Witness Statement Ref. No. 298/1

NAME OF CHILD: RAYCHEL FERGUSON (LUCY CRAWFORD)

Name: Moira Stewart

Title: Doctor

Present position and institution:
Senior Lecturer, Queen's University, Belfast / Consultant Paediatrician, Belfast Health & Social Care Trust

Previous position and institution:
(As at the time of the child's death)

Senior Lecturer, Queen's University, Belfast / Consultant Paediatrician (Community Child Health), North & West Belfast HSC Trust

Membership of Advisory Panels and Committees:
(Identify by date and title all of those between January 2000 - October 2012)

Chairman Paediatric Training Committee 1999-2002
Regional Advisor to Royal College of Paediatrics & children 1999-2002
Advanced Paediatric Life Support Instructor 1999-2006
External Assessor SpR Training Programme RCPI 2004 -
Regional Academic Advisor, RCPCH 2006 -
Lead Clinician (NI) Confidential Enquiry into Maternal and child Deaths - 2005 -
NI Representative on Council RCPCH 2001-2004
Principal Regional Examiner RCPCH 2006-2012
Officer for Ireland RCPCH 2007-2012
President Ulster Paediatric Society 2011-
Children and Young People's service framework- Acute and Long term conditions subgroup lead 2010-

Previous Statements, Depositions and Reports:
(Identify by date and title all those made in relation to the child's death)
Report to Sperrin Lakeland Trust on management of four clinical cases including LC -sent 26-04-2001. The review followed a request to Royal College of Paediatrics and Child Health for a general paediatrician to review clinical care provided by one consultant, to four children in Sperrin Lakeland Trust, across a range of presenting symptoms and signs.
External professional competency review of the practice of one individual - report sent to Sperrin Lakeland Trust July 2002

OFFICIAL USE:
List of previous statements, depositions and reports:

Ref:	Date:	

IMPORTANT INSTRUCTIONS FOR ANSWERING:

Please attach additional sheets if more space is required. Please identify clearly any document to which you refer or rely upon for your answer. If the document has an Inquiry reference number, e.g. Ref: 049-001-001 which is 'Chart No.1 Old Notes', then please provide that number.

If the document does not have an Inquiry reference number, then please provide a copy of the document attached

I. QUESTIONS IN RELATION TO YOUR QUALIFICATIONS, CAREER AND TRAINING

(1) Please address the following questions with regard to your qualifications, experience and occupation/post as of April 2001:

(a) State your medical and professional qualifications, and the date on which they were obtained. (CV appended)
MD Dec 1986
MB BAO BCh July 1977
FRCP July 1994
FRCPCH 1996
DCH April 1981

(b) Specify the post which you held on that date and the name of your employer. (CV appended) Senior Lecturer Queen's University, Belfast / Consultant Paediatrician North & West Belfast Health & Social Care Trust

(c) State the date of your appointment to that post, and provide a description of all of the professional posts held by you before and since that date, giving the dates of your employment in each case. (CV appended)
Date appointed February 1990

(d) Describe your role within or your association with the Royal College of Paediatrics and Child Health (RCPCH).

i) Regional Advisor (NI) RCPCH 1999-2002
Responsibility for all aspects of training of junior doctors including appointments, assessments and supervision of training programmes.
Approval of job descriptions for new and replacement Consultant Paediatric Posts in NI.
Inspection of all training posts within NI to ensure they meet training standards of RCPCH and Specialist Training Authority.

ii) NI Council Representative 2001-2004

iii) Regional Academic Advisor RCPCH. Advises on matters to do with academic training for paediatric trainees NI

iv) Examiner for MRCPCH clinical and written exams. Includes question writing, standard setting, criterion marking, participation in clinical examinations, hosting and organising clinical examinations

(2) At any time prior to your involvement in providing a report to the Sperrin Lakeland Trust (on behalf of the RCPCH) in Lucy's case, had you received any form of advice, training or education in order to inform you of the appropriate approach to fluid management in paediatric cases and if so please state,

During my undergraduate and postgraduate training I was taught the basics of fluid management in children. At undergraduate level - this was in 1975-1976 - I remember a lecture on fluid requirements in children but not the details.

As a trainee doctor, I was often responsible for prescribing iv fluids, initially to adults and then children and neonates. There was consultant supervision if needed. I do not recall formal postgraduate teaching on iv fluid prescribing except for specific conditions such as diabetic ketoacidosis. However, postgraduate examinations in paediatrics often include questions on appropriate fluid management in children so I would have prepared for these questions in my examination preparation.

However, the most detailed teaching of fluids was obtained in qualification of the Advanced Paediatric Life Support Programme (1998) and reinforced during time as APLS Instructor (Qualified in 1999)

Apart from APLS, I do not remember formal teaching on fluid balance during postgraduate training.

APLS training focuses on initial resuscitation and management of acutely unwell children, fluid balance, use of IV fluids including correction of electrolytes disturbances.

(a) Who provided this advice, training or education to you? A.P.L.S.

(b) When was it provided? See above

(c) What form did it take? See above

(d) Generally, what information were you given or what issues were covered? See above

(3) At any time prior to your involvement in providing a report to the Sperrin Lakeland Trust (on behalf of the RCPCH) in Lucy's case, had you received any form of advice, training or education in order to inform you of the issues relating to hyponatraemia in paediatric cases and if so please state,

NO

I had not received specific training on issues relating to hyponatraemia but I do try to keep updated on current topics by reading journals and attending audit meetings.

(a) Who provided this advice, training or education to you?

(b) When was it provided?

(c) What form did it take?

(d) Generally, what information were you given or what issues were covered?

(4) Prior to April 2001, describe in detail your experience of dealing with children with hyponatraemia, including the

(a) Estimated total number of such cases, together with the dates and where they took place.

Prior to April 2001, I had seen many children with hyponatraemia - i.e. as defined by sodium level less than 135 mmol/L, in day to day work.

I had also seen a number of children - I cannot even guess at figures - with sodium less than 127/128 mmol/L and at least two with severe hyponatraemia. These two children had severe underlying conditions, one had chronic renal failure and the second had haemolytic uraemic syndrome and the consultant nephrologist was on leave. Both children were treated successfully.

In other children with severe hyponatraemia, it has often been on the basis of acute severe illness such as septicaemia where the management of fluids has been as part of a team including intensivists and other specialists as required. As far as I am aware, there were no adverse incidents related to fluid administration or hyponatraemia in any of my patients, as distinct from their underlying illness.

(b) Nature of your involvement.

As paediatric SHO and Registrar - often responsible for daily fluid prescription and monitoring. Consultant level - overall responsibility, sometimes as part of team in case of seriously ill children, for prescribing and administration of IV fluids.

(c) Outcome for the children. No adverse outcomes to best of my knowledge.

(5) Since April 2001, describe in detail your experience of dealing with children with hyponatraemia, including the

Since April 2001, I have probably had similar experiences. It is not unusual for children with acute illnesses such as gastroenteritis to present with sodium levels less than 130mmol/L. I have had one baby present with sodium of 102 mmol/L, who has made a

complete recovery under my management. I am not aware of any adverse outcomes related to hyponatraemia.

(a) **Estimated total number of such cases, together with the dates and where they took place.** I cannot estimate numbers but in practice, sodium levels below 135 mmol/L and even 130 mmol/L are not uncommon in day to day practice.

(b) **Nature of your involvement.** Consultant responsibility for all children admitted under my care.

(c) **Outcome for the children.** No adverse outcomes to best of my knowledge.

II. **Questions Arising Out of the Report You Prepared for Sperrin Lakeland Trust on Behalf of the RCPCH (and Submitted on 26 April 2001)**

(6) *"I have examined the case notes of LC, including the post mortem report and the report provided by Dr. Murray Quinn."* **(Ref: 036a-025-052)**

(a) **Please confirm that your reference to *"the case notes of LC"* was a reference to the clinical notes and records to be found in the Inquiry's File 27?**

I confirm this to be so

(b) **If so, apart from Lucy's case notes, the post mortem report and the report provided by Dr. Murray Quinn, did you receive any other material or information from the Trust in relation to the condition or treatment of Lucy?**

No. There may have been a request letter but I do not have copy and cannot recall with certainty.

(c) **For the avoidance of doubt, please consider the documentation listed in the Appendix of the Review of Lucy Crawford's Case (Ref: 033-102-269) and clarify whether you received any of those documents from the Trust?**

No I did not receive these reports.

(d) **If you did not receive any of the statements or reports which had been provided to the Trust during its Review by the nurses and doctors who had been involved in Lucy's care, please clarify whether you asked the Trust to provide you with material setting out the views of those nurses and doctors? If you did not ask for material of this type please explain why.**

The initial request from the Trust was to review the case notes of 4 children with regard to any concerns about care delivered by the consultant involved in the 4 cases. I was not asked to prepare a comprehensive medical report on any individual child but to comment on overall management of the children by a general paediatrician, as documented in case notes provided by Sperrin Lakeland Trust. At the time I agreed to undertake the review, I was unaware of any details regarding diagnosis or outcome.

(7) *"She was admitted about 7.30pm in the evening and around 10.30pm an IV line was inserted and she was commenced on intravenous fluids, 0.18% sodium chloride. From the nursing notes it*

appears that venous samples were taken at this stage (blood urea mildly elevated at 9.9 mmo/L and CO2 reduced at 16 mmol/L)." **(Ref: 036A-025-052)**

(a) **How did you conclude that venous samples were taken at or around 10.30pm?**
The documentation in the medical notes is difficult to interpret. The plan at 1930 hours included bloods for FBC, U/E & glucose, CRP, blood culture but unclear whether done before the cannula inserted at 2230 hours (nursing) /2300 hours (medical). The time on the laboratory form is 20.50 so it is likely that the samples were taken independently of cannula insertion

(b) **Please refer to any document or note which supports this conclusion.**
(Ref 027-017-058)

(8) *"Intubation was carried out around 4 am but the notes in the chart state that heart rate and oxygen saturation measurements were satisfactory from the time of respiratory arrest until intubation was carried out. Around this time pupils were noted to be fixed and unresponsive."* **(Ref: 036a-025-053)**

(a) **How did you conclude that it was around 4.00am that Lucy's pupils were fixed and unresponsive?**

Medical notes – 3.30am – pupils dilated and unresponsive but time recorded in medical notes is after 5am (Ref 027-010-023) – I cannot make out exact time.

(b) **Please refer to any document or note which supports this conclusion.**

Nursing notes 4.35am pupils fixed and dilated (Ref 027-015-038).

(9) *"Lucy was probably quite ill on admission. She had been off her food for 5 days, with fever and vomiting for 36 hours and drowsiness for 12 hours."* **(Ref: 036a-025-055)**

(a) **What did you intend to convey by the phrase "*quite ill*"?**

By "quite ill", I meant that she was sicker than children with mild, self limiting viral infections.

(b) **Outline all of the factors which led you to suspect that Lucy was "*quite ill*" on admission, and refer to the particular notes and records which informed your view on this.**

History stated that she was more lethargic than usual, poor appetite for 5 days, vomiting everything, pyrexic (Ref 027-009-020). Respiratory rate was increased, pulse rate at upper limit of normal and she had prolonged capillary refill time (Ref 027-003-011).

In addition, initial blood results showed elevated CRP (inflammatory marker), white cell count (raised in infection), and urea , and reduced CO_2 (metabolic acidosis).

(c) **Did you reach a conclusion in relation to whether the illness which Lucy was suffering on admission to Hospital was the cause of her deterioration and death? If so, please**

explain the conclusion which you reached and fully explain the basis for it. If you addressed this issue in your report please highlight the relevant passages.

I did not reach conclusions as to underlying condition. History and symptoms are suggestive of infective cause, most likely gastroenteritis, leading to admission but there is limited information in notes to make definitive diagnosis. The post mortem report (Ref 027-002-004) available stated that "extensive pneumonic lesion within the lungs was important as the ultimate cause of death." Samples taken clinically (and by this I presumed before death) were positive for enterovirus PCR on a number of occasions.

(10) **You considered several possible explanations for the *"episode"* which occurred at 02.55. The second possibility which you considered was explained in the following terms:**

"She had a seizure like episode due to underlying biochemical abnormality. Initial sodium was 137 mmol/L, and potassium 4.1 mmol/L at 10.30pm. At 3.00am, and after administration of 0.18% NaCl, the repeat sodium was 127, and potassium 2.5. Biochemical changes are often well tolerated and easily corrected with appropriate fluid replacement, although these results do show a change over a relatively short period of time."

Arising out of this passage please address the following questions:

(a) **How did you conclude that it was around 3.00am that the repeat sodium was 127?**

Medical notes (Ref 027-010-022) report acute deterioration around 3am. I made the assumption that repeat bloods were checked about 3.20am (Ref 027-017-057).

(b) **Please refer to any document or note which supports this conclusion.**

Medical notes (Ref 027-010-023) report results of repeat bloods and sodium recorded as 127 mmol/L. Potassium was also low at this time and urea had fallen to within normal range.

(c) **Did you reach any conclusion in relation to whether the fluids which had been administered to Lucy could have caused the biochemical changes over a short period of time? If so, what consideration did you give to this issue and what conclusions did you reach? If you addressed this issue in your report please highlight the relevant passages.**

As I stated previously, the report was not a medical report but to provide a review of care provided by an individual consultant to 4 children in Sperrin Lakeland Trust.

(d) **Did you give any consideration to whether the fluids received by Lucy represented appropriate fluid replacement to correct the biochemical abnormality? If so, please explain the consideration you gave to this issue, and the conclusions which you reached. If you addressed this issue in your report please highlight the relevant passages.**

My report comments on change in sodium levels over short periods of time (Ref 036a-025-057).
The report details APLS guidelines for child with moderate / severe dehydration with deficit replaced with normal saline (Ref 036a-025-058).
My report (Ref 036a-025-055) details the recommendations for initial intravenous fluid management in child with degree of shock i.e. fluid bolus of 20ml/kg (normal saline, or less commonly, colloid)

(e) **Did you give any consideration to whether the fluids given to Lucy both before and after the *"seizure like episode"* could have caused or contributed to the production of the cerebral oedema? If so, please explain the consideration you gave to this issue, and the conclusions which you reached. If you addressed this issue in your report please highlight the relevant passages.**

Ref 036a-025-026 refers to electrolyte results from samples taken round time of this episode and that they were obtained after administration of Solution 18. I make extensive reference to guidelines at the time on fluid administration in a child presenting with Lucy's symptoms.

Also in the summary (Ref 036a-025-060) I comment on deficiencies in prescription and recording of volumes of fluids administered. Further interpretation was difficult due to poor documentation. However, I considered that further conclusions as to cause of death were more appropriate at inquest, when all additional information could be considered.

(11) **You provided the following advice in relation to how Lucy's fluid intake should have been managed:**

***"Given the symptoms and signs, and the prolonged capillary refill time (> 2 secs), it would be appropriate to give an immediate fluid bolus of up to 20ml/kg (N Saline, or less commonly, colloid) and then reassess."* (Ref: 036a-025-055)**

You later set out the fluid regime which ought to have been prescribed once *"shock"* had been corrected (Ref: 036a-025-058).

Arising out of that analysis, please address the following:

(a) **Please identify all of the factors which indicated to you that Lucy was in circulatory shock.**

The factors suggestion shock were -

i) Increased respiratory rate (40/min)
ii) Heart rate (140/min) - upper limit normal
iii) Prolonged capillary refill time (>2 seconds)
iv) Reduced CO_2
v) Lethargy

(b) **If you were of the view that Lucy was in shock, what advice, if any, did you give to the Trust in relation to the appropriateness of the fluid regime which Lucy received between 10.30pm and 3.00am?**

The advice to Trust was that she should have been given up to 20ml/kg N saline, or colloid (Ref 036a-025-055), as an initial fluid bolus.

(c) **Was it appropriate to treat Lucy with Solution 18 at a rate of 100 ml/hr between 10.30pm and 3.00am? Please fully explain your view, and specify the rate/type and volume of fluids which Lucy should have received during that period.**

This was a clumsy attempt to reconcile volume of fluids Lucy received from 10.30pm to 3am with recommendations for administration of IV fluids in child presenting with shock and dehydration.
Solution 18 would have been an inappropriate solution according to accepted practice at this time. Initial treatment with bolus of normal saline at 20ml/kg given over short period of time would have appropriate treatment.
Replacement dehydration (7.5%) - 750ml normal saline (estimated dehydration)
Maintenance fluid -100ml/kg over 24 hours

(d) **If it was not appropriate to treat Lucy with Solution 18 at a rate of 100 ml/hr between 10.30pm and 3.00am, please indicate whether you clearly said so in your report and refer to the relevant passages?**

I set out the APLS guidelines on fluid management (Ref 0361-025-058).
Summary (Ref 036a-025-060) states "deficiencies in prescribing and recording of volumes of fluids administered).

(12) **You carried out an analysis of the fluid regime which should have been prescribed for Lucy by reference to the APLS guidelines. You then stated:**

"The volume given, therefore, does not appear excessive. There is a debate about the most appropriate fluid to use." (Ref: 036a-025-058)

(a) **Please clarify why you calculated Lucy's fluid deficit by reference to a weight of 10kg when her weight on admission was measured at 9.14kg as shown at (Ref: 027-009-021)?**

Actual weight was recorded at 9.14kg. The reference to weight of 10kg was simply for ease of calculation. However, in assessing maintenance and allowing for dehydration, weight following rehydration is likely to be just under 10kg.

(b) **If your view was that the appropriate infusion rate was 70-80 mls/hr (based on a weight of 10kg), please explain why you reached the view that the volume of fluid given to Lucy (at a rate of 100 mls/hr) did not appear excessive?**

As I recorded earlier, I did not find it possible to work out exactly what her IV fluid input was during the time from insertion of cannula until sudden deterioration. If she had been given a fluid bolus (20ml/kg) to correct shock, she would have received 180-190ml/fluid over a short period of time. Over the next 4 hours (11pm - 3am), if she had received additional 60-70 ml/kg (maintenance and deficit) she would have received a further 240-280ml which altogether makes 440-480 ml in total. I agree that the calculations may be difficult to follow but I do not believe the volume was the major problem - given her initial presentation.

(c) **Did you give any consideration to whether the type of fluid (Solution 18) administered at a rate of 100 ml/hr to Lucy could be considered excessive? If so, what consideration did you give to this issue and what conclusions did you reach? If you addressed this issue in your report please highlight the relevant passages.**
Summary clearly states "deficiencies in prescription and administration of fluids (Ref 036a-025-060)

(13) *"After the respiratory arrest at 3.15 am, the fluids changed to N saline. The clinical notes state that 500mls were given over the next hour. A volume of 20mg/kg would be indicated in a "shock" situation, although measurements recorded at this time do not suggest circulatory compromise, and her urea had fallen to normal levels."* **(Ref: 036a-025-058)**

(a) **How did you conclude that the fluids were changed after the respiratory arrest? Please refer to any document or note which supports this conclusion.**

The medical notes (Ref 027-010-024) written at 3.20 am state that 500ml normal saline was commenced at 3.20 am. The nursing notes state that N saline was started at 3.15am to run freely (Ref 027-025-057) The fluid balance chart (Ref 027-025-062) state that 500ml normal saline was commenced at 3am but cannot work out rate.

(b) **How did you conclude that Lucy received 500 mls of Normal Saline for one hour? Please refer to any document or note which supports this conclusion.**
The medical notes state that 500ml N saline was given over 60 minutes. (Ref 027-010-057)
The fluid balance chart (Ref 027-019-062) is confusing as I cannot make out rate.

(c) **If Lucy was not in a *"shock"* situation was it appropriate to give her 500 mls of Normal Saline in one hour? Please fully explain your view, and specify the rate/type and volume of fluids which Lucy should have received after 03.00.**

It would be inappropriate to give a further fluid bolus of 500ml normal saline to a child who has had a seizure-like episode, respiratory arrest, fixed dilated pupils, increased BP (144/113) (Ref 027-023-073).

(d) **If it was not appropriate to treat Lucy with 500 ml of Normal Saline in one hour, please indicate whether you said so in your report and refer to the relevant passage.**

My report does not specifically refer to appropriateness of fluid given after respiratory arrest. The emphasis was on the events leading up to the respiratory arrest. However, the summary does state deficiencies in fluid prescription and recording and that the events which occurred about 8 hours after admission (i.e. around 3am) were likely to have been preterminal (Ref 036a-025-060). Following her acute deterioration and respiratory arrest, other consultants were involved in her management, and their care was outside remit of report requested.

(e) **Were you ever advised by the Sperrin Lakeland Trust that Lucy received 250 mls of Normal Saline between 03.15 and 04.00, before the dose was reduced to 30 ml/hr for the next two hours? If so, who advised you of this and when were you so advised?**

Not to my knowledge.

III. Questions Arising out of a Meeting Between You and Dr. James Kelly on 1 June 2001

(14) The note of this meeting records the following:

"A1-5 Capillary refill time, raised urea and C02 level point to circulatory failure. IV fluids were indicated earlier. Overall amount of fluids once started not a major problem but rate of change of electrolytes may have been responsible for the cerebral oedema. RVH ward guidelines would recommend N-saline not 1/5th normal as the replacement fluid." **(Ref: 036a-027-067)**

Arising out of this note please address the following questions:

(a) **Please confirm that the views that you expressed to Dr. Kelly are accurately recorded in this note. If not, please identify any inaccuracy, or comment on any matter which has not been adequately covered by the note.**

I met Dr Kelly. He asked me questions, took notes but I do not have copies so answers are based on recall of conversation. I presume he has a copy of answers to the list of questions he put to me.
This is a brief summary of a much longer conversation. I do remember him asking me if I really thought the electrolyte disturbances had caused the seizure (Q5) and I said an unequivocal "yes". From recall, I then went on to elaborate on guidelines for type of fluid for replacement of dehydration and for treatment of "shock". I did not use the term "RVH ward guidelines" as I always refer to Royal Belfast Hospital for Sick Children or Children's Hospital. My report to SL Trust outlines APLS guidelines for fluid management and does not mention ward guidelines.

(b) **If the note is accurate please answer the following questions:**

(i) **What did you mean when you expressed the view that the *"overall amount of fluids once started not a major problem"*?**

It was extremely difficult to work out from the notes what volume of fluid had been prescribed. I hope I have explained in my calculations. My opinion is that a volume of at most, 400ml, given to a child with evidence of shock over 4 hour period, including resuscitation, maintenance and replacement fluids would not usually be excessive - but that the exclusive use of hypotonic fluids i.e. Solution 18 led to rapid fall in sodium and resulted in acute deterioration around 3am or thereabouts.

(ii) **Please specify the fluids that you were referring to in the note (ie. were you referring to just the Solution 18, or were you also including the Normal Saline in your analysis?)**

I was referring to Solution 18, given in the hours between insertion of cannula to acute deterioration. This seemed obvious to me at time of writing the report but appreciate that it could have been more clearly set out. During my meeting with Dr Kelly, the focus was on events leading up to 3am.

(iii) **Please specify the total amount which you concluded had been given which was not a major problem, and explain why you were of the view that this overall amount did not cause or constitute a major problem?**

At the time, and now on review of the notes , I still find it impossible to determine actual volumes of fluids given, due to lack of documentation.

(iv) **What did you mean when you expressed the view that the *"rate of change of electrolytes may have been responsible for the cerebral oedema"*?**

I explained the guidelines in general use for children presenting with shock and/or dehydration, and that use of hypotonic solution 18 would not have been indicated as sole infusion fluid. I was and am aware of the problems associated with abnormal electrolyte levels in children and in particular, rapid changes in values.

(v) **Did you express this view (about the rate of change of electrolytes possibly being responsible for the cerebral oedema) in your original report for the Sperrin Lakeland Trust? If so, identify the relevant passage. If you didn't express this view, please explain your omission to do so.**

(Ref 036a-025-027) As I have explained, I was not asked to do medical report. However, when asked direct question at follow up meeting, I clearly expressed this view(Q5).

(vi) **Did you give any consideration to what might have caused the rate of change of electrolytes? If so, what consideration did you give to this issue and what conclusions did you reach?**

I felt that conclusions were more properly reached at Coroner's inquest, when all information could be considered.

(vii) **Did you provide any advice to the Sperrin Lakeland Trust in relation to what might have caused the rate of change of electrolytes. If so, what advice did you give, and when and in what form did you give that advice?**

From recall, I am fairly certain that I said that the change in electrolytes resulted from administration of Solution 18 as Dr Kelly alludes to this in his note.

IV. Questions Arising out of the Report You Co-Authored with Dr. Boon Following RCPCH External Review [036a-150-309]

(15) *"The prescription for the fluid therapy for LC was very poorly documented and it was not at all clear what fluid regime was being requested for this girl. With the benefit of hindsight there seems to be little doubt that this girl died from unrecognized hyponatraemia although at that time this was not so well recognized as at present."* **(Ref: 036a-150-312)**

(a) **Please identify all of the factors that led you/Dr. Boon to conclude that Lucy had died from hyponatraemia? If applicable, please state specifically if your conclusions were based on the content of any particular medical notes and/or information provided to you by witnesses, and identify and refer to those notes/information.**

I cannot remember details except that Dr Boon and I spent a long time discussing Lucy's case, and agreed that this statement should be included, even though we found the documentation of events following admission to be very poor and difficult to follow, and that we had not been asked to prepare a medical report on Lucy's cause of death.

(b) **Please state what particular benefit hindsight provided to you/Dr. Boon to enable you both to reach the conclusion by August 2002 that Lucy died from unrecognized hyponatraemia?**

Dr Boon and I had access to documents not available at time of initial report, and the opportunity to talk to other members of Sperrin Lakeland Trust. We discussed possible factors which might have contributed to Lucy's death but decided that we could stand over this statement.

(c) **Please explain what you/Dr. Boon meant by the phrase, "*this girl died from unrecognized hyponatraemia although at that time this was not so well recognized as at present*"?**

In particular state:

(i) **Who was the hyponatraemia unrecognized by?**
The phrase, from recall, was used in the context that, at that time, there was less awareness among general paediatricians in the UK of the potential harm associated with use of hypotonic solutions in acutely unwell children, due to lowering of sodium levels.

(ii) **At what time(s), in relation to the death of Lucy, was this hyponatraemia unrecognized?**
I cannot comment on whether the hyponatraemia was recognized during her time in Erne Hospital. As far as I can see, it was not recorded in the notes. It is recorded in the clinical summary sent from RBHSC to the pathologist but not in the postmortem commentary. I cite hyponatraemia in my report (Ref 036a-025-026) and also in my meeting with Dr Kelly.

(iii) **Why do think the hyponatraemia in Lucy's case went unrecognized?**
Please see answer to earlier questions

(iv) **What had changed between the date of Lucy's death and the date of your report (August 2002) to permit this hyponatraemia to become recognized?**
Dr Boon and I agreed that there was better awareness of hyponatraemia in general paediatric practice. From the late 1990s, and more especially in early 2000s, there have been an increasing number of published scientific papers which reported adverse outcomes associated with hyponatraemia in acutely unwell children.

(d) **Did you/Dr. Boon provide any advice to the Sperrin Lakeland Trust in relation to what might have caused the hyponatraemia which you say caused Lucy's death? If so, what advice did you give/Dr. Boon, and when and in what form was this advice given? If you/Dr. Boon did not provide that advice, please explain the omission to do so.**
The External Review was to provide report on professional concerns about clinical competency and professional performance of an individual. It was not commissioned or delivered as a medical report on Lucy's death.
The External review report does state that " more attention to detail of the fluid therapy might possibly have avoided this girl's cerebral oedema and fatal outcome"

(e) **Please explain why you were unable to reach the conclusion that Lucy had died of hyponatraemia when you submitted your first report for the Sperrin Lakeland Trust in April 2001?**

The first report was a request to carry out an examination of case notes of 4 children within SL Trust to ascertain whether there were concerns regarding care delivered by one consultant. I was very clear as to the limitations of the report and that it was NOT intended to be a medical report or an expert witness report on any of the four cases. I would not have agreed to do such reports as I am a general paediatrician and have never undertaken this role. The conclusions in the case of LC were limited by lack of additional information including her primary care notes, and clinical course following transfer to RBHSC. In addition, the lack of

documentation in Erne Hospital notes, meant that clear conclusions as to the interplay of factors leading to her death were outside the scope of the initial report. Dr Boon and I were sent additional documentation, prior to our External Review visit to Erne Hospital, when we met with other members of staff, over and above that given to me at time of initial report.

(16) Did you discuss with the Sperrin Lakeland Trust whether there was a need to report Lucy's death to the Coroner in light of the conclusion reached by you/Dr. Boon that Lucy had died from hyponatraemia? If so, please outline the nature of this discussion, any advice provided by you, and who you held this discussion with. If you did not have such a discussion please explain why not?

I asked (from recall of my meeting with Dr Kelly) about the Coroners findings as to cause of death. From memory, I was surprised that the Coroner had not requested a Coroners PM. I was aware at this time that medico-legal action by the parents was underway. At the time of External Review, Dr Boon and I were aware that legal proceedings had still not been concluded but assumed that expert witnesses were involved.

V. Other Matters

(17) Provide any further points and comments that you wish to make, together with any documents, in relation to:

(a) The cause Lucy's death;

I am aware of the conclusions reached at Coroner's Inquest by Mr Leckey in 2004.

(b) The role performed by you, the Sperrin Lakeland Trust or others when reviewing or investigating issues which touched on the cause of Lucy's death;

The role I, and then Dr Boon and I, were asked to undertake was to address professional competency issues relating to practice and care provided by one consultant in Erne Hospital. At no time were we asked to prepare a medical report on cause of Lucy's death.

(c) The procedures which were followed by you or others when reviewing or investigating issues which touched on the cause of Lucy's death;

The reviews were carried out following requests by SL Trust to RCPCH for such reviews. RCPCH clearly set out terms of reference for indemnity and for further actions once reports had been completed. The reports, once submitted, were the property of SL Trust, and SL Trust had responsibility for further actions.

(d) Lessons learned from Lucy's death and how that affected your practice;

Over the past decade, in light of Lucy's death and other reports of adverse outcomes associated with use of IV hypotonic fluids, I am much more vigilant about monitoring fluid balance and electrolytes in infants and children. In the past I would have been confident to entrust junior staff with prescription of intravenous fluids, although I still feel this is a task which they should undertake. I am also very aware of need to share all information with

parents and families, but not sure if this has changed or simply been reinforced by experiences over the years.

(e) **Any other relevant matter.**

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

Signed: **Dated:** 19.11.12

CURRICULUM VITAE

Surname:	Stewart
Christian Names:	Moira Connell
Date of Birth:	[redacted]
Place of Birth:	[redacted]
Nationality:	[redacted]
Address:	[redacted]
Marital Status:	[redacted]
Medical School:	The Queen's University of Belfast
Date of Qualification:	July 1977
Degrees (with dates):	MB, BAO, BCh (July 1977) The Queen's University of Belfast DCH (April 1981) Dublin MRCP (February 1982) London FRCP (July 1994) London FRCPCH (1996) MD (December 1986) The Queen's University of Belfast
OBE:	Awarded January 2012, New Year's Honours List
Present Appointment:	Senior Lecturer in Child Health The Queen's University of Belfast Consultant Paediatrician Belfast Health and Social Care Trust

APPOINTMENTS HELD SINCE QUALIFICATION

Hospital	Speciality/Grade	Duration of Appointment
Royal Victoria Hospital	Junior House Officer	1 Aug 77 – 31 Jul 78
Royal Victoria Hospital Mater Infirmorum Hospital	Senior House Officer (Anaesthetics)	1 Aug 78 – 31 Jan 79
Royal Belfast Hospital for Sick Children	Senior House Officer (Paediatrics)	1 Feb 79 – 31 Jul 79
Royal Victoria Hospital	Senior House Officer (Medicine)	1 Aug 79 – 31 Jan 80
Royal Belfast Hospital for Sick Children Royal maternity Hospital	Senior House Officer (Paediatrics)	1 Feb 80 – 31 Jul 81
Ulster Hospital Dundonald	Registrar (Paediatrics)	1 Aug 81 – 31 Jul 82
Altnagelvin Hospital	Registrar (Paediatrics)	1 Aug 82 – 31 Jul 83
Royal Belfast Hospital for Sick Children	Senior Registrar/Senior Tutor (Paediatrics)	1 Aug 83 – 31 Jul 84
Maternity Leave		1 Aug 84 – 30 Oct 84
Royal Belfast Hospital for Sick Children	Research Fellow (DHSS)	30 Oct 84 – 31 Jul 86
Northwick Park Hospital	Honorary Senior Registrar (Community Paediatrics)	1 Aug 86 – 31 Dec 86
Maternity Leave		1 Jan 87 – 30 Apr 87
Community Paediatrics (South Belfast)	Senior Registrar	1 May 87 – 31 Oct 88
Belvoir Park Hospital	Locum Consultant Paediatrician	1 Aug 88 – 15 Aug 88
Royal Belfast Hospital for Sick Children	Senior Registrar/Senior Tutor	1 Nov 88 – 31 Mar 89
Community Paediatrics (EHSSB)	Senior Registrar (Community Paediatrics)	1 Apr 89 – 31 Jan 90
Royal Belfast Hospital for Sick Children	Senior Tutor/Senior Registrar	1 Feb 90 – 15 Jul 90

Belfast Health and Social Care Trust Department of Child Health QUB	Consultant Paediatrician/Senior Lecturer	16 Jul 90 – Present

CONSULTANT PAEDIATRICIAN/SENIOR LECTURER (CHILD HEALTH) 1990 - PRESENT

First Consultant community paediatrician in Ireland. During past 22 years have developed community paediatrics as a specialist service with particular responsibility for children with chronic disease and disability. There are now paediatricians with community responsibility in all Health Trusts in Northern Ireland. Combined hospital/community post with acute "on-call" responsibilities to Royal Belfast Hospital for Sick Children (tertiary paediatric unit for Northern Ireland) and one hospital outpatient session per week.

Establishment of multidisciplinary child development team in North & West Belfast including links with Social Services and Education. Setting up of pre-school playgroups for children with developmental delay to support children and parents attending Child Development Clinic. Setting up additional second tier services within North & West Belfast including multidisciplinary asthma clinic, feeding clinic and behaviour clinic. Setting up of Parent-Support Group for families attending clinics. Provision of continuity of care for children with chronic disease and handicap through promotion of a combined service with hospital.

AUDIT AND RESEARCH

Active participation in combined hospital/community audit projects. Chairperson for regional audit group for Child Health System.

Lead role in community based audit programme – ongoing.

Special projects (see 'Publications')

- Factors associated with presentation of children to RBHSC. MD 1986.
- Health status of primary school entrants in North & West Belfast (Report completed – Fit for the future 1992).
- Prevalence of Asthma in schools. 1993 - 1994
- Children with mild to moderate learning disability. 1992-1994 (See Publications).
- Early detection of congenital heart disease by Child Health Surveillance (see Publications).
- Risk factors for Bronchiolitis-Supervisor for MD Thesis – Awarded June 1999.
- Childhood accidents 1992 – 1996.
- Development of Paediatric Guidelines for RBHSC and Healthcare of Children (see Publications).
- Follow up study to determine health status at 10 years in children who were intensively investigated as fetuses using Doppler umbilical artery ultrasonography – Supervisor for MD Thesis – Awarded June 2001
- Pregnancy planning and health outcomes – Supervisor for MD Thesis – Awarded June 2003
- Comparison of outcome in acutely ill children admitted to hospital with children discharged following attendance at A&E. Res project completed. (see Publications)

- Growth, learning and development study of infants who are failing to thrive. Res project completed (See publications).
- Targeted interventions to pregnant women from areas of high deprivations. Res project completed. Follow-up study underway (see Publications).
- Interprofessional Education Research Project – development of IPE within undergraduate and postgraduate curricula (see Publications).
- Effects of utero exposure to anticonvulsant monotherapy on growth and neurodevelopment. Supervisor for MD thesis - awarded 2009.
- Development of outcome measures for children attending feeding clinics (Papers accepted for International Meeting in Paris, March 2012.
- Twin Study: neurodevelopmental outcomes – ongoing.
- Numeracy skills in undergraduate medical students and children's nursing students (Completed 2011).

APPOINTMENTS

Ulster Paediatric Society (Committee)	1987-1990
Ulster Paediatric Society (Secretary)	1995-1997
Northern Ireland Committee for Hospital Junior Staff Paediatric Representative	1988-1989
Medical Paediatrics Committee of NI Postgraduate Council for Continuing Medical and Dental Education	1993-2002
Paediatric Sub-Committee of Area Medical Advisory Board	1991-1995
Examiner for DCH, Royal College of Physicians, London	1992- 1996
British Paediatric Association Steering Group – Audit of Paediatric Admissions	1993-1997
Regional Co-ordinator British Association of Community Child Health Convenor Irish Association Community Child Health	 1993-1996 1996-1998
Speciality Adviser (Paediatrics) Postgraduate Committee for Continuing Medical and Dental Education	1996-1999
Deputy Regional Adviser Royal College of Paediatrics and Child Health	1996-1999
Council Member, Faculty of Paediatrics Royal College of Physicians of Ireland	2002-2005
Regional Adviser Royal College of Paediatrics and Child Health	1999-2002
Examiner DCH (RCSI) Examiner RCPCH (Part II) – Senior Examiner.	1996-2007

Question setting,. Criterion referencing. Clinical examiner.

Instructor Advanced Paediatric Life Support	1999-2006
Chairman Paediatric Training Committee (NI)	1999-2002
Northern Ireland Representative Council RCPCH	2001 – 2004.
Secretary, Ireland Committee RCPCH	2003 – 2006
Course Co-ordinator, Health Care of Children, QUB	2003 – ongoing.
Principal Regional Examiner, RCPCH	2006 – 2012
Convenor N.I. Regional Committee, RCPCH	2006 – 2007
External Assessor SpR Training Programme. Royal College of Physicians in Ireland.	2004 – ongoing.
Regional Academic Adviser, RCPCH	2006
Lead Clinician (NI), Confidential Enquiry into Maternal and Child Deaths	2005 – 2007
Officer for Ireland, RCPCH (roles in cross-border training, research & assessment)	2007 – 2012
President, Ulster Paediatric Society	2011 - ongoing

SUPERVISOR FOR MD

MD Supervisor. Thesis awarded June 1999, QUB	1995-1999
MD Supervisor. Thesis awarded June 2001, QUB	1998-2001
MD Supervisor. Thesis awarded June 2003, QUB	1999-2003
MD Supervisor. Thesis awarded June 2007, QUB	2003-2006
MD Examiner (internal) - Theses	2004

MEMBERSHIP OF LEARNED SOCIETIES

Paediatric Research Society
Ulster Paediatric Society
Irish Paediatric Association
Royal College of Paediatrics and Child Health – Fellow
British Association Community Child Health
Royal College of Physicians (London) - Fellow

INVITED LECTURES / ARTICLES

Failure to Thrive – Regional Meeting	October 1999
Chairperson – Ulster Paediatric Society Annual Symposium	March 2000
Prospectus (Northern Ireland Paediatric Training Scheme)	NICPGME
Paediatric Medical Guidelines	RBHSC
Effects of War on Children – RCPCH Annual Meeting	April 2002
Identifying Nutritional Deficiencies in Young Children Symposium on Managing Under and Over Nutrition in Early Childhood	Europa Hotel 26 September 2002
Invited Chair Person – WHSSB. Workshop on Modernisation of Acute Services WHSSB Headquarters	10 October 2002
Paediatrics on the Peaceline – Ulster Paediatric Society Annual Symposium	March 2002
Child Growth & Development. Paediatric Dietetics General Introduction Course	September 2003
Invited Chairperson – BACCH. Symposium on Acquired Brain Injury in Children	November 2006
Invited Small Group Co-ordinator: Closing the Loop: Connecting Child Care Research Policy and Practice. IUCCR Seminar	December 2007
Invitation to be Subject Specialist Advisor for Higher Education Academy. Director HEA	December 2007
Convenor National Workshop. SimBaby in IPE	Nov 07 / 29 May 2008
Teaching Award, QUB	2007/2008
SimBaby – IPE teaching project	2005-
Commissioned commentary for CEMACH Report	April 2008
Why Children Die: A pilot study and beyond. CEMACH, Kings Hall	26 October 2008
Indian Academy of Paediatrics – Early Interventions Workshop, Ludhiana, India	October 2010

PUBLICATIONS

Stewart MC, Simpson E, Carson D. Paediatric Prescriber – Royal Victoria Hospital 1985

Stewart MC. An examination of the characteristics of a random sample of children who presented at the Royal Belfast Hospital for Sick Children and of the medical resources used in their management. The Queen's University of Belfast 1986

Stewart MC, Savage JM, Bell B, McCord B. Long-term renal prognosis of henoch-schonlein purpura in an unselected childhood population. European Journal of Paediatrics 1988 – quoted extensively at nephrology meetings and in publications.

Potts SR, Hamilton JRL, Stewart MC, Boston VE. Henoch-schonlein purpura: problems in surgical diagnosis and management. The Ulster Medical Journal October 1987; Vol 56

Stewart MC, Savage JM, Scott MJ, McClure BG. Primary medical care in a paediatric accident & emergency department. The Ulster Medical Journal April 1989; Vol 58 No 1

Stewart MC, Savage JM, Scott MJ, McClure BG. Why children attend outpatient clinics. Irish Medical Journal 1991; Vol 84 No 1

Fox K, Ranking MG, Salmon SS, Stewart MC. How schools perceive the school health service. Public Health 1991; Vol 105

Steen HJ, Stewart MC, McAuley D, Parker S. Changing trends in approach to wheezy children by family doctors. Irish Medical Journal 1992; Vol 85 No 2

Corrigan N, Stewart M, Scott M, Fee F. The predictive value of pre-school surveillance in the detection of mild to moderate learning difficulties. Arch Dis Child October 1996; Vol 74: 517-21. This was a large cohort study which has informed clinical practice.

Armstrong A, Steen JH, Stewart MC. Asthma is going undetected despite school health surveillance. Irish Journal of Medical Sciences 1996; Vol 165; Supp 4 (67) Abstract

Corrigan N, Stewart M, Scott M, Fee F. Fragile X, iron and neurodevelopmental screening in 8 year old children with mild to moderate learning difficulties. Arch Dis Paed 1997; Vol 76: 264-67

Thompson MEM, Nelson JK, McMaster C, Stewart MC, Shields MD, Ennis M. Risk factors for bronchiolitis: Presentation of an on-going prospective clinical study. Inflamm Res 46, 1997; Supp 1: 585-86

Stewart C, Stewart M, Craig C, Mulholland C. Does the current approach to screening for congenital heart disease detect it? Ambulatory Child Health 1997; Vol 3, 2: 115-20

Magee AC, Humphreys MW, McKee S, Stewart M, Nevin NC. De Novo direct duplication 2 (p12-p21) with paternally inherited inversion 2p11.2 2q12.2 Clin Genet 1998; 54: 65-69

Stewart M, Wernecke U, MacFaul R, Taylor-Meek J, Smith HE, Smith IJ. Medical and social factors involved in the admission and discharge of acutely ill children. Arch Dis Child 1998; Vol 79 No 3: 219-24

MacFaul R, Stewart MC, Wernecke U, Tyalor-Meek J, Smith HE, Smith IJ. Parental and professional perception of need for emergency admission to hospital: prospective questionnaire based study. Arch Dis Child 1998; Vol 79: 213-18

McGovern MC, Stewart MC. Drawing up clinical guidelines. Int J Clin Prac (International Journal of Clinical Practice) 1999; 53 (2): 118-21

Thompson MEM, Nelson J, Stewart MC, Shields MD, Ennis M, Stevenson MR. Cord blood basophil releasability and other risk factors for respiratory disease in infancy. American J of Respiratory and Critical Care 1999; 159 (33)

Robinson M, Savage JM, Stewart MC, Sweeney L. The diagnostic value, parental and patient acceptability of micturating cysto-urethrography. I.M.J 1999; Vol 92 (5): 366-68

Nelson JK, Shields MD, Stewart MC, Coyle PV. An investigation of the prevalence of respiratory virus infections in an infant population with a multi-antigen fluorescence immunoassay using heel prick blood samples collected on filter paper. Ped Research 1999, 45 (6): 799-02

Stewart MC. Paediatrics on the peaceline. BMJ 1999. This is important to me as it records the delivery of services to children in North and West Belfast during the difficult times of the Troubles.

Nelson JK, McMaster C, O'Hare MMT, Stewart MC, Shields MD, Ennis M. Comparison of cord blood serum cotinine concentrations and maternal smoking history. Ir J Med Sci 1999, 168 (7): 8

McGovern MC, Stewart MC, Morrison PJ, Webb D, Hawkins S. Early onset of friedreichs ataxia in a compound heterozygote. Arch Dis Child 2000; 83: 74-75

Macpherson C, Stewart MC, McClure BG, Alderdice F, Stevenson M, O'Reilly D. Pregnancy, planning and health inequalities. Arch Dis Child 2000; 82 (1)

McGovern MC, Glasgow JFT, Stewart MC. Reye's syndrome and aspirin! Lest we forget. BMJ 2001; 322: 1591-92

Stewart C, Stewart MC, Stewart F. Microgastria – Limb reduction anomaly with total amelia. Clin Dysmorphol. 2002 Jul; 11(3):187-90

Shields MD, O'Hare B, Nelson J, Stewart MC, Coyle P. Different sex ratios at birth In Europe and North America. Maternal cytomegalovirus seropositively affects sex determination. BMJ. 2002;10;325(7359);334.

Hughes J, Stewart MC. Self administration of epinephrine in children: a survey of current prescription practice & recommendations for improvement. The Ulster Medical Journal 2003; Vol 72 (2): 80-85

Bothwell J, McManus L, Crawford V, Burns G, Stewart M, Shields M. Home heating and respiratory symptoms among children in Belfast, Northern Ireland. Archives of Environmental Health 2003; Vol 58 (9): 549-553

Small F, Alderdice F, McCusker C, Stevenson M, Stewart M. A prospective cohort study comparing hospital admission for gastro-enteritis with home management. Child Care, Health and Development 2005 Sep;31(5):555-62

Morison S, Stewart M. Developing interprofessional assessment. Learning in Health and Social Care. 2005:4:4:192-202.

Sloan S, Sneddon H, Stewart M, Iwaniec D. Brest is Best? Reasons why mother's decide to breast feed or bottle feed their babies and factors influencing the duration of breast feeding. Child Care in Practice. 2006;12:3:283-297.

Stewart M. Learning in Health and Social Care. Blackwell Publishing Limited. Sept 2006. 5:3:166-167.

Stewart M, Morison S, Moriarty P. Educational Strategies for the Foundation Years: Developing Teamwork, communication and teaching. British Journal Hospital Medicine. 2006. 67:12:663-665.

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Spence D, Alderdice D, Halliday H, Stewart M. Does intrauterine growth restriction affect quality of life in adulthood. Archives of Disease in Childhood 2007;92.8: 700-704.

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Dunne L, Stewart M, Sneddon H, Iwaniec D. Maternal Mental Health and Faltering Growth in Infants. Child Abuse Review 2007;16:283-295.

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Vasantha RB, Sathyanarayama R, Stewart M, Thornbury E. Extra-adrenal retroperitoneal neuroblastoma 2009. Feb 27. www.eurorad.org/case/php?id=6899
Purdy J, Stewart M. Feeding and nutrition in infants and children – an interprofessional approach. The Clinical Teacher 2009;6:190-194.

Sneddon H, Iwaniec D, Stewart M. Prevalence of childhood abuse in mothers taking part in a study of parenting their own children. Child Abuse Review 2010;Vol 19:39-55.

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Stewart M, Kennedy N, Cuene-Grandidier H. Undergraduate Interprofessional Education using High Fidelity Paediatrics Simulation. The Clinical Teacher 2010;Vol 7:2:90-96.

Stewart M, Purdy J, Kennedy N, Burns A. An interprofessional approach to improving paediatric medication safety. Biomedical Central – Medical Education 2010:10:19

Cupples ME, Stewart MC, Percy A, Hepper P, Murphy C, Halliday HL. A RCT of peer-mentoring for first-time mothers in socially disadvantaged areas (The MOMENTS Study). Arch Dis Child 2011; Vol 96:3:252-258.

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Armstrong G, Jain S, McConnell K, Nilson L, Stewart M. The demographics and follow up of children on home artificial nutrition support in Belfast. http://irishpaediatrics.com/publications.html

Armstrong G, Stewart M. Nutritional rickets – an emerging differential diagnosis in children with faltering growth. http://ngc.ekonnect.co/NGC_522/track_244/posters.aspx?page=0

Armstrong G, Jain S, McConnell K, Nilson L, Stewart M. The demographics and follow up of children on home artificial nutrition support in Belfast.
http://ngc.ekonnect.co/NGC_522/track_244/posters.aspx?page=0

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PUBLISHED ABSTRACTS

Corrigan N, Stewart MC, McClure G, Halliday H, Reid M. Learning difficulties at seven years in SCBU babies – who should we screen? BPA, April 1992

Corrigan N, Stewart MC, Scott M, Fee F. The predictive value of pre-school Child Health Surveillance in the detection of mild to moderate learning difficulties. BPA, April 1993

Hughes J, Stewart MC, Glasgow JFT, McMillan A. Accidents in pre-school traveller's children. Abstract published from Irish Paediatric Association Meeting. November 1993

Shields MD, Stewart MC, Burns G. Survey of type of home heating and asthma symptoms in children. Lancet (The Challenge of Asthma: ISBN 0 900511 20 6; Abstracts, p77-78) Lancet Conference 1997

McGovern MC, Stewart MC, Morrison P, Hawkins S, Webb DW. Early onset of friederich's ataxia in a compound heterozygate. Dev Medicine & Child Neurology 1998; Supp No 79, Vol 40: 22

Stewart MC, Savage JM, Sweeney L. The diagnostic value, parental and patient acceptability of MCUG. Proceedings of the Paediatric Research Society. Vol 1996-1998

Thompson AJ, Gray A, Walton, Stewart MC, Doran JD, McClure BG. Arterial compliance in eleven-year-old children related to fetal doppler measurements. Proceedings of the 2nd European Meeting on Pulse Wave Analysis. October 1999

Thompson AJ, Shields MD, McClure BG, Stewart MC. Blood pressure, body mass index and skin fold thickness at age eleven related to fetal nutritional parameters (Abstract). *Ir J Med Sci 1999* (in press)

Thompson AJ, Stewart MC, McClure BG, Shields ME. Lung function at age eleven and fetal nutritional parameters (Abstract). *Ir J Med Sci 1999* (in press)

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Thompson AJ, Stewart MC, McClure BG, McConnell BA, Shields MD. Lung function at age twelve and fetal nutritional parameters (Abstract). *Pediatr Res 2000* (in press)

McConnell BA, Thompson AJ, Stewart MC, Doran JD, Hepper PG. Pulsatility index as a determinant of neurodevelopmental outcome (Abstract). *Pediatr Res 2000* (in press)

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Thompson AJ, McConnell BA, Shields MD, McClure BG, Doran JC, McMaster C, Young I, Stewart MC. Plasma homocysteine at age twelve and nutritional parameters at birth (Abstract). *Pediatr Res 2000* (in press)

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MCS/AMG/6-11-12