Inquiry obtained a report from Dr. W. St. C Forbes (Consultant Neuroradiologist). It is dated the 8 December 2011, and was sent to you by email by the Secretary to the Inquiry on the 20 December 2011. A further copy of this report is attached for your assistance.

Consultant Neuropathologist

8. In relation to a report from a neuropathologist we would ask you to note that the Inquiry has not sought such input to date. In the brief that we sent to you in November we identified at paragraph 134 the disciplines from which the Inquiry has sought expert reports: nursing, paediatrics, anaesthesia, surgical, and neuroradiology.

9. It will greatly assist the Inquiry if you could explain as fully as possible why it is necessary to request a report from a consultant neuropathologist, particularly in light of the findings of Dr. Forbes.

10. We note that you have indicated at paragraph 27 of your report that it is important to determine whether there was a subarachnoid haemorrhage. It appears to us that Dr. Forbes has dealt with this issue comprehensively, particularly at page 4 of his report, but if you are of the view that his report is insufficient to resolve the issue please let us know.

11. In particular if it is now necessary to obtain a view from a consultant neuropathologist, it would greatly assist the Inquiry if you could fully explain why this is indicated. It would also assist if you would be prepared to highlight the specific questions/issues which should be directed to such an expert.

I have now had the opportunity to review Dr Forbes' report and note that he does not consider that there is evidence of subarachnoid haemorrhage or venous sinus thrombosis and that, from the original instructions, there was no evidence of these conditions at autopsy. The neuroimaging and the neuropathology show severe cerebral oedema. Although other pathologies may not have been excluded, it is unlikely that a further view from a Consultant Neuropathologist would lead to a definitive diagnosis.

Expert in Fluid Balance

12. We also note that at paragraph 25 of your report, that you are of the view that an expert in fluid balance should review the urinary sodium measurement against what you refer to (in paragraph 23) as

the possibility of a metabolic problem exposed by the operation or a co-existing infection, such as a urinary tract infection.

13. You should note that the Inquiry has not to date sought a specific report from an expert in fluid balance. We have taken this approach taking into account the Inquiry's terms of reference and the fact that the findings of the post mortem which indicated that the cerebral oedema was caused by three factors (infusion of hypotonic fluids, profuse vomiting, and anti-diuretic hormone secretion) proved to be uncontroversial at the Inquest into her death.

14. You will note that late last year when you were originally briefed, we sent to you the reports of Dr. Clodagh Loughrey (Consultant Chemical Pathologist) [014-005-014], Autopsy report [014-005-006], Clinical Summary [014-005-012]. You will have noted that the conclusions of Dr. Loughrey were inserted into the Autopsy report of Dr. Herron at [014-005-013].

15. In the circumstances, it would greatly assist the Inquiry if you could fully explain why you believe that the input of an expert in fluid balance is now indicated; specify the medical discipline from which the Inquiry should seek such an opinion; and indicate the specific questions/issues which should be directed to such an expert.

Although it is possible that Raychel's severe cerebral oedema, demonstrated on CT and at autopsy, was secondary to diltuional hyponatraemia from the use of large volumes of solution 18, this diagnosis is currently more controversial than it was at the time of the Inquest and I have considerable concerns that:

1. a number of alternative causes of acute cerebral oedema were not excluded, including metabolic conditions causing hyperammonaemia e.g. ornithinine carbamoyl transferase deficiency. I have seen cases of hyperammonaemia presenting in a very similar way and I think that an alternative is more likely than dilutional hyponatraemia for the cause of Raychel's acute cerebral odema, cerebral heniation and brain death

2. the main initial cause of the hyponatraemia was loss of sodium accompanied by loss of chloride containing fluids during the severe vomiting, which is not adequately explained as a post-operative complication given that Raychel did not have appendicitis pathologically

3. once the intracranial pathology, from whatever cause, had become established, the hyponatraemia may have been exacerbated by urinary losses secondary to salt-wasting, which is commonly associated with acute cerebral disorders

Serum Ammonia and Amylase

16. At paragraph 15 of your report you say that you cannot see a serum ammonia to exclude a Reye-like illness. At paragraph 16 you say that you cannot see an Amylase to exclude pancreatitis.

17. The Inquiry needs to be clear about what you are saying in relation to these specific matters.

18. Are you saying that serum ammonia and Amylase are tests or investigations that you suspect were performed by Altnagelvin Hospital, and that you simply cannot locate the results on the notes?

19. If so, we can make a request to Altnagelvin to assist with this if that is what you are advising us to do.

20. Alternatively, on your reading of the papers, do you believe that such tests weren't performed?

I went through the available notes carefully and do not think that these tests were performed

21. If so, perhaps you could advise on the following matters:

    - Whether these are tests that should have been done.
    - If that is your opinion, please explain when the tests should have been performed.
    - Who should have performed them?
    - Why they should have been performed?
    - What were the implications of not performing them?

I think that Raychel should have had a comprehensive screen for metabolic and other causes of coma, including an ammonia, once she was transferred to the Paediatric Intensive Care Unit as this would have been standard practice at the time. This standard practice was formalised by a Delphi process of agreement between experts in the field during 2004 (Bowker et al 2006). The process was led by colleagues in Nottingham and I took part but the recommended investigations were standard in 2001.

Raychel should have had an amylase performed at Altnagelvin on 8th June in view of her abdominal pain and vomiting but I suspect this was not done because the surgeon considered that there was appendicitis as the cause, although this was not demonstrated pathologically.

Raychel's Height

22. We note that at paragraph 24 you have indicated that you have not been able to determine Raychel's height, and that this is relevant to determining whether her blood pressure was intermittently higher than the appropriate centile.

23. Please indicate whether this is an issue which the Inquiry should investigate.

24. You may have noted that the Neuropathologist at the time of conducting the post-mortem recorded that "the body is that of a child with features in keeping with that of the age of the deceased" (064-046-138).

25. If this finding is insufficiently precise for your purposes please let us know.

Although it might have been helpful to document Raychel's blood pressure appropriately against the charts standardised for height and age, I think that posterior reversible encephalopathy syndrome is a less likely diagnosis than a metabolic encephalopathy.

Further Matters

26. Finally, it would be extremely helpful for the Inquiry if you could add two further features to any further report that you produce:

    a. A 'glossary' for the purposes of explaining the medical terms that you are using;

    b. Where you cite medical findings or test results or indeed any factual matter gleaned from the materials which have been sent to you, please insert the relevant Inquiry page/document reference.

We look forward to receiving your advice and guidance with regard to the issues raised herein as soon as possible. When we have your response we can then action any necessary further investigations which you may indicate remain appropriate.

In any event we note again that your initial report is preliminary in nature and that we will receive your final report in due course.

Bowker R, Stephenson T J, & Baumer HJ 2006, "Evidence-based guideline for the management of decreased conscious level.", *Archives of Disease in Childhood-Education and Practice* no. 91, pp. 115-122.