

**CORONERS ACT (Northern Ireland), 1959**

*Deposition of Witness* taken on **TUESDAY** the **18TH** day of **JUNE** 1996,  
at inquest touching the death of **ADAM STRAIN**, before me **MR J L LECKEY**  
Coroner for the District of **GREATER BELFAST**  
as follows to wit:-

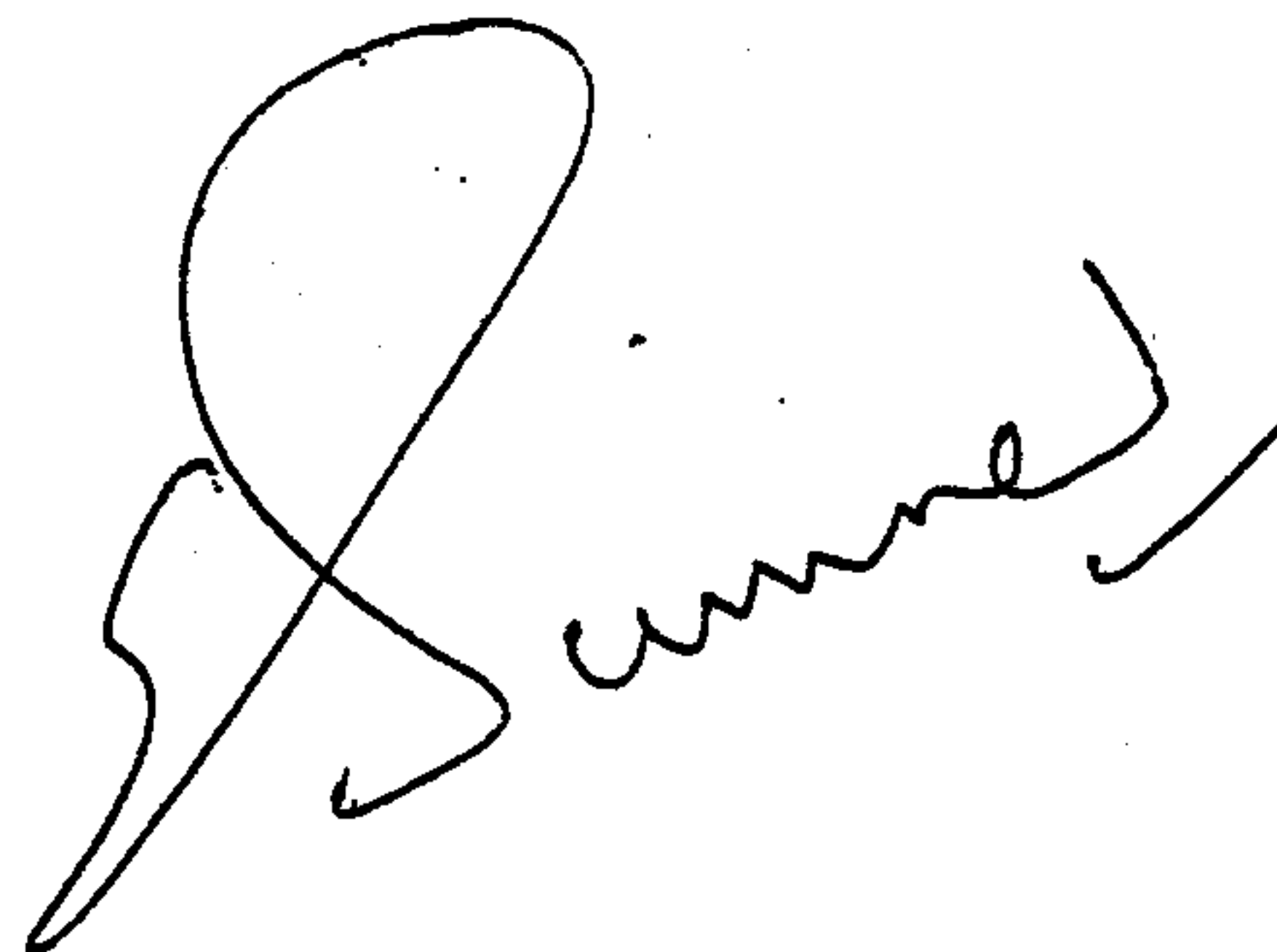
*The Deposition of* **DR EDWARD SUMNER**

of **GREAT ORMOND STREET HOSPITAL, LONDON**

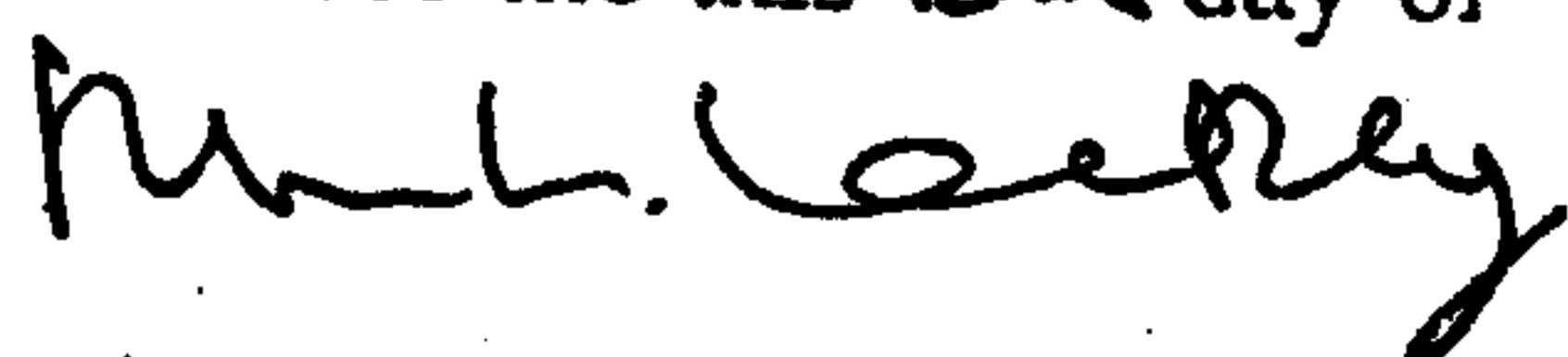
(Address)

who being sworn upon his oath, saith

I am a Consultant Paediatric Anaesthetist at the Great Ormond Street Hospital for Children NHS Trust. At the request of HM Coroner for Greater Belfast Mr J L Leckey LLM, I prepared a report on the circumstances of the death of Adam Strain which I now produce marked C3



TAKEN before me this **18th** day of **JUNE** 19**96**



Coroner for the District of Greater Belfast

CORONERS ACT (Northern Ireland), 1959

Deposition of Witness taken on the day  
of 19 , at inquest touching the death of  
before me  
Coroner for the District of

as follows to wit:—

The Deposition of DR EDWARD SUMNER

of

(Address)

who being sworn upon his oath, saith

Blood gas should have been taken or seen as Adam was on the operation table. He was a sick child but relative to other children on a renal transplant programme he was relatively healthy. I believe the mechanism for hyponatraemia in Adam would be the same as in any child. I personally have not come across a similar case — it is an extremely rare case. The brain is more sensitive to oedema than other organs. The impaired blood flow ~~to~~ from the <sup>brain</sup> head may have been contributory. I think it is impossible to say that Adam was more susceptible than a normal healthy child. Case management is extremely difficult. 123 a low reading which would require investigation.

Mr. Bringham: 123 — should not go any lower and something would have to be done about it. All fluids given contained sodium to a greater or lesser degree. With hindsight there was a problem with venous drainage which Dr Taylor could not have known about.

CORONERS ACT (Northern Ireland), 1959

Deposition of Witness taken on the day  
of 19 , at inquest touching the death of  
, before me  
Coroner for the District of

as follows to wit:—

The Deposition of Dr EDWARD SUMNER

of

(Address)

who being sworn upon his oath, saith

~~There~~ there will be an increased risk of fluid getting into the brain. Sodium is a crucial element of our body and is crucial for the maintenance of cells. Where that is absent water moves into the cells and they swell. At 123 some oedema of the kidney could be beginning. We would know of the Arrieff paper. Hyponatraemia is more difficult to diagnose during anaesthesia — it can mask the signs. I believe that without the urinary drainage problem Adam may have provided the level did not drop below 123 survived. You can survive with a reading of 123 if it does not fall further. I agree with Dr Arrieff's definition of hyponatraemia & dilutional hyponatraemia. Adam was described as polyuric — passing a lot of urine. I do not know how much he passed during the operation. This information is not routinely kept. The fluids given did not contain sufficient sodium to counteract that being lost. The need to give adequate fluid does not override the importance of sufficient sodium. The haematocrit reading together with the level



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\_\_\_\_\_, before me  
Coroner for the District of \_\_\_\_\_

as follows to wit:—

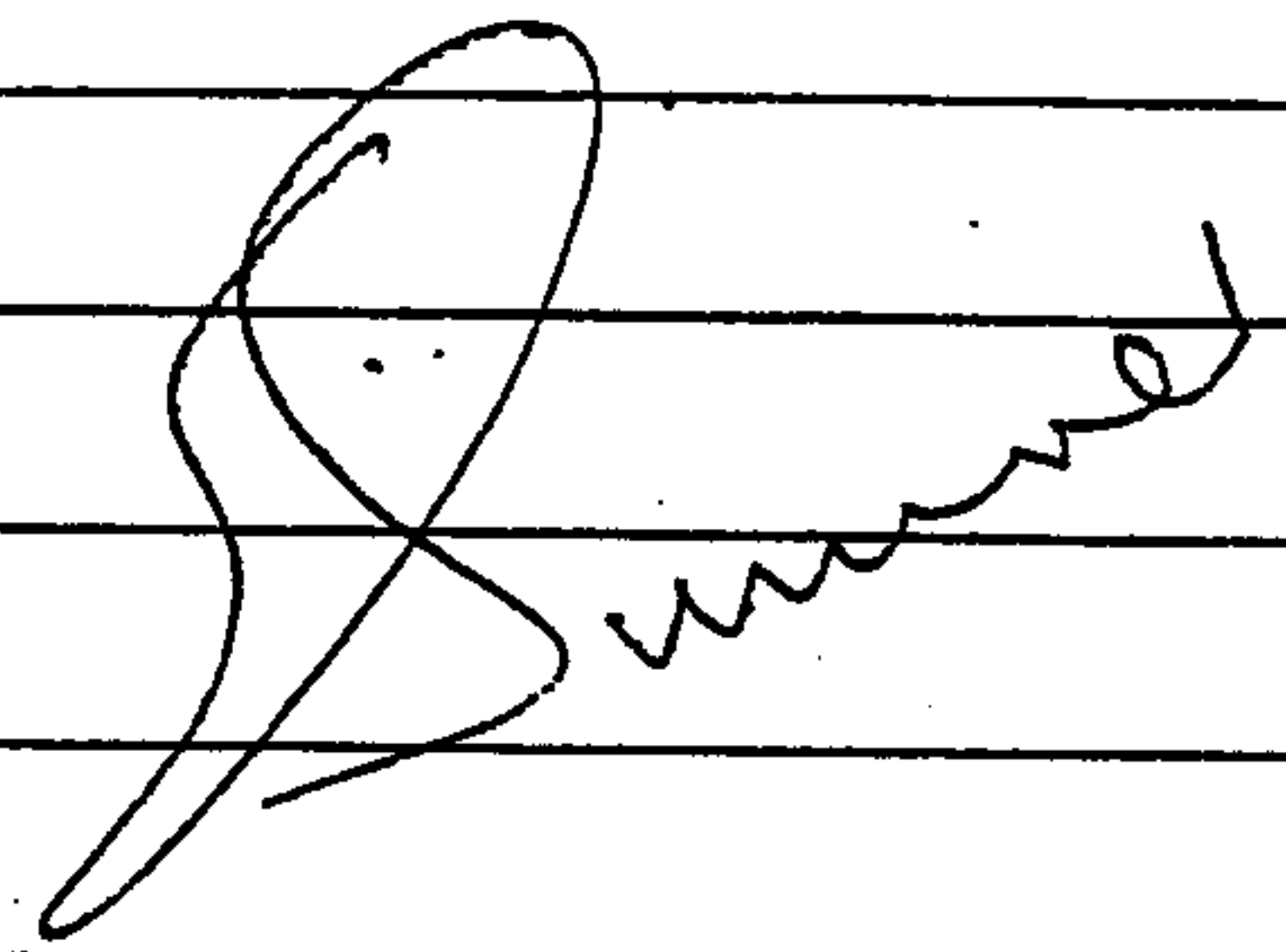
The Deposition of DR EDWARD SUMNER

of \_\_\_\_\_

who being sworn upon his \_\_\_\_\_ oath, saith \_\_\_\_\_

(Address, \_\_\_\_\_)

The low sodium was indicative of the  
hyponatraemia. Below 128 is a hyponatraemic  
state. A mortality rate of 3 in 10,000 is  
unusual.

Sumner

## TRANSCRIPTION OF DEPOSITION OF DR EDWARD SUMNER

Blood gas should have been taken as soon as Adam was on the operation table. He was a sick child but relative to other children on a renal transplant programme. He was relatively healthy. I believe the mechanisms for hyponatraemia in Adam would be the same as in any child. I personally have not come across a similar case - it is an extremely rare case. The brain is more sensitive to oedema than other organs. The impaired blood flow from the brain may have been contributory. I think it is impossible to say that Adam was more susceptible than a normal healthy child. Case management is extremely difficult. 123 a low reading which would require investigation.

Mr Brangham: 123 - should not got any lower and something would have to be done about it. All fluids given contained sodium to a greater or lesser degree. With hindsight there was a problem with venous drainage which Dr Taylor could not have known about.

Miss Higgins: One member of the anaesthesia team would see the parent in Gt Ormond Street before surgery to take a full history. That could include any problem with sodium deficiency. Parents are very knowledgeable and a good source of information. Putting lines in is a highly skilled business and Adam's chubbiness would have made that more difficult. Normally we go to the right first but I cannot criticise what Dr Taylor did. HE had to get a line into the upper part of the body, not the groin. Turning the head may have occluded the external jugular vein. Drainage may have been impaired without one knowing it, though you might have guessed that the drainage was normal. I always have the patient's head to one side. Arterial blood is used for blood gases and electrolytes. The venous line has three lumens for giving volume (blood, plasma) for continuous measurement of CVP and for infusion of drugs. It is not interrupted. Blood gases are measured by a machine or at the lab (the latter would be slow - an hour perhaps). In complex surgery I do blood gases at the beginning, the middle and the end. In this case they were not taken at the beginning. Length of the operation determines the frequency of doing this. In a 6 hour operation - 4 sets; 4 hours - 3. If sodium falls below 128 that is hyponatraemia and there will be an increasing risk of fluid getting into the brain. Sodium is a crucial element of our body and is crucial for the maintenance of cells. Where that is absent water moves into the cells and they swell. At 123 some oedema of the tissues could be beginning. We would know of the Arieff paper. Hyponatraemia is more difficult to diagnose during anaesthesia - it can mask the signs. I believe that with out the venous drainage problem, Adam may have survived provided the level did not drop below 123. You can survive with a reading of 123 if it does not fall further. I agree with Dr Armour's definition of hyponatraemia and dilutional hyponatraemia. Adam was described as polyuric - passing a lot of urine. I do not know how much he passed during the operation. This information is not routinely kept. The fluids given did not contain sufficient sodium to counteract that being lost. The need to give adequate fluid does not override the importance of sufficient sodium. The haematocrit reading together with the low sodium indicated not enough red cells being given and relatively insufficient sodium. All the fluids given after dialysis may have been given to increase central venous pressure. It may have had the effect of causing the dilution of the sodium in the body. Fluid balance in paediatrics is a very controversial area with a variety of views. With kidney transplants one gives more fluids than in other operations. When the new kidney is perfused it is vital that sufficient fluids are available. I got the impression that Dr Taylor was not believing the CVP readings he was getting. I believe they were probably



correct but high. I think I would have believed them. A high CVO can mean too much fluid has been administered. In a child it is very distensible. That in turn increases blood volumes. Once that was apparent the rate of infusion of fluids could be slowed as a different fluid given. Also, I would have transfused the child with red blood cells. Last CVP reading was taken just before 11.30. Monitoring was continued in ICU. Swelling can occur very quickly - perhaps within an hour. Sometimes with relatively small amounts of fluid. I do not look out for swelling intra-operatively due to the drapes. It is not so easy to determine intra-operatively. Swelling of the brain can be independent of swelling of the face. They may be connected. The low sodium was indicative of the hyponatraemia. Below 128 is a hyponatraemic state. A mortality rate of 3 in 10,000 is unusual.