

IN THE CORONERS COURT
OF VICTORIA
AT MELBOURNE

Court Reference: 1611/2010

FINDING INTO DEATH WITH INQUEST

Form 37 Rule 60(1)

Section 67 of the Coroners Act 2008

Inquest into the Death of: Emilie Suzanne Le Coz

Delivered On: 22 October 2015

Delivered At: 65 Kavanagh Street
Southbank 3006

Hearing Dates: 18-21 November 2013, 16 December 2013 and 23 March 2014.

Findings of: PETER WHITE, CORONER

Representation: Jacinta Forbes SC for Deen Le Coz
Christopher Winneke of Counsel for Alfred Health.

Police Coronial Support Unit S/C John Kennedy

I, PETER WHITE, Coroner having investigated the death of EMILIE SUZANNE LE COZ

AND having held an inquest in relation to this death on 18, 19, 20, 21 November 2013, 16 December 2013 and 23 March 2014

at Melbourne

find that the identity of the deceased was Emilie Suzanne Le Coz

born on 29 April 1979, aged 31

and the death occurred on 30 April 2010

at the Alfred Hospital, 55 Commercial Road, Melbourne, Victoria

from:

1 (a) RAISED INTRACRANIAL PRESSURE

1 (b) VENTRICULOPERITONEAL SHUNT DYSFUNCTION

in the following circumstances:

1. Emilie Suzanne LeCoz (Emilie) was a 31-year-old woman who lived with her mother, Deen LeCoz, (Deen). Emilie was born on 19 April 1970 and was eight weeks premature.¹ Emilie was diagnosed with hydrocephalus and cerebral palsy and she had a ventriculoperitoneal shunt² (the shunt) inserted at three weeks of age.³ Deen reported that Emilie was a happy child who attended a normal primary school and secondary school. On completion of her schooling, she studied a business course at TAFE and completed a medical secretary course. She found work at an organisation called SCOPE where she worked part time.⁴
2. Emilie lived with her mother until her death. She used walking sticks to move over short distances and a wheel chair to mobilise over longer distances but she was an independent person.⁵ In 1993 she underwent a shunt revision at the Royal Children's Hospital. This procedure was performed by Consultant neurosurgeon, Mr Geoffrey Klug. Emilie had not seen a neurosurgeon since 1996.
3. In November 2009, Deen noticed that Emilie's behaviour began to change and that her memory was becoming poor. On 26 December 2009, she suffered from what her mother described as an incapacitating headache. Emilie refused to go to the doctor until 29 January 2010. The doctor failed to find evidence that the headache was related to the shunt, but made a referral to the Alfred Hospital Neurological Outpatient Clinic⁶. Emilie's headaches continued. An appointment was made for 19 February 2010 however when that day came, Emilie refused to attend the appointment.

¹ Letter of Deen Le Coz dated 14 November 2013.

² The VP shunt consisted of a ventricular catheter running from the ventricle in to a valve situated in the burr hole. A separate catheter was joined to the valve and ran from the valve down Emilie's neck and ended in the peritoneal cavity.

³ Ibid.

⁴ Ibid.

⁵ Ibid.

⁶ See GP referral at p115 of the Inquest brief.

4. On 14 March 2010, Deen called an ambulance to take Emilie to hospital due to her ongoing headaches and her refusal to attend appointments. She was taken to the Alfred Hospital and admitted under the neurology team. A CT, an MRI and x-ray shunt series were conducted, along with a Cerebral Spinal Fluid (CSF) shunt flow function test. The neurology team concluded that the cause of Emilie's headaches was migraine. They considered that the shunt was functioning correctly and she was discharged. (I set out the details of this admission and discharge below).
5. The discharge plan included a plan to have her reviewed by her former neurosurgeon, Mr Klug and a referral to neuropsychology and the neurology outpatient clinic.
6. The medical records indicate that on 23 March 2010, Emilie was taken back to the Alfred by ambulance.⁷ The Alfred medical records notes that Emilie had been experiencing ongoing headaches, she looked well but said pain was 8/10.⁸ She was seen by social work and by neurology. The on patient progress note states,

same pattern of headache, and large anxiety overlay.⁹

She was given pain relief and discharged on the same day.¹⁰ At this time Deen states that she re-iterated that she believed there was something seriously wrong which she wanted identified and treated,

but again the hospital maintained that it was stress or migraine. I felt that they thought I was making a fuss.¹¹
7. Mr Klug, on receiving the discharge summary from 19 March 2010, called Dr Susan Walker, the HMO who prepared the discharge summary and informed her that he no longer practised. He expressed his concern that the MRI scan could suggest raised intracranial pressure and that the matter needed to be investigated with some energy.¹² An appointment was made for Emilie to attend the neurosurgery outpatient clinic at the Alfred in two to three weeks time. Emilie attended the neuropsychology appointment on 12 April 2010.¹³ However, she did not attend the neurosurgical out-patients clinic for the appointed review on 27 April. On the day prior Emilie had been unwell with a headache and Deen rang the hospital to reschedule the appointment.¹⁴ According to Dr Walker, a new appointment was then made for 5 May.¹⁵
8. On the evening of 29 April 2010, Deen became increasingly concerned about Emilie and asked a friend, a former nurse, to come over. Deen noticed that Emile had

⁷ IBp184.

⁸ IB p189.

⁹ IB p190.

¹⁰ IB p189.

¹¹ IB p 32.

¹² Mr Klug could not himself recall if he described the matter as 'urgent'. See transcript 160 line 26, but according to Dr Walker he gave the impression that it was a serious problem but, 'he certainly didn't say that she needs to come to the emergency department today or tomorrow'. See transcript page 222-223.

¹³ See Neuropsychological report at page 118 of the Inquest brief, Exhibit 12. See further discussion from paragraph 101 below.

¹⁴ See exhibit 2(a) paragraph 8.

¹⁵ See exhibit 12 page 38.

stopped breathing on occasion and was also incontinent.¹⁶ Deen called an ambulance in the early hours of 30 April 2010. When the paramedics attended, the decision was made to delay transferring Emilie to hospital until the morning. On the morning of 30 April at about 8am, another ambulance was called and Emilie was taken to the Alfred Hospital.

9. Emilie was placed in the short stay area of the ED. At approximately 3.55pm she suffered a cardiac arrest and staff commenced cardiopulmonary resuscitation (CPR). CPR continued for approximately 10 to 15 minutes before her pulse spontaneously returned. A CT scan was performed that showed findings consistent with hypoxic brain injury. Emilie was transferred to the Intensive Care Unit where treatment was withdrawn. She passed away at approximately 10.25 pm that evening, with her mother at her side.

MEDICAL INVESTIGATION

10. Dr Julie Teague, Forensic Pathologist at the Victorian Institute of Forensic Medicine (VIFM), performed a post mortem medical examination. Dr Teague provided a report detailing her findings at post mortem.¹⁷ Dr Teague tested the shunt and noted that:

The intracranial portion of the shunt, drained freely when disconnected from the reservoir. The reservoir of the shunt decompressed and refilled on the application and release of the pressure.

The tubing running from the reservoir down the neck, right chest and into the abdomen allowed fluid to flow through the components when tested in isolation, (ie the tubing from the neck/chest/abdomen tested separately).

The end of the tubing sat freely in the anterior abdomen without obvious compression, kinks or knots.

The peritoneal cavity did not contain any free fluid.¹⁸

11. The post mortem examination revealed significant neuro-pathological changes of raised intracranial pressure and herniation of the cerebellar tonsils and uncus. Dr Teague commented that there was a displacement of the extracranial portion of tubing, which had become disconnected from the valve that,

has uncertain significance with regard to the mechanism of death.¹⁹

12. Dr Teague concluded that the cause of Emilie's death was 1(a) intracranial pressure and 1(b) ventriculoperitoneal shunt dysfunction.²⁰

13. Dr Christopher O'Donnell, forensic radiologist at the (VIFM) provided a report of his review of post mortem radiography.²¹ Dr O'Donnell reviewed the ante mortem imaging conducted at the Alfred Hospital on 14 March 2010 and 30 April 2010 and compared it to the post mortem imaging conducted at VIFM. Dr O'Donnell noted that:

In the interval between CT scans of 14/03/10 and 30/04/10, there has been a dramatic change in appearances of the brain with features indicative of brain swelling developing in that interval.

He further stated that:

¹⁶ The medical notes from 30 April 2010 noted that Deen had observed Emilie losing consciousness. Deen did not agree with this in her oral evidence, and insisted that she noticed Emilie had stopped breathing.

¹⁷ Dr Julie Teague, Medical Examination Report dated 13 July 2010, Inquest brief page 1.

¹⁸ Ibid page 12.

¹⁹ Ibid page 13

²⁰ Ibid page 12.

²¹ Dr Christopher O'Donnell, Radiography report, inquest brief page 24.

There are only 2 possible causes for this interval change. i.e (1) blockage of the right lateral ventriculo-peritoneal shunt tube causing the ventricular CSF pressure to rise or (2) development of a diffuse pathological process in the brain parenchyma that has caused it to become swollen.²²

14. Dr Teague consulted with Dr O'Donnell and reported that,
Later discussions with consultant radiologist Dr O'Donnell have identified the extracranial portion of tubing which connects the valve apparatus to the peritoneal cavity has become displaced, leaving a gap where the tubing is not continuous. There is fluid filling the tract where the tubing should have been situated. This is visible on pre and post mortem imaging.²³
15. The post mortem CT scan that was attached to Dr O'Donnell's statement clearly shows the peritoneal catheter tube stopped at the C4 vertebrae.²⁴
16. On the basis of Dr Teague and Dr O'Donnell's reports and all of the rest of the evidence and in the absence of contradictory evidence, I find that the cause of Emilie's death was raised intracranial pressure (ICP), in the setting of ventriculoperitoneal shunt dysfunction.

CORONIAL INVESTIGATION

17. Emilie's death was reported to the Coroners Court of Victoria by the Alfred Hospital. The primary purpose of a coronial investigation in to a reportable death²⁵ is to ascertain if possible, the identity of the deceased, the cause of death (interpreted as the medical cause of death) and the circumstances in which the death occurred.²⁶
18. Coroners can comment on any matter connected with the death, including matters relating to public health and safety or the administration of justice.
19. As part of my investigation, I caused the Coroner's investigator, Senior Constable John Kennedy to compile an inquest brief. That brief contains statements from the medical staff involved in Emilie's care, post mortem medical investigation reports and medical records. Deen also sent letters to the Court outlining her concerns about the circumstances of Emilie's death that I have included in the inquest brief. As a result of Deen's concerns, I determined to hold an inquest into Emilie's death. The issues explored at inquest were:
 - a. Emilie's hospital admission between 14 March 2010 and 19 March 2010 (the March admission).
 - b. Alfred medical staff's interpretation of CT, MRI and x-rays, and the shunt flow study and the reports accompanying these scans.
 - c. The appropriateness of admitting Emilie under the neurology team, rather than the neurosurgery team.
 - d. The appropriateness of Emilie's discharge from the Alfred.

²² Ibid page 26.

²³ Dr Teague, Medical Examiners Report page 12.

²⁴ Exhibit 3g

²⁵ Section 4 of the *Coroners Act 2008* (Vic) requires certain deaths to be reported to the coroner for investigation. Apart from a jurisdictional nexus with the State of Victoria, the definition of a reportable death includes all deaths that appear 'to have been unexpected, unnatural or violent or to have resulted, directly or indirectly, from accident or injury'. Emilie's death falls within this definition.

²⁶ *Coroners Act 2008* (Vic) s 67.

20. I note that at the commencement of the inquest, I accepted that it was not unreasonable for the doctors on 30 April 2010 to rely on the documentation and diagnosis from the 14 – 19 March admission in forming an initial opinion as to Emilie’s presentation at that time. The March admission therefore became the focus of my investigation.
21. This finding is based on the totality of the evidence before me comprising of the inquest brief, oral testimony and exhibits tendered at inquest.

Deen Le Coz

22. In late 2009, Deen started to notice that Emilie was complaining of a headache, that her memory had deteriorated and that she was repeating herself.²⁷ On 26 December 2009, Emilie was so incapacitated by her headache that she could not get out of bed.²⁸ Between December and March, Emilie had an underlying headache constantly, that fluctuated between her being able to function reasonably well and at other times being unable to function at all.²⁹
23. Deen further stated that Emilie would sometimes refuse to go to an appointment because she was terrified of doctors testing her shunt.³⁰ Emilie could not bear anyone touching her shunt.³¹ When Deen contacted the ambulance on 14 March 2010, Emilie was reluctant to go to hospital.³²
24. Deen had a belief that something was not right with Emilie’s shunt.
25. Deen found that while Emilie was in hospital during the March admission, that there was no consultation with her about whether she thought there may have been a shunt malfunction.³³ She stated that she did not get to speak to any senior doctors and mostly dealt with Dr Walker, a doctor whom she described as very good.³⁴
26. In relation to the discharge plan, it was not her recollection that she was required to contact Mr Klug to make an appointment.³⁵ In any event, the hospital became aware that Mr Klug was no longer practicing. An appointment was then made for the Alfred hospital neurosurgery clinic.
27. After Emilie was discharged, her headaches continued.³⁶ Between her discharge and 30 April 2010, Emilie displayed symptoms including a lack of strength in her legs and on several occasions did not make it to the bathroom.³⁷

²⁷ T15:3-7.

²⁸ T15:8-12.

²⁹ T15:19-21.

³⁰ T15:22-31. See also the evidence of Professor Storey referred to below at concerning this matter

³¹ T16:7-8.

³² T18:12-14.

³³ T17:3-5.

³⁴ T 59: 25

³⁵ T61:26-28, T64:16-20. Deen had a recollection of speaking to Mr Klug via phone during Emilie’s March admission. I note however that Mr Klug who was acting on the basis of his receipt of Emilie’s discharge note, did not recall this to be the case.

³⁶ T23:30-T24:1.

28. On 23 March 2010, Deen called an ambulance again to take Emilie to hospital but on arrival Emilie's headache appeared to have improved.³⁸
29. On 12 April 2011, Deen took Emilie to see the neuropsychologist and Emilie was well that day. They returned to the hospital on another day to get the outcome of the tests.³⁹ Deen recalled taking the CT scans from 1990 and 1993 to Dr Walker once she had located them.⁴⁰
30. Deen followed Emilie to hospital on 30 April 2010. She sat with Emilie and held her hand. She recalled that Emilie was in severe pain⁴¹ and that she had to assist Emilie to take a tablet.⁴² Deen stepped out of the short stay unit in the afternoon and returned to find Emilie in cardiac arrest.

Dr Susan Walker

31. Dr Susan Walker was employed by the Alfred Hospital from January 2010 as a neurology Hospital Medical Officer (HMO). This was her first rotation and she was the junior member of the neurology team.⁴³ Dr Walker gave evidence that as a junior HMO she was not expected to manage the patient in isolation, and that she would consult with more senior members of her team.⁴⁴
32. Dr Walker first became involved in Emilie's care on 15 March 2010 when she saw her on the morning ward round with neurology registrar Dr Marco Fedi.⁴⁵ Dr Walker noted that Emilie had presented to the ED on the afternoon of 14 March 2010. The ED intern had noted in the medical records that Emilie was experiencing recurrent headaches, but no nausea, vomiting, visual changes or weakness, symptoms of raised ICP. She discussed Emilie with the neurology registrar on call who requested a CT brain scan. That scan was performed on 14 March 2010 at 2240 hrs. The CT brain scan was reported as showing:
- Communicating hydrocephalus with VP shunt in situ, consistent with history. No previous studies available to assess interval change, otherwise no evidence of acute intracranial abnormalities.⁴⁶
33. The night HMO had also reviewed Emilie and noted that the headache was not particularly worse in the morning and that there were no changes in gait or focal neurological defects.⁴⁷ The working diagnosis of the night HMO was that Emilie's

³⁷ T24:26-T25:3.

³⁸ T26:14-16. See contrary views concerning her overall condition following her discharge on both 19 and 23 March, from Emilie's mother, Deen, discussed at paragraph 28 above.

³⁹ T52:26-31.

⁴⁰ T53:30.

⁴¹ T70:30-31.

⁴² T73:5-12.

⁴³ T200:1, Dr Walker gave evidence that this was her first rotation. Dr Walker also gave evidence that she could not recall having dealt with someone with a VP shunt specifically before Emilie. T 201:4-6

⁴⁴ T205:5-7

⁴⁵ Statement of Dr Susan Walker, inquest brief page 34.

⁴⁶ IB page 209, exhibit 3(i)

⁴⁷ Changes in gait and focal neurological defects would indicate raised intracranial pressure.

headaches and change in mental state may have been due to hydrocephalus, but there was no evidence of acute shunt blockage. The neurology team was to assess her in the morning.⁴⁸

34. When Dr Walker first reviewed Emilie on 15 March 2010, Emilie reported recurrent frontal headaches and short-term memory impairment, with her current episode of headache lasting one week.⁴⁹ Again, it was noted that Emilie did not have a fever, neck stiffness, nausea or vomiting, visual symptoms, new focal neurological deficits and the headaches were not worse in the morning. The absence of these symptoms in the neurology team's view, pointed to a diagnoses of migraine rather than raised ICP due to shunt malfunction.
35. Dr Walker reviewed Emilie later that morning with Professor Storey (neurological consultant and the most senior doctor involved in Emilie's care). Emilie displayed normal eye movements and on ophthalmoscopy, there was no papilloedema.⁵⁰ Papilloedema and abnormal eye movements are indicators of raised ICP. They also reviewed the CT brain scan from the previous day.
36. A plan was formulated for Emilie to undergo an MRI brain scan and neurosurgical review. Deen was also asked to bring in Emilie's previous CT scans so that they could be compared to the 14 March 2010 scan.⁵¹ (I note that Deen was unable to find any previous scans at home but did subsequently find scans that were provided to Dr Walker, after Emilie's discharge. The previous scans were therefore not available for the treating doctors to compare to any of the investigations undertaken during the March admission).
37. At 1120 hours, on 15 March 2010, Dr Walker requested a neurosurgeon to review Emilie in relation to possible shunt malfunctioning. As a result, neurosurgical registrar Dr Rebecca Limb reviewed Emilie later that day. Dr Limb recommended that a CSF flow scan shunt study (shunt study) be performed and x-ray of the shunt to check the catheter position. Dr Walker booked these procedures.
38. On 16 March 2010, Dr Walker reviewed Emilie at 8.30 hrs with Professor Storey. Dr Walker recorded that Emilie looked well and was afebrile with normal observations.⁵² Professor Storey considered that Emilie's headache was likely to be due to migraine rather than secondary to shunt blockage.⁵³ Propanolol was commenced as migraine treatment. Dr Walker stated that they continued to consider the possibility of a shunt problem and discussed with neurosurgery the possibility of an MRI.⁵⁴ Emilie was also referred for psychiatric review.
39. That afternoon, Dr Walker recorded the out come of the x-rays of the skull, cervical spine, chest and abdomen as,
reported no break in the tubing but cannot really be seen in skull films.⁵⁵

⁴⁸ Statement of Dr Susan Walker, inquest brief page 34. I note that Emilie was admitted under the neurology team, not the neurosurgical team.

⁴⁹ Ibid page 35

⁵⁰ Papilloedema is a marker of raised intracranial pressure.

⁵¹ Statement of Dr Susan Walker, inquest brief page 34.

⁵² Statement of Dr Walker, IB p35

⁵³ Statement of Dr Walker, IB p35

⁵⁴ Statement of Dr Walker, IB p35

⁵⁵ T199:3-10 I note that Dr Walker amended her statement in the witness box to reflect this wording.

40. The x-ray report of the skull stated:

A burr hole is seen in the cranial vault in the right occipital region. No tubing can be identified in this burr hole site or in the soft tissues posterior to or inferior to the burr hole. In the lower aspect of the image a small calibre tube can be seen passing from the thoracic region to the lower right side of the neck but this cannot be followed in continuity to the level of the burr hole. The tube in the right side of the neck has its proximal extremity at C4-C5 disk level.⁵⁶

41. Dr Walker gave evidence that she was more concerned with looking for a break or a kink in the tubing rather than having an appreciation for a disconnection⁵⁷ and that she did not think that she would have understood about a disconnection.⁵⁸ She further stated that she could not recall if she actually looked at the x-ray images, as they would not have meant much to her, and was instead reading the report prepared on those images.⁵⁹

42. Dr Walker further stated that the management decisions surrounding the reports were the responsibility of the registrars. If they had difficulties, they would escalate the issue to the consultant, Professor Storey,⁶⁰ but she was unsure as to who had ultimate responsibility to make decisions about the x-rays.⁶¹ Dr Walker did not dispute that the team that sought the report would be responsible for formulating the response to that information.⁶²

43. On the basis of the evidence above, I am satisfied that Dr Walker did not have the relevant experience to properly assess the x-ray series images or the reports, and I also accept that she did not have a decision making role in Emilie's care.

44. On 17 March 2010, Dr Walker attended on Emilie on the morning ward round with Dr Fedi. She noted that Emilie's headaches were improving and that she was awaiting her shunt study and MRI brain scan.⁶³ The shunt study was performed that afternoon.⁶⁴

45. On 18 March 2010, Dr Walker's involvement with Emilie was limited to attending on her during morning ward round. Dr Walker noted the results of the previous day's shunt study that indicated the shunt was functioning properly. Emilie was also noted to have ongoing mild headache.⁶⁵

46. The CSF flow study report stated:

These demonstrate normal flow from the reservoir to the abdominal cavity thereby demonstrating a patent ventriculoperitoneal shunt.

CONCLUSION: normally functioning ventriculoperitoneal shunt from the shunt reservoir to the abdominal cavity.⁶⁶

⁵⁶ Exhibit 3A

⁵⁷ T209:14-19.

⁵⁸ T209:24-26.

⁵⁹ T210:11-15.

⁶⁰ T213:13-17.

⁶¹ T214:3-6

⁶² T214:31

⁶³ Statement of Dr Walker, IB p36

⁶⁴ T207:28

⁶⁵ Statement of Dr Walker, IB p36

⁶⁶ Exhibit 3i

47. On 19 March 2010, Dr Walker saw Emilie during ward round, with Professor Storey. Emilie stated she was feeling well with minimal headache, was afebrile and had stable blood pressure and heart rate. Dr Walker recorded (from Professor Storey), that Emilie was due to have her MRI brain scan, after a review of which, if there were no concerns she could be discharged.
48. The MRI was performed at approximately 10 am on 19 March 2010. The MRI report contained the comment:
- Partial callosal dysgenesis. Hydrocephalus associated with transependymal oedema and posterior fossa compression with 12mm cerebellar tonsil herniation despite VP shunt, suggestive of shunt obstruction.⁶⁷
- The underlining is mine.
- Dr Walker further stated that,
- I recall that I discussed these findings with either Dr Fedi and /or Professor Storey and that the assessment was made that these findings were likely to be chronic. I record (sic) this assessment in Ms Le Coz's discharge summary.⁶⁸
- The decision that Emilie was suitable for discharge was made by the neurology team.⁶⁹ Dr Walker herself signed the discharge note, which (relevantly) incorporated the MRI report and the reference to shunt obstruction set out above. As above Dr Walker recalled discussing the MRI findings with Dr Fedi, who in turn possibly discussed it with Professor Storey,⁷⁰ and the assessment was made that the findings on MRI were likely to be chronic.⁷¹
49. Dr Walker prepared the discharge plan timed at 19.58, and noted that Emilie was to undergo outpatient neuropsychology assessment, neurology outpatient clinic follow up in relation to propranolol as a migraine prophylaxis in the next 6 to 8 weeks and neurosurgery follow up in the next few months with Mr Klug, at the Children's Hospital, (who had performed the shunt revision in 1993).⁷²
50. The discharge report noted that the shunt tubing was intact. Dr Walker stated in evidence that this entry in the discharge report, in hindsight, was not in fact correct.⁷³ Dr Walker further recorded that the MRI report was attached to the discharge note with the changes present felt to be chronic, in the light of the earlier CSF result.

⁶⁷ Exhibit 3(T) and same document at page 261 (I B).

⁶⁸ See exhibit 4 paragraph 24. I note here that Professor Storey later testified that he did not recall involvement in discussion concerning the MRI report but if asked he would have thought she was still suitable for discharge, because of the shunt function test and her clinical improvement (see paragraph 92 below), while Dr Fedi believed that either he or Dr Walker had consulted with either Professor Storey, or another consultant. See paragraph 64 below .

⁶⁹ T215:6 Dr Walker signed the Discharge note, which (relevantly) incorporated the MRI report and the advice referred to above.

⁷⁰ T215:29 – T216:6. Dr Walker had a recollection of discussing the MRI with Dr Fedi and it was her vague recollection that Professor Storey knew about the MRI report.

⁷¹ Statement of Dr Walker, IB p37 Dr Walker could not recall who made this decision that the changes were more likely chronic, but as the junior officer, she was sure it was not her. T230:29-T231:5. On the face of the notes, they do not disclose anything about the consideration of the MRI report. T234:13-14.

⁷² Statement of Dr Walker, IB p37, also see discharge summary at exhibit 3(r).

⁷³ T221:8-11

51. Dr Walker faxed the discharge summary to Mr Klug's rooms. Mr Klug called Dr Walker possibly at the start of April to inform her that he no longer consulted but to express his concern about Emilie, and the possibility of shunt dysfunction. Her recollection of the conversation was to the effect that

his advice would be that she have further assessment.⁷⁴

52. Dr Walker then called the on call neurology consultant who also suggested further neurosurgical input. She then called Dr Limb, on leave at the time, who suggested referral to the neurosurgical clinic.⁷⁵ Dr Walker also consulted the on call neurosurgical registrar who gave the same advice as Dr Limb.⁷⁶ I accept this evidence as an accurate record of what occurred after Mr Klug's phone call.

53. As a result of this conversation, Dr Walker requested a new neurosurgical clinic appointment at the Alfred, for the next three weeks.⁷⁷ The medical record suggest that Dr Walker faxed a consultation sheet to the neurosurgery clinic on 8 April 2010 at 14.30. That note states:

I was contacted by neurosurgeon Mr Klug who received d/c summ (as we didn't know he'd retired) + he was concerned re report of transependymal oedema on MRI + felt normal shunt study didn't rule out shunt no flowing easily. She has therefore been referred to neurosurg clinic. Due to have neuropsychology ax 12/4/10 and FU neurology clinic 11/15/10. Please book px in for next 3 weeks.⁷⁸

54. Deen left a message on Dr Walker's mobile phone on 29 April 2010 expressing concern for Emilie. Dr Walker had planned to call Deen back on 30 April 2010 but then learned that they had presented to ED. She explained Emilie's progress to date to Dr Fedi.⁷⁹

55. Dr Walker made a note on 30 April 2010 at 1830 after she was informed about Emilie's situation. That note outlined her contact with Deen and Mr Klug and her taking the CT scans to the neuroradiology meeting. The note states that:

I took the CT scan to our meeting (neuroradiology meeting) 2 weeks ago + Dr Anthony Kawn and reg Dr Ramasundara r/ved it + compared to scans done during admit 14-19/3/10. they advised it appeared similar to previous w no significant change.⁸⁰

*Dr Marco Fedi*⁸¹

56. In March 2010, Dr Marco Fedi was employed as a neurology registrar at the Alfred Hospital, where he had been for approximately one month. Dr Fedi provided a statement that was included in the inquest brief.⁸² That statement focused on the events of 30 April 2010, however Dr Fedi also gave oral testimony at inquest of his involvement with Emilie during the March admission.

⁷⁴ T223:2

⁷⁵ T224:23-29.

⁷⁶ T225:9-10

⁷⁷ Exhibit 3U. See page 123 of the inquest brief for referral. This was faxed on 8 April 2010.

⁷⁸ Exhibit 3U. See page 123 of the inquest brief.

⁷⁹ Exhibit 4i.

⁸⁰ Exhibit 4i.

⁸¹ Dr Fedi trained as a neurologist in Italy and achieved consultant status in Italy before moving to Australia. On arrival he was required to re-train at the Alfred Hospital as a neurology registrar, putting him back at a level he had already achieved in Italy. T286:19-13

⁸² IB p46.

57. According to Dr Fedi the results of the brain CT and brain MRI were compared with previous studies, scans that were provided by Deen to Dr Walker, and discussed on multiple occasions with the radiology and neurology consultants.⁸³ I find that these discussions took place only after Emilie's discharge on 19 March, and were not raised again by Dr Fedi for consideration when he was called upon to offer advice to the ED registrar, Dr Lanyon, after Emilie was admitted again on 30 April.

58. Dr Fedi reviewed Emilie on a daily basis from 15 March 2010 to 19 March 2010.⁸⁴ He was present with Dr Walker on 15 March 2010 when she was first reviewed by the neurology team.⁸⁵ The neurological team was in charge and was being assisted by the neurosurgery team.⁸⁶ His major concern on the day of Emilie's admission was whether or not there was a VP shunt obstruction.⁸⁷ He personally reviewed the CT scan from 14 March 2010 and the report.⁸⁸ He agreed that he gave concern to the thought that perhaps the VP shunt blockage was still an issue and therefore triggered further investigations.⁸⁹

59. Dr Fedi testified that he has been trained to review brain MRI scans and CT scans but not to review the types of tests conducted on Emilie, that is the x-rays or the VP shunt.⁹⁰ Dr Fedi stated that he was,

relying on the neurosurgical team to tell us whether there was or there wasn't a shunt malfunction.⁹¹

60. In relation to the x-ray images, Dr Fedi stated that he,

could not recall being told there was any abnormality on the x-ray.⁹²

When taken to the x-ray skull image taken on 16 March 2010, he agreed that the tubing appears to end abruptly around the C4 disk and not follow its path to the burr hole.⁹³ It was his understanding that sometimes the valve or the tubing can become non radiopaque so he,

would have relied on other expertise such as the neurosurgery team,

if he were to observe such a situation.⁹⁴ He could not recall specifically discussing the progress notes made by Dr Walker on the x-ray report but imagines he would have done so.⁹⁵ Dr Fedi noted that there was no clear conclusion on the x-ray of the skull report to guide the clinician⁹⁶ and it is not clear why the valve is not identified on the scan.⁹⁷

⁸³ IBp46.

⁸⁴ T287:8-9.

⁸⁵ T330:8-9

⁸⁶ T288:13. The neurology team was in fact supported by junior neurosurgery registrar Dr Limb, whose evidence is discussed below.

⁸⁷ T288:19-22

⁸⁸ T289:4-12

⁸⁹ T290:13-18.

⁹⁰ T292:1-4.

⁹¹ T292:5-7

⁹² T297:11-15.

⁹³ T298:31-T299:4

⁹⁴ T299:12-17.

⁹⁵ T300:14-15.

⁹⁶ T303:10-14.

61. Dr Fedi conceded that perhaps they should have discussed the x-ray report with a neurosurgical consultant as well as a neurological consultant.⁹⁸ He agreed in cross-examination that the x-ray report was consistent with a non-functioning shunt.⁹⁹ I note that Dr Fedi stated many times that x-rays were not a test that he would normally request.¹⁰⁰ As far as he was concerned the neurological team had arranged the various reports on behalf of neurosurgery,
- and it was a question of getting all the information and get a further neurosurgical review as I mentioned before,¹⁰¹
62. Dr Fedi was present when the shunt study was done and agreed that the study showed the isotope moving down the passage and ending up in the abdominal cavity.¹⁰² Dr Fedi was not aware that if shunts are in place for a long time, a fibrous tract of tissue can build up, and if the shunt becomes displaced, the tract of tissue may remain.¹⁰³ He was not aware that this could lead to a situation where CSF fluid could be carried through the tissue tract and therefore may lead to a misleading shunt study result.¹⁰⁴
63. The diagnosis of migraine was made on the basis of some of the features of her headache, and also on the basis of the absence of signs and symptoms suggestive or raised intracranial pressure.¹⁰⁵ They had intended that the MRI would be performed before the shunt function test, but the first booked MRI could not go ahead due to Emilie being unable to remain still.¹⁰⁶
64. Dr Fedi testified that a person suffering from acute intracranial hypertension,
- Would normally present with a continuous headache with nausea and vomiting, with blurred vision and with an unsteady gait. A patient with chronic hydrocephalus can vary their symptoms depending on the, as I have said, abnormalities found on the scan. For instance, I noted that she had partial callosal dysgenesis, which might have contributed to her mild cognitive impairment that was documented later in the neuropsychology report. So to answer your question, the clinical features from a symptomatic point of view are dramatically different. From an examination point of view there's also significant differences especially within acute intracranial hypertension would have evidence of papilledema.¹⁰⁷
65. In relation to contacting a consultant about the MRI scan on the day of Emilie's discharge, Dr Fedi could not recall whether it was himself or Dr Walker who contacted either Professor Storey, or another consultant.¹⁰⁸ He had some concerns about the MRI due

⁹⁷ T303:29-T304: 1.

⁹⁸ T308:23-26. I note that he further testified that he was 'almost certain they are both aware of those results'. T308:25-26.

⁹⁹ T333:9-10.

¹⁰⁰ T334:1-3

¹⁰¹ T308: 14-16

¹⁰² T310:20-23.

¹⁰³ T310:24-27.

¹⁰⁴ T311:3-9.

¹⁰⁵ T311:28-T312:1.

¹⁰⁶ T339:11-13

¹⁰⁷ T314:15-28.

¹⁰⁸ T316:1-4.

to the reported presence of transependymal oedema.¹⁰⁹ His concerns were allayed by the fact that Emilie was doing well clinically and did not have any headache and she seemed stable enough to be discharged.¹¹⁰ He was involved in the decision to discharge Emilie¹¹¹ but he was certain that the neurological consultant (possibly Professor Storey) was contacted.¹¹² He did not personally seek neurosurgical review at the time of discharge, and he was in clinic at the time, and so not with the patient.¹¹³ He accessed the scan images using the PACS system while he was in the clinic,¹¹⁴ but the evidence is unclear as to whether he had access to the MRI report at this time. Dr Fedi agreed that it may have been more prudent to wait for that report prior to discharging Emilie.¹¹⁵

66. Dr Fedi also testified that despite the presence of transependymal oedema on the MRI, they (Dr Fedi could not recall who 'they' were¹¹⁶) had a discussion about whether it was transependymal oedema or whether it just related to chronic hydrocephalus and therefore white matter changes.¹¹⁷ The presence of marked dilation of ventricles as noted in the MRI report was not necessarily concerning to Dr Fedi, as it depends on baseline imaging and in a patient with hydrocephalus, it is normal to see dilated ventricles.¹¹⁸ That had prompted (them) to take action in requesting the previous scans from Deen.
67. Dr Fedi considered that the x-ray was the least important test followed by the MRI, and CT and then the shunt flow study as the most important test.¹¹⁹ He was not aware of Mr Klug's opinion that the x-ray series should be considered as the most important aspect of any such investigation.¹²⁰
68. Dr Fedi recalled that on 24 March 2010, (some 5 days after her release a regular meeting between the neurologists and the radiologists was held and Emilie's case was discussed¹²¹ and he raised his concern in respect of possible shunt dysfunction.¹²² At that meeting they looked at the CT scan, the MRI scan, the x-rays and the CSF shunt study.¹²³ To his recollection, the outcome of that meeting was that the changes on the MRI were interpreted as chronic changes and that they needed to have the baseline imaging in order to

¹⁰⁹ T315:30-31.

¹¹⁰ T316:17-22.

¹¹¹ T316:25.

¹¹² T317:1-2.

¹¹³ T342:27-30

¹¹⁴ T347:11-13

¹¹⁵ T352:8-11.

¹¹⁶ T34728-31

¹¹⁷ T348:8-11.

¹¹⁸ T349:25-31.

¹¹⁹ T339:24-31

¹²⁰ T340:5-9.

¹²¹ T355:9-17.

¹²² T356:9-10.

¹²³ T356:17-19.

compare the status of the ventricles.¹²⁴ I was not provided with any records kept of this meeting.

69. Dr Fedi was also present at the meeting where the previous CT scans had been made available by Deen. He could not remember the exact date but thought it was in mid April.¹²⁵ His understanding was that the radiologists who did the comparison thought the two scans were alike and that the size of the ventricles looked similar.¹²⁶ Because of those conclusions, they thought the changes were chronic.¹²⁷ He could not say whether he was aware that the scans provided for comparison included a scan taken in 1993, when Mr Klug had suspected that Emilie may have had a shunt blockage.¹²⁸

70. Dr Fedi was the on call neurology registrar on 30 April 2010. The ED HMO, Dr Lanyon, contacted Dr Fedi in relation to Emilie's presentation. Dr Fedi suggested administering Largactil as she had responded to treatment for migraine.¹²⁹ Dr Fedi did not see Emilie before she arrested.¹³⁰ He stated that he kept in regular contact about Emilie's progress and was told that she was improving.¹³¹ He also noted that no abnormal findings on neurological examination were reported to him.¹³² He was not told that Emilie had experienced apnoea the night before her transfer to ED on 30 April 2010.¹³³

Dr Rebecca Limb

71. Dr Rebecca Limb was a neurosurgery registrar on call on 15 March 2010. She had been working as a neurosurgery registrar for approximately one month at that time.¹³⁴ She was requested to review Emilie that day. Dr Limb noted that on examination, she looked well, had a Glasgow Coma Score of 15/15 but she would not let Dr Limb examine the area around her shunt. Dr Limb noted that Emilie had no evidence of papilloedema and her symptoms were not suggestive of raised intracranial pressure. Dr Limb's statement to the court stated that:

My advice, on noting that Emilie was clinically well and her symptoms at the time were relatively mild, was that an acutely blocked shunt was unlikely, and to further investigate this I suggested performing shunt series x-rays and a nuclear medicine shunt study. I also advised that the Neurology team obtain her last CT scan from the Royal Children's Hospital to compare with her scan performed at the Alfred Hospital to see if the ventriculomegaly had worsened.¹³⁵

¹²⁴ T356:22-27

¹²⁵ T357-11- T358:1.

¹²⁶ T358:8-14.

¹²⁷ T358:15-17.

¹²⁸ T360:28-31.

¹²⁹ T324:8-10.

¹³⁰ T366:19-21.

¹³¹ T366:26-27.

¹³² T366:27-29.

¹³³ T367:13-15

¹³⁴ T514:32. Dr Limb had been involved with patients who had presented with VP shunts only a handful of times, somewhere between 5 and 10. T534:27-30.

¹³⁵ Exhibit 11, Statement of Dr Rebecca Limb

72. It was Dr Limb's evidence that she discussed Emilie's case with the consultant Neurosurgeon on call the next morning who agreed with her plan and advised waiting the outcome of the x-rays and nuclear medicine shunt study.¹³⁶ (There does not appear to be a note of that conversation in Emilie's record).
73. On 17 March 2010, Dr Limb injected the Technetium radioisotope tracer into Emilie's reservoir for the CSF shunt function study. She recalled the technicians and consultant radiologist remarking that the tracer appeared to be in the reservoir but was not yet seen in the abdomen. She then had to leave to attend another appointment.¹³⁷ She believed that she became aware of the result of the shunt study later in the day by Dr Fedi, and may have checked up on it herself later, but she could not recall with certainty.¹³⁸
74. Dr Limb could not recall when she looked at the shunt series x-rays but stated that it would have been her usual practice to look at them prior to performing the nuclear medicine study, and that is her practice now.¹³⁹ However, given that there was no evidence that the x-rays were discussed during the shunt study, she agreed that it was reasonable for the Court to infer that she did not see the x-rays before the shunt study.¹⁴⁰
75. She was sure that when she saw the x-rays, she did not see the formal radiologist's report, although in oral evidence she stated that she did not have a recollection of looking at the x-rays at all.¹⁴¹ Dr Limb's statement stated that:
- As a junior registrar I probably would have found the findings of the shunt series x-rays difficult to interpret, but would have reasoned that the absence of a section of catheter in the neck on x-ray would not have necessarily meant a blocked or non functioning shunt, particularly in light of the nuclear medicine study. Indeed, in this situation, I would have been more reassured by the findings of the latter, and therefore would have not initiated any further urgent action.¹⁴²
76. Her oral testimony was however that had she seen the x-ray report, it would have flagged in her mind that something was unusual and she would have flagged that with her consultant.¹⁴³ She did not discuss the x-ray results or the results of the shunt study with her consultant.¹⁴⁴ She recalled however that she did have several conversations, probably not documented, with the neurology registrar, Dr Fedi.¹⁴⁵ In cross-examination, she agreed that had the conflict between the shunt study results and the x-ray results been appreciated by her, it would have been something that warranted discussion with her consultant.¹⁴⁶

¹³⁶ Exhibit 11

¹³⁷ Exhibit 11

¹³⁸ T522:28-T523:9.

¹³⁹ T519:10-14

¹⁴⁰ T517:18 – T518:5

¹⁴¹ T516:30-31.

¹⁴² Exhibit 11 p2

¹⁴³ T519:25 – T520:7.

¹⁴⁴ T520:25-31

¹⁴⁵ T521:23-26

¹⁴⁶ T541:14-16

77. Dr Limb also stated that she did not discuss the results of the work up with the consultant.¹⁴⁷ She stated that the nuclear medicine study result was reassuring to her and to the neurology team. She did not always speak to the consultant about normal results.¹⁴⁸
78. Dr Limb was guided by her usual approach in relation to contacting the neurosurgical consultant set out below in that she would be instructed to,
do the tests and let me know if they're abnormal. That's normally what would happen. It's very different if the patient's under your own bed card I have to say because the consultants would be then more closely involved. If the patient's under somebody else's bed card and if it's a team that worked very close with neurosurgery such as neurology, I think our consultants are normally happy to defer to the judgment of the consultant in the treating team.¹⁴⁹
79. I find that it would have been appropriate for all work up studies including both the x-ray images, the MRI and both reports, to have been reviewed by Dr Limb, and in these particular circumstances, then by a neurosurgery consultant. This did not occur as Dr Limb either did not see the x-rays, MRI, or results, or if she did, -because she was not aware of their significance. It also appears to have been relevant that Emilie, was not admitted under a neurosurgical "bedcard".
80. According to Dr Limb, after the shunt flow study on 17 March 2010, she did not see Emilie again and she was not asked to conduct a formal assessment of Emilie by the neurology team.¹⁵⁰ She did however suggest that Emilie see the neurosurgery team within the next 2 to 3 weeks.¹⁵¹ She could not recall if she suggested this before or after Emilie's discharge.¹⁵² The evidence of Mr Klug and Dr Walker suggests he was approached only after discharge, and I accept that to be the case with Dr Limb approached after the failure of the arrangement made for Emilie to be reviewed by Mr Klug.
81. Dr Limb found out that Emilie was being discharged. She could not remember being approached and asked about discharge plans.¹⁵³ However when asked in terms of her involvement with Emilie, if she ever saw evidence which would have troubled her in terms of discharge she replied that she did not.¹⁵⁴
82. She believed that Mr Klug's contact with Dr Walker, who in turn contacted a neurosurgical registrar (that may have been her), precipitated the urgent review appointment.¹⁵⁵
83. In relation to the possibility of a fibrous tract developing that could connect a failed shunt with a reservoir in a VP shunt, Dr Limb stated that she had not heard of this concept, until a few months before the commencement of my inquest into Emilie's death.¹⁵⁶

¹⁴⁷ T516:16-18

¹⁴⁸ T533:30-T534:2

¹⁴⁹ T521:1-19.

¹⁵⁰ T544:19-22.

¹⁵¹ Exhibit 11 at page 2, where Dr Limb states that she suggested that Emilie see the Neurosurgery team within the next two to three weeks in clinic (as an urgent appointment), for a clinical review and to reassess the need for any further surgical intervention regarding the shunt.

¹⁵² T514:7-9.

¹⁵³ T527:5-13

¹⁵⁴ T528:7-9.

¹⁵⁵ T529:5-6.

Professor E Storey

84. Professor Storey was Head of the Neurology Unit, and the Neurology Consultant in charge of Emilie's care while she was in an inpatient on the Neurology ward.¹⁵⁷ He saw Emilie on 15, 16 and 19 March 2010.
85. Professor Storey provided a statement to the Court. He outlined in that statement that Emilie was admitted under neurology after admission was requested by the ED and accepted by the neurology registrar on call overnight on 14 March 2010. His statement reported:
- In retrospect, admission under Neurosurgery might perhaps have been preferable, as suspected shunt malfunction falls within the realm of neurosurgical rather than neurological expertise. I am uncertain why the decision for admission under Neurology was made, although I surmise that the previous documentation of a history of migraine in Emilie's record and/or her mother's concern at her behavioural changes may have contributed. The investigation of possible physical reasons for behavioural changes is generally considered a neurological rather than a neurosurgical problem.¹⁵⁸
86. At the time, he considered that admission under neurology was not unreasonable as, although shunt obstruction had to be excluded, it was actually less likely than migraine as a cause of the headaches,¹⁵⁹
- and he considered that they had covered the possibility of shunt dysfunction through the referral to the neurosurgeons.¹⁶⁰
87. When Professor Storey examined Emilie on 15 March 2010, she refused to let him examine her shunt.
88. Professor Storey stated that the fluctuating nature of her headache, its chronic nature and its response to anti-migraine preventative treatment, together with a lack of clinical signs of intracranial pressure reinforced the diagnosis of migraine.¹⁶¹
89. Professor Storey was not sure whether he saw the x-ray films before he heard the result of the shunt flow study but his usual practice would have been to review the films at the next ward round on 19 March 2010. There was no record of this occurring. However, he sated that he would not have considered the x-rays as especially significant given that he could see what could have been interpreted as the shunt track on the CT scan and it was his understanding that not all shunts are radiopaque.
90. He stated that,
- I concluded that the plain x-rays must have been not able to visualise a shunt tube that was nevertheless for whatever reason, be it that part of the shunt tube was no [sic] radiopaque, or be it that we were looking at the tail end of the previous shunt tube or something along those lines. I went back to the CT, and this I do have a recollection of, and could see a white area tracking down from the shunt valve down towards the neck. Now, that in retrospect was clearly the fibrosed tract filled with

¹⁵⁶ T534:3-10.

¹⁵⁷ T 430-31:29-2.

¹⁵⁸ Statement of Professor Storey, Exhibit 9.

¹⁵⁹ T507:7-9.

¹⁶⁰ T507:10-14.

¹⁶¹ Exhibit 9.

fluid, but at the time I thought that that was shunt tube, and placed more reliance on the nuclear study showing patency than I did on the shunt tube x-ray.¹⁶²

91. Professor Storey further testified that he had a clear recollection of examining the CT scan on 19 March 2010, as he wanted to see whether he could see the shunt tube above the level where it appeared to terminate on the x-ray, and he believed that he could do so.¹⁶³ He also did not observe sulcal effacement on that CT scan from 14 March 2010.¹⁶⁴ I note that this is consistent with Dr O'Donnell's report as to the changes from the 14 March scan to the post mortem scan.¹⁶⁵ A lack of sulcal effacement suggested to him that there was not raised pressure.¹⁶⁶

92. In relation to the wording of the x-ray report, he suggested that a different wording may have alerted them to a possible problem. On his reading of the report, it says that they cannot see the tube above C4, which is not the same as saying that the tube had detached and migrated distally.¹⁶⁷ The sentences:

This is an abnormal result that requires follow up. The registrar has been notified.

now end radiological reports of major abnormalities. This was not the case in 2010. What they were looking for was a fracture in the tube.¹⁶⁸ At the time he reviewed the x-ray, he was interpreting it in light of the shunt study that showed patency and in his view,

that trumped everything.¹⁶⁹

93. Professor Storey gave instructions that Emilie could be discharged home if the MRI was ok. If he was absent from the hospital, it was his normal practice to delegate discharge to the registrar. His further testimony was that this is standard practice as consultants cannot be on the wards all the time.¹⁷⁰ It is usual for the registrar to delay discharge and speak to him if there was an unexpected investigation result. He did not know why the formal report suggesting shunt obstruction came to be construed as,

changes are felt to be chronic,

but he maintained that he could have had that opinion. Had he seen the scan prior to discharge, he would have supported the decision to discharge her¹⁷¹ due to the shunt study results and Emilie's clinical improvement with anti-migraine therapy.

94. Professor Storey also testified in retrospect, there must have been two separate headache diagnoses going on, but at the time, they thought it was all explicable by migraine.¹⁷² He stated that:

¹⁶² T441:23 – T442:4

¹⁶³ T495:8-11

¹⁶⁴ T499:30

¹⁶⁵ T500:10-13

¹⁶⁶ T506:11-17.

¹⁶⁷ T443:9-18

¹⁶⁸ T444:6

¹⁶⁹ T447:1-7

¹⁷⁰ T449:27-29.

¹⁷¹ T452:24-25

¹⁷² T454:10-14.

Migraine's very common, and if you were [to] postulate that the headaches that Emilie had were solely based on raised pressure, you'd have to postulate a five year history of malfunctioning shunt, which is almost inconceivable I think. There's also the issue that the headaches themselves seemed to improve with anti-migraine treatment, both specific, being the Imigran, and prophylactic, being propranolol.¹⁷³

95. Professor Storey stated that Emilie's situation was a rare one, and made more unusual by the fact that it stretched over a number of months.¹⁷⁴ Mr Klug agreed that this was an unusual situation¹⁷⁵ as did Assoc Prof Owler.¹⁷⁶ Mr Klug also agreed that the headache in December 2009 could have been from another cause.¹⁷⁷

*Dr Nicolas Lanyon*¹⁷⁸

96. Dr Lanyon was the ED intern on 30 April 2010 when Emilie arrived at the ED. He reviewed her at approximately 9.55 am. He took a partial history from Emilie, performed an examination and looked at the discharge summary from 19 March 2010.
97. His differential diagnosis was of persistent headache with new neurological symptoms of possible brief loss of consciousness overnight and incontinence to urine. He considered a VP shunt obstruction but given the neurology notes and past investigations, he felt this was less likely. This was his first patient with a VP shunt,¹⁷⁹ but his experience and teaching in regard to shunts is that if there is one in place, it must always be considered as a potential cause of the pathology, particularly if the pathology relates to the head.¹⁸⁰
98. He spoke to the ED consultant, Dr Arendse, who agreed with his plan to get advice from neurology regarding pain relief and at approximately 10.30 am he called Dr Fedi. He checked Dr Fedi's advice to administer 12.5 mg of Largactil, with Dr Arendse and prescribed it as per the drug chart and Dr Fedi's advice.
99. At approximately 11.30, Deen arrived and he obtained a further history from her. Deen informed him of the two brief episodes of loss of consciousness with fine shaking and loss of bladder control. He did not obtain any description of apnoea from Deen. (I note that Deen's evidence differs on this issue). At this point Emilie's headache had improved.
100. He spoke to Dr Fedi again at approximately midday and informed him of the additional history. Dr Lanyon asked him whether he thought a CT scan was appropriate and Dr Fedi suggested it was not.¹⁸¹ Dr Fedi recommended a further 12.5 mg infusion of Largactil. Dr Fedi indicated to him that he would review the patient. The evidence does not suggest that Dr Fedi informed Dr Lanyon of his earlier concerns about the possibility of a

¹⁷³ T464:18-25.

¹⁷⁴ T459:24-29.

¹⁷⁵ T123:7-10

¹⁷⁶ T385:1-9.

¹⁷⁷ T190:18-20.

¹⁷⁸ Dr Lanyon's statement is Exhibit 6. He also provided typed notes that he made at his home in the week following Emilie's death (T264:8-10), of his recollection of events, at Exhibit 6A.

¹⁷⁹ T262:15-16.

¹⁸⁰ T262:28-32.

¹⁸¹ The medical records at page 130 of the inquest brief note that he discussed performing a CT scan Dr Fed. Dr Lanyon recorded 'No reason for CT scan given lack of N&V'. I take N&V to mean nausea and vomiting.

shunt malfunction. (Obtaining such a history would have been highly significant for the ED Doctor and almost certainly would have been recorded if obtained).

101. At some point, he could not recall when, he was informed that Emilie's pain had dropped to 0/10 at about midday. Emilie did not convey this to him directly¹⁸² but he recalled that he became aware of it on that day.¹⁸³

102. Emilie was transferred to the Emergency Short Stay Unit (ESSU). It was his recollection that he checked in with Emilie and Deen at 13.15 and noted that she was sleeping. Just before 16.00 he heard the emergency buzzer go off in Emilie's cubical. He attended and noted that she had gone in to cardiac arrest.

Mr G Klug

103. Mr Klug performed the revision of Emilie's shunt in 1993.¹⁸⁴ He provided a statement to the Court in relation to his knowledge of Emilie's shunt and his involvement in contacting Dr Walker after Emilie's discharge and his concerns about the MRI findings on 19 March 2010.¹⁸⁵ At the time of writing his report, Mr Klug had access to the MRI scan, and the report of the CT scan, the report of the x-ray scans and the shunt function study.¹⁸⁶ He did not visualise the CT scans or the plain x-rays, but did so prior to and during testimony.

104. It was Mr Klug's opinion that,

plain x-rays of the entire shunt system are essential to ensure that the shunt tubing is in continuity.

He further stated that,

The material used in shunts undertaken at the time of consideration were radio opaque and plain x-rays would clearly reveal the location of the shunt tubing and would indicate whether or not there was any breakage or disconnection.¹⁸⁷

The underlining is mine.

105. In his view, the plain x-ray studies clearly showed a disconnected shunt¹⁸⁸ and were the most important aspect of diagnosing the disconnected shunt.¹⁸⁹ It was his opinion that shunt function tests could be misleading and do not indicate whether there is a disconnection.¹⁹⁰

106. Mr Klug could recall having a conversation with Dr Walker but he could not remember the precise date. He had received Dr Walker's discharge summary and the MRI scan, (but not the x-ray series or reports). He called Dr Walker to let her know that he no

¹⁸² T280:17-18.

¹⁸³ T280:22-25.

¹⁸⁴ See Exhibit 3v for Mr Klug's operation report.

¹⁸⁵ Exhibit 3, Statement of Mr Geoffrey Klug dated 12 August 2013.

¹⁸⁶ Exhibit 3.

¹⁸⁷ Exhibit 3 page 4.

¹⁸⁸ Exhibit 3 p6.

¹⁸⁹ T88:23-24.

¹⁹⁰ T88:26-27.

longer undertook patient care work. He could recall that he stated he was concerned regarding the findings on the MRI scan, which could suggest raised intracranial pressure.¹⁹¹ His concerns surrounded the reported findings of marked dilation of the lateral and third ventricles and evidence of cerebellar tonsil herniation and changes suggesting the presence of trans-ependymal oedema.¹⁹² He was of the view that there may be resistance to the flow of fluid causing a build up of intracranial pressure even though the shunt flow study was normal. He recalled commenting to Dr Walker about the shunt study and telling her that it could not be completely relied on as being an indicator of satisfactory shunt function.¹⁹³ Dr Walker agreed that this was what Mr Klug had conveyed to her.¹⁹⁴ He suggested to Dr Walker that further investigation was required¹⁹⁵ and that it needed to be looked in to with some energy.¹⁹⁶ He could not recall using the term urgent.¹⁹⁷

107. I further note that at the time he received the discharge report Dr Klug was under the impression that the x-ray was normal and therefore that the shunt tube was not disconnected. Had the x-ray report formed part of the discharge summary, I am satisfied that Dr Klug would have immediately identified the shunt disconnection and taken the necessary steps to specifically address that matter.

108. Mr Klug testified that in 1993 he performed a shunt revision on Emilie after the peritoneal catheter became disconnected from the valve and migrated distally so that it was entirely within the peritoneal cavity.¹⁹⁸ The peritoneal catheter was not removed during the surgery as it was too difficult to remove.¹⁹⁹ He believed that the catheter left in the peritoneal cavity was made of radiopaque material.²⁰⁰ In relation to the radiopacity of the catheter, Mr Klug stated that the catheter he inserted in 1993 was a radiopaque catheter, and that the entire length of the tube was radiopaque and able to be seen on x-ray.²⁰¹

109. When questioned by the Court as to whether a disconnected shunt can immediately cause intracranial pressure to develop, Mr Klug explained that:

Sometimes when a shunt disconnects within a very short period of time, the patient becomes acutely symptomatic and needs to have it fixed up as a matter of urgency, and presumably as it disconnects the fluid no longer passes beyond. On other occasions though the tube may disconnect and move a little and some fluid continues to pass down where the tube was actually situated. There's a fibrous tunnel and so some fluid can continue to flow down and get into the tube and then continue on its way. But that's an unstable situation because the fibrous tunnel is not like a plastic tube, which is

¹⁹¹ Exhibit 4 p5.

¹⁹² When cross examined as to the lack of sulcal effacement on the MRI scan from 19 March 2010, Mr Klug stated that: 'I would have said it's of interest but not the most dominant finding by any means. I mean, the most dominant finding to me is the enlarged ventricles and the report of the assessing radiologist that there was some ependymal oedema. To me those are the important things.' T128:15-20. He also stated that he would defer to what the radiologist told him in relation to the findings of the MRI. T129:15-18.

¹⁹³ Exhibit 3, page 6.

¹⁹⁴ T230:1-3.

¹⁹⁵ T156:5-10.

¹⁹⁶ T156:20

¹⁹⁷ T160:25-28.

¹⁹⁸ T78:20-25

¹⁹⁹ T78:31-T79:4

²⁰⁰ T80:1-2.

²⁰¹ T154:8-15 and statement at exhibit 3 page 4.

rigid and can't be kinked. It's vulnerable to distortion, kinking, and sooner or later an obstruction will occur there of a complete nature.²⁰²

110. It was Mr Klug's evidence that it was possible for a 14 cm gap to be bridged by the fibrous tract given the length of time that the shunt had been in situ.²⁰³ His further evidence was that this created a very unstable situation²⁰⁴ and that although some flow of fluid may take place it is very unstable, with the possibility of partial obstruction and a rise in symptoms such as headache vomiting and drowsiness, which could fluctuate with symptoms of pressure that could exist for some time.²⁰⁵ Although generally in his experience, if a shunt becomes disconnected, a person develops symptoms within a short period of time, he gave evidence that a scenario in which a fibrous tract may control the hydrocephalus partially, but for a lengthy period of time, can occur, albeit that it was unusual.²⁰⁶

111. In relation to the CT scan performed on 14 March 2010, in Mr Klug's view, the CT scan showed lateral ventricles, which were significantly dilated.²⁰⁷ This dilation suggested to him that the shunt was not working properly.²⁰⁸ He would expect that a person with a functioning ventricular shunt all of her life, would have smaller ventricles.²⁰⁹

112. Mr Klug disagreed with Dr O'Donnell's statement as to the 14 March 2010 scan, that

The CT scan of the brain on 14 March 2010 shows a right lateral ventricular shunt in situ with widely spaced sulci in the frontal lobes and overlying the vertex. This indicates that the shunt is functioning adequately.²¹⁰

As he thought that it was an unreasonable assumption for Dr O'Donnell to have made in respect of a person with a shunt for their whole life.²¹¹

113. In relation to the x-ray series, in his opinion, when one looks at the skull x-ray it was very, very clear that is stopped at the C3-4 level.²¹²

114. He felt it was unfortunate that the shunt function test was subsequently performed as it may have misled people to think that the shunt was functioning properly.²¹³

115. Mr Klug further agreed that the investigation should have been assessed by the neurosurgical unit, and someone in the neurosurgical unit experienced in the management of shunts.²¹⁴

²⁰² T83:2-15.

²⁰³ T86:12-15.

²⁰⁴ T122:4-5.

²⁰⁵ T122:23-26.

²⁰⁶ T122:27- T123:10

²⁰⁷ T110:3-4.

²⁰⁸ T110:5-8.

²⁰⁹ T112:16-20.

²¹⁰ T131:7-21

²¹¹ T131:7-21.

²¹² T134:19-21.

²¹³ T137:6-10.

²¹⁴ T148:7-10

116. Mr Klug concluded his statement by expressing the opinion that if Emilie's abnormally functioning shunt had been detected and corrected by surgery that she, would have made a good recovery with every prospect of returning to her previous state of health.²¹⁵

Associate Professor B Owler

117. Associate Professor Owler, neurosurgeon, provided an expert report, requested by the Alfred Hospital, in relation to Emilie's treatment.²¹⁶ Assoc Prof Owler had access to all the scans and reports when preparing his report.

118. Associate Professor Owler stated that the changes observed on MRI did not necessarily indicate raised intracranial pressure.²¹⁷ In his view, the presence of CSF over the convexity of the brain indicated that the shunt was probably functioning.²¹⁸ He stated in his report that there was no evidence of sulcal effacement in either the CT or the MRI scans and this factor may also have suggested to the doctors that the shunt was functioning.²¹⁹ The presence of CSF over the convexity usually provides some reassurance that the pressure in the brain is not abnormally high.²²⁰

119. Further, without the benefit of the previous scans, it would have been difficult for the doctors to conclude that the shunt was blocked and that she should be taken to emergency.²²¹ Examination had not demonstrated any features consistent with raised intracranial pressure²²² and Emilie was noted to improve during the admission with paracetamol and propranolol.²²³

120. In his opinion, the investigation and management of Emilie was appropriate and in accordance with reasonable medical practice.²²⁴ Further, the presence of the fibrous tract, acting as the catheter is a very rare situation, and was diagnosed in retrospect. It would have been a very difficult diagnosis to reach in the clinical context of Emilie's case.²²⁵ Mr Klug disagreed with this statement, if all the information is analysed.²²⁶ Mr Klug asserted that an experienced neurosurgeon would have been able to correctly interpret the situation.²²⁷

²¹⁵ Exhibit 3, page 9.

²¹⁶ Exhibit 8, Report of Associate Professor Brian Owler

²¹⁷ Exhibit 8 p2.

²¹⁸ Exhibit 8 p2.

²¹⁹ Exhibit 8 p2.

²²⁰ T404:22-24.

²²¹ Exhibit 8 p3.

²²² Exhibit 8 p3.

²²³ Exhibit 8 p3.

²²⁴ Exhibit 8 p3.

²²⁵ Exhibit 8 p6.

²²⁶ T191:9-14

²²⁷ T191:15-18

121. Associate Professor Owler disagreed with Mr Klug about the possibility that CSF study could have shown fluid passing because of raised pressure, as that defeats the purpose of what a shunt is.²²⁸

I don't follow his rationale that a normally functioning shunt is still consistent with having raised pressure because the shunts open at a certain pressure normally and if the pressure is high then if the shunt is working normally you would expect fluid to flow through the shunt until the pressure was sufficiently lowered so that the valve closed again. I mean that's how a shunt works. So to have a shunt functioning completely normally and there to be raised pressure don't actually – the two don't actually equate in my opinion, particularly if there's large ventricles.²²⁹

122. He agreed that if he had received the discharge summary and he was in Mr Klug's position, and known the patient and what the scans looked like in the past, he would have been concerned.²³⁰ However without that prior knowledge it would have been a difficult interpretation.²³¹

123. He accepted that given the conflicting information of the x-ray and the shunt study, he would normally expect greater neurosurgical involvement.²³² He would normally have expected that a registrar would discuss the case with their consultant registrar, if there was any difficulty or doubt.²³³ He would also have expected Emilie to be admitted under the neurosurgical unit on the 14 March 2010 presentation.²³⁴

Dr de Villiers Smit

124. Dr de Villiers Smit is the Director of the Emergency and Trauma Centre (the ED) at the Alfred hospital. Dr de Villiers Smit provided two statements to the Court but I did not hear oral evidence from him.

125. Dr de Villiers Smit's supplementary statement outlined the introduction of the Timely Quality Care (TQC) system of care. The TQC system involves 6 principles, as set out in Dr de Villiers Smit's statement.²³⁵

Principle 1: Patients that present to the Emergency & Trauma Centre (E&TC) will be assessed, have treatment and investigations initiated and a management plan in place within 60 minutes of arrival.

Principle 2: Patients will be discharged from the E&TC or admitted to the hospital as decided by the ET&C consultant staff.

Principle 3: Patients will be reviewed by the inpatient unit within 2 hours of being referred for admission.

Principle 4: Patients will be admitted to a bed in the most appropriate clinical place, the first time.

Principle 5: Patients will have their investigations, consultations and interventions completed as soon as possible, in order of request and in no longer than 24 hours.

²²⁸ T387:24-31

²²⁹ T403:8-18

²³⁰ T388:23-28

²³¹ T388:28-31

²³² T391:16-19

²³³ T391:27-31

²³⁴ T392:5-7

²³⁵ Supplementary Statement of Dr deVilliers Smit p1.

Principle 6: Patients will be actively managed to ensure they are only in hospital as long as is clinically necessary.

126. The Alfred Hospital has also developed Initial Investigation Checklist Guidelines, one of those checklists address investigations required for a patient with a suspected blocked VP shunt.²³⁶
127. It was Dr de Villers Smit's opinion that under the new system, Emilie would have been seen by a consultant ED physician within 60 minutes of her arrival, 'and appropriate investigations initiated in accordance with the neurology and neurosurgical checklists, with plans for review by neurology and neurosurgery clinicians.'²³⁷

FINDINGS

128. Having considered all of the evidence together with Counsels submissions and a separate submission from Deen La Coz, I make the following findings in respect of Emilie's death.
129. I find that during the March admission, Emilie was very unwell, and that a patient with a history such as Emilie should have been admitted under the Alfred hospitals neurosurgical unit. I note with approval that under protocols now introduced to the hospital's ED that such a presentation involving a history of a VP shunt insertion, would now result in such an approach.
130. I further accept Mr Klug's evidence that the shunt function test can be misleading and may not indicate whether the shunt was disconnected. I also understand why it might have been considered by Professor Storey that the results of a shunt function test should 'trump' everything else.
131. I further accept that it is possible that two separate phenomena, that is a migraine of unknown cause and a shunt malfunction, may have co-existed during the March admission.
132. I am satisfied however that the x-ray series and in particular the x-ray film of the skull, showed findings consistent with a disconnected peritoneal shunt and that this particular presentation should have been referred to a consultant surgeon experienced in this area, for review. Had this occurred I am satisfied that there was a probability that the radiopacity explanation for Emilie's x-ray, showing (an apparent and as then unexplained) shunt disconnection, would have been examined quite possibly by reference to Dr Klug directly, and that the urgency of Emilie's situation would then have been better understood.²³⁸
133. In the alternative I find that it would have been appropriate for all work up studies including the x-ray images, the MRI and both reports, to have been referred to neurosurgery registrar Dr Limb, before Emilie's discharge and in these particular circumstances, by her then to her supervising neurosurgery consultant. This also did not occur as either Dr Fedi who claimed to have relied on his neurosurgical counter-part, did not in fact request her later involvement, or because if she did see the x-rays, MRI, and the resulting reports, that she did

²³⁶ Ibid p2.

²³⁷ Ibid.

²³⁸ A second opportunity to address this matter was lost when Mr Klug's later concerns about the MRI results as indicated on Emilie's 19 March discharge note, also failed to cause a timely review by an appropriately experienced surgeon.

not understand their significance. The absence of clinical notes concerning these references, in particular from Dr Fedi to Dr Limb, is troubling.

134. Additionally, the suggestion that this was possibly a matter involving shunt malfunction should have caused the whole of the neurology team to act with greater caution than I find actually occurred. I find instead that the x-ray image of the skull was not interpreted correctly by the neurology team, and that the MRI report, which was available before discharge, appears to have been misunderstood. Further, I find the x-rays show in quite dramatic fashion that the shunt tubing was clearly visible from C4/C5 below to the peritoneum, and not above. The notion that part of the tube was visible and part not visible because it may have been x-rayed against a bone, did not provide a sufficient cause to disregard the radiologists warning concerning that matter.
135. I am also troubled by the reliance on the finding that by 19 March, Emilie was in a clinically improved condition. In this regard we know from Deen that her daughter was very often keen to avoid contact with clinicians, and also from Deen, Dr Limb and Professor Storey, that she would not allow anyone to examine (and touch) the skull area where her shunt device had originally been positioned.
136. Deen's further evidence that she felt her concerns were only ever able to be expressed through Dr Walker, and were not taken seriously by other clinicians, suggests that the neurology unit as a group, did not comprehend the possibility that Emilie was not a reliable historian in respect of her own condition and pain.
137. As above, I accept the earlier development of the fibrous tract was unusual and that this clinical sign in particular was misleading. I also note the limited experience of Dr Fedi and the neurosurgery registrar Dr Limb and of Dr Walker and that the Alfred is a teaching hospital, with the Doctors concerned each in the early stages of their respective assignments.²³⁹
138. I also note that Dr Limb felt somewhat constrained in regard to an approach to her own surgical consultant because of her position as a junior registrar being called into advise colleagues from another hospital department. In such circumstances, hospital protocol should always encourage junior clinicians to record their findings and opinions and not to be hesitant about the elevation of those opinions.
139. I additionally find that because this was a difficult matter, there should for this same reason have been an easier path to consultant support provided to inexperienced and junior clinical staff, especially in the period prior to Emilie's discharge. I further find that given the inconsistent clinical test results, available at the time of discharge, that the views of Professor Storey's counterpart consultant neurosurgeon, or alternatively Dr Klug, or a neurosurgeon who had particular experience with VP shunts, should have been formally sought.
140. This did not occur and in these circumstances and with the possibility of shunt dysfunction not satisfactorily excluded, I find that Emilie should not have been discharged on 19 March 2010, with a diagnosis of migraine.
141. While this particular situation is unlikely to re-occur given that such patients would now be managed by a neurosurgical unit, I would offer that where conflicting results and multidiscipline issues arise, as here, that it is appropriate that investigations and reports then

²³⁹ In regard to the background experience of Dr M Fedi, see footnote 81 above.

available, be discussed at a consultant to consultant level with a view to a possible patient transfer.

142. In relation to the conflicting evidence of Mr Klug and Associate Professor Owler as to whether the CSF study excluded raised ICP, it is fair to conclude that when the shunt study was performed, the fibrous tract was operating to drain the fluid, but that it could not show the means by which that fluid was draining. As above, I accept that this was misleading to Professor Storey in particular, and as to why priority was given by him, to the results of the shunt function test.
143. However, in relation to the differing views of Mr Klug and Associate Professor Owler as to whether or not the MRI indicated the possibility of raised intracranial pressure, I find that the radiologist report noted the possibility of transependymal oedema suggesting possible shunt malfunction. (As above), coupled with the x-ray series and report, this material should have led to a further formal review by a neurosurgeon, with previous shunt experience.
144. I also note Deen's evidence of her own observations of her daughter and her concerns surrounding what she felt was a lack of communication between Emilie's treating doctors and herself. I am left with a sense that in this like certain earlier cases involving an apparently limited intercourse between clinicians and long time carer's, that an invaluable opportunity was missed.

I direct that a copy of this finding be provided to the following:

Deen Le Coz

The Alfred Hospital

Professor E Storey

Dr M Fedi

Dr R Limb

Dr S Walker

Mr G Klug

Associate Professor B Owler

Signature:



PETER WHITE

CORONER

Date: 22 October 2015

