IN THE CORONERS COURT
OF VICTORIA
AT GEELONG

Court Reference: COR 2011 1475

FINDING INTO DEATH WITH INQUEST

Form 37 Rule 60(1)
Section 67 of the ***Coroners Act 2008***

Inquest into the Death of: LEROY WILLIAM SCOTT

Delivered On:	4th December, 2014
Delivered At:	Coroners Court of Victoria 65 Kavanagh Street Southbank Victoria 3006
Hearing Dates:	26th May to 30th May 2014
Findings of:	JACINTA HEFFEY, CORONER
Representation:	Leading Senior Constable Kelly Ramsay – Police Coronial Support Unit - Assisting Coroner Mr M Wilson – Acting for the Scott family Mr S Cash of Counsel – Acting for Dr David Fuller Mr P Halley of Counsel - Acting for Dr Peter Vuillermin Mr A Pillay of Counsel - Acting for Barwon Health Mr J Goetz of Counsel - Acting for St John of God Pathology

I, JACINTA HEFFEY, Coroner having investigated the death of LEROY WILLIAM SCOTT

AND having held an inquest in relation to this death from the 26th May 2014 to the 30th May 2014
at GEELONG CORONERS COURT
find that the identity of the deceased was LEROY WILLIAM SCOTT
born on the 31st December 2009
and that death occurred on the 26th April 2011
at Barwon Health (Geelong Hospital), Bellerine Street, Geelong 3220
from:

1 (a) STAPHYLOCCOCCUS AUREUS SEPTICAEMIA OF UNKNOWN ORIGIN

in the following circumstances:

1. Leroy was aged 15 months at the time of his death and was the first born child of Andre and Christine Scott. He had been a healthy active little boy until about three days before he was taken to Barwon Health Emergency Department by his parents at approximately 9.15 PM on Saturday 23rd April, 2011. He was triaged as Category 4 (or semi-urgent non-life threatening) after being assessed by Triage Nurse Rachel Mol and taken to the paediatric waiting room. He was febrile (temperature 38.1) and had a history of being lethargic with poor oral intake. At 11.25 PM, his mother asked for his temperature to be taken again and it was recorded to be 38.8. Nurse Mol spoke with Emergency Consultant Dr David Eddy who prescribed 150 mg paracetamol. At 12.20 AM his temperature was 38.5.

2. He was not seen by a doctor, locum paediatric registrar Dr Ian Stokes, until 5 AM on Sunday 24th April. He considered the likely diagnosis was otitis media. Intravenous cannulation was unsuccessful, however blood was taken at 5.50 AM and sent for a full blood count and film, C-reactive protein (CRP), urea and electrolytes and a blood culture[1]. Due to his dehydration, a naso-gastric tube was inserted and fluid delivered at 220 ml per hour. Leroy was transferred to the paediatric ward at 8 AM.

3. The blood sample provided for the blood culture arrived at St John of God Pathology (SJOG Pathology) at 5.50 AM via pneumatic tube. It was put into an incubator at 10.18 AM. At 8

[1] Dr Owen Harris, Head of Microbiology at St John of God Pathology, told the court that the purpose of a blood culture is to see if bacteria will grow. The incubator gives out readings every 10-15 minutes. Viruses are not detectable in a blood culture. See Transcript P 74.

PM it returned a positive result.[2] The following morning, Anzac Day, the sample was removed and a gram stain was conducted. This returned a result of gram-positive cocci resembling staphylococcus. This being regarded as "*a significant result*" the practice is that it be phoned through to the appropriate on-call physician at Barwon Health, in this case, Dr Eugene Athan, Head of the Infectious Diseases Department at the hospital, who then informs the medical team. It is also entered onto the BOSS computer system available to hospital staff at Barwon Health. Dr Athan told the court that he received this information at about 10 AM on the 25th April. He relayed it to the nurse in charge and offered to speak to the paediatric registrar on duty. He said that whilst he was doing that he got the impression that the registrar was nearby and had apparently informed the nurse to confirm with him that the treating team was content with the status of the child and were going to await the culture confirmation prior to commencing any antibiotic treatment.

4. From the laboratory's point of view, the next step upon receiving this result was to conduct a coagulase test to determine whether the strain detected was pathogenic or whether it was coagulate negative staphylococcus (that is, a contaminant from the skin obtained at time of collection). This test was not set up until 2 PM on the 25th April. On a normal working weekday, following this test, a reading would have been taken at 2 hours,4 hours and 24 hours.[3] As this was a public holiday, laboratory staff had left at 5.30 PM. Dr Harris conceded in evidence, however, that results would have been available to be read prior to 5.30 PM "*but that didn't happen*".[4] Just what those results are likely to have been between 4 PM and 5.30 PM is not now possible to say. Dr Athan said that initial results (with 80% reliability) may not known for up to six hours. Definitive results (100% reliability) may take another 12-24 hours.

5. The other potentially significant marker of bacterial infection was the CRP reading which was available on the morning of the 24th April. More will be said about the significance of both the blood culture results and the CRP reading later in this Finding.

6. To continue the narrative, as stated above, Leroy was admitted to the paediatric ward at 8 AM on the 24th April. He was reviewed by paediatric Consultant Dr Peter Vuillerman at noon on that day. He observed, inter alia, that Leroy was *"miserable but alert, appropriate."* Dr

---

[2] Dr Harris told the court that if bacteria is in the blood stream in high numbers, it will take less time to grow. Transcript P 74.

[3] On a working weekday, the laboratory closes at 10.30 PM.

[4] See Transcript P 78 Lines 24-26.

Stokes at his 5 AM review had noted *"a small area of redness on lower spine, non-tender"*. Dr Vuillerman noted and depicted anatomically a slightly red swelling which he described as non-tender, non-fluctuant (i.e. it did not appear fluid-filled to the touch), non-transluminable (i.e. not conducting light - suggesting not fluid-filled). It had a slight red lump in the middle. Dr Vuillerman considered that this was likely a local reaction to an insect bite.

7. Dr Vuillerman's impression was that Leroy was most likely suffering from a viral illness and local reaction to mosquito bite. He adds in the progress notes *"but serious bacterial illness still possible."* His Plan was *"to observe - low threshold to notify me if more unwell"*.

8. When Dr Vuillerman reviewed Leroy for the second time at 7.30 PM (more than 7 hours later) on the 24th April, he comments in the notes *"Looks improved"*. He noted that the swelling on the back was *"slightly more oedematous, very mild tenderness."* He concludes that *"viral illness still seems most likely, not sufficiently tender for fever/raised CRP to be due to soft tissue infection"*. In his statement,[5] he said that he discussed Leroy's progress with his parents at this second review and they informed him *"that Leroy had become a little more interactive"* and his father had given an example of Leroy pointing at something that was going on outside his room on the ward. Again the Plan was to observe and to continue current treatment which was to maintain fluids via the naso-gastric tube and administer analgesia.[6]

9. Dr Vuillerman's observation that Leroy looked improved was consistent with the subsequent nursing entries in the Progress Notes. At 8.30 PM on the 24th April, there is an entry *"Miserable at times throughout the afternoon however seems to be responding well to analgesia..."* And the following entry at 7.30 AM on Monday 25th April states *"Woke much brighter this morning - cuddled into Dad but keen to look about his room..."*

10. Dr Vuillerman handed over to Dr David Fuller at about 8.30 AM on Monday 25th April, 2011. The results of the blood culture had not yet been communicated to Barwon Health at that stage. The laboratory opened at 9 AM. Dr Eta Raicebe, Paediatric Registrar, met and reviewed Leroy at 10.30 AM that day, at which time she had become aware of the blood culture gram stain result. She told Dr Fuller about it and of her belief that the coagulase test results would be phoned through later that day. Dr Fuller first reviewed Leroy at 11.30 AM and then, a second time, later that day at 8.20 PM. He told the court that prior to the second

[5] See Inquest Brief Pp 33-39

[6] Dr Vuillerman was on the original witness list but his attendance was dispensed with after all Counsel indicated that they did not wish to cross-examine him. I deduce from this that his evidence, including his evidence regarding his discussions with Leroy's family, was not contested.

review he had contacted Dr Raicebe regarding the update on the laboratory testing and she had told him that the laboratory would not be able to provide further identification that day. Dr Raicebe's evidence was different. She told the court she had not heard anything back and had assumed, therefore, that the test had shown that the staph was a contaminant.

11. At the commencement of the Inquest, Mr Cash, Counsel for Dr Fuller conceded on his behalf that at the 8.20 PM review on the 25th April, he had failed to appreciate the extent of Leroy's deterioration as being referable to a bacterial infection. He further conceded that in the context of unresolved blood culture results, he should have commenced antibiotic therapy at that time. It was the view of all the medical witnesses that had anti-biotic therapy been administered at this stage, Leroy is very likely to have survived.

12. As a consequence of this concession, the hearing was confined to the issue of assessing the medical management of Leroy during the 25th April, leading up to the 8.20 PM review and, in particular, whether Dr Fuller should have instituted further investigations and/or commenced empirical antibiotic therapy following his 11.30 AM review. As far as Dr Vuillerman was concerned, there was no criticism by any party or expert witness about his management of Leroy. During his involvement, the preliminary result of the blood culture test was not yet known. In relation to Dr Fuller, it was primarily the fact of his knowledge of this result together with the elevated C-reactive protein result, combined with the interpretation of other observations, that raised questions in the minds of some expert witnesses about the adequacy of his management that morning.

13. But to continue the narrative, over the course of the 25th April, Leroy developed a rash. This was not an extension of the lesion already noted on his back. This rash was checked by both Drs Raicebe and Fuller and found to be "*blanching*". Dr Fuller told the court this was more common in a viral illness than in a bacterial illness. If it had been non-blanching (or purpuric) *"that's when we get concerned that there is a bacterial illness going on"*. At the time of the 8.20 PM review, according to Dr Fuller, Leroy looked miserable but was taking in his surrounds. His respiration rate was 40 beats per minute. It had previously ranged from 26 to 38 beats per minute. A new feature was the presence of mild intercostal recession and mild expiratory wheeze at both bases. Dr Fuller organised chest and abdominal x-rays and prescribed Salbutamol (Ventolin). The former showed new patchy changes throughout the lung fields. However, he told the court that he found no areas of focal consolidation and no effusion to suggest bacterial pneumonia. He concluded that Leroy had viral pneumonia that

was not Ventolin responsive. This review had taken place at the request of a nurse responding to Leroy's parents' concern.[7]

14. Dr Raicebe reviewed Leroy at 3 AM on the morning of the 26th April. At that time, he was afebrile (temperature 36 degrees). He had a pulse rate of 130 beats per minute (but she notes he was crying at the time). His respiration rate was 32 breaths per minute.

15. At 5 AM, when Dr Raicebe saw Leroy again, the situation had drastically changed. He had now developed a purpuric rash over the whole of his body. She phoned Dr Fuller at 5.17 AM and he agreed that he was to be given cefotaxime intravenously. Dr Raicebe took Leroy to the paediatric treatment room and successfully cannulated him and started administering the cefotaxime and a bolus of normal saline. This occurred at 6 AM. Dr Raicebe was called away to the Delivery Suite and on the way telephoned Dr Fuller and asked him to urgently review Leroy. He came in immediately. He told the court that the rash had changed dramatically. It was wide-spread, large (several cm), raised and palpable, pink and purple lesions all over his body. His abdomen which had previously been distended but soft and not guarded, was now much more distended. He had cool peripheries and was very distressed when moved. His capillary return was 2.5 seconds; pulse rate 144 bpm and blood pressure measured 114/76. His heart rate increased to 200 bpm and Dr Fuller diagnosed that he was in shock. A further bolus of 20 ml saline was ordered. His pulse rate settled to 165 bpm but then rose again to 180 per minute. At this point, a decision was made to transfer him to the Royal Children's Hospital ICU and PETS (Paediatric Emergency Transport Service) was requested. In the meantime, Dr Fuller got on the phone to the Geelong ICU. He was then put through to the ICU Registrar who suggested he call the ICU Consultant, which he did. Further calls were made to the ICU asking them to put up a dobutamine infusion in preparation for Leroy's arrival and to the Anaesthetics Registrar to seek help to intubate Leroy on arrival in the ICU as recommended on the phone by PETS. All these calls meant that Leroy was not transferred to ICU and intubated until approximately 8.50 AM. More will be said later in this Finding about changes that have been brought about as a result of Leroy's case.

16. There were some difficulties with flying the PET team to Geelong by helicopter (apparently due to fog) and consequently the PET team travelled by road and did not arrive in Geelong until 10.42 AM

[7] I accept Dr Fuller's evidence that he did not suggest that Leroy was suffering from Henoch-Schonlein purpure on that evening, but rather said this the following morning when the rash was purpuric.

17. At 10.12 AM, Leroy suffered a cardiac arrest. Despite full cardio-pulmonary resuscitation and inotropic support, after 46 minutes, at 10.58 AM with the concurrence of the PET team, it was decided that there was no prospect of reversing the situation. Resuscitation efforts ceased and Leroy passed away.

18. A decision was made by me to conduct an Inquest into Leroy's death. His parents had legitimate questions to which they sought answers. This death was unexpected and avoidable. The most important area of enquiry was whether it was *prospectively* avoidable or whether a judgment that it was avoidable is one that can only be reasonably made in hindsight.

19. The concession made on Dr Fuller's behalf at the commencement of the Hearing narrowed the issues to some extent. However, there remained the live issue of whether the potential gravity of Leroy's presenting features was unreasonably overlooked earlier in his presentation to Barwon Health; whether the index of suspicion was insufficiently raised. The saddest aspect of this case is that had there been a different response, in other words, simply put, had empirical antibiotics been administered earlier, Leroy would almost certainly have survived. In most hospital deaths that become coronial investigations, the outcome of adopting a different clinical course is rarely so clear-cut. (In most cases, it is not possible to say with any certainty that a patient might have survived had certain steps been taken, as there are usually other complicating features.) It is tempting for this reason to see the process of the actual clinical decision-making as equally clear-cut. However, as the conflicting assessments of the various medical witnesses in this case showed, this is not at all the case.

20. The other issue was the apparent tardiness of the conduct and communication of the various tests and test results from St John of God Pathology to the Barwon Health treating team. Ultimately, the final coagulase test results were not communicated until 10.18 AM on the 26th April (having been read at 10.17 AM). By this time, Leroy had gone into cardiac arrest.

21. I propose to deal with both issues in sequence.

CLINICAL MANAGEMENT POST 10.30 AM ON 25TH APRIL, 2010

22. As stated above, the management by Dr Vuillerman on the 24th April was perfectly reasonable and nobody contended otherwise. It was the decision-making that occurred after the initial blood culture results were known and the CRP measure was known (that is, after 10.30 AM on the 25th April), that was the subject of criticism and disagreement amongst the medical witnesses.

23. The Coroners Court commissioned Dr Simon Costello, a Consultant Paediatrician at Cabrini Children's Centre to provide a report. The family's lawyers engaged Associate Professor John Raftos, an Emergency Physician since 1983. In addition, the court heard expert evidence from Dr Lionel Lubitz, a Paediatrician at the Royal Children's Hospital since 1979 and Associate Professor Damon Eisen, a Consultant Infectious Diseases Physician at the Royal Melbourne Hospital, both of whom were called on behalf of Dr Fuller.

24. What became plain through the course of the evidence was that there are many features common to both viral and bacterial illnesses and, furthermore, that by far the majority of children admitted to hospital with features of this kind turn out to have a viral illness. An article published by the British Medical Journal in February this year summarised research between 2009 and 2011 in the UK (where there is an immunisation programme similar to that in Australia). This research found that in 46,039 admissions to hospital of children between the ages of 1 month to 15 years, clinically significant blood/CSF cultures were obtained in only 504 cases. (In percentage terms, this equates to 1.1% of all such admissions). Of those 504, only 115 were *community acquired* infections (that is the infections not acquired in hospital) occurring in children who did not have pre-existing co-morbidities. In percentage terms this equates to 23% of 1.1% of admissions. [8]

25. **The vital observations** (blood pressure, temperature, respiration rate, oxygen saturations) recorded from the time of the medical review in the Emergency Department on the morning of the 24th April until Leroy's decline early on the morning of the 26th April were not in themselves alarming. Leroy's temperature was 37°, or above, from 10 AM on the 24th April and for most of the period he was in hospital, spiking at 40.2° at 1.10 PM on the 24th April and at 38° at 6.30 PM on the 25th April, against a background of regular administrations of paracetamol and ibuprofen.

26. As far as Leroy's **temperature** was concerned, Associate Professor Raftos told the court that temperatures fluctuate with the time of day and after treatment with panadol and nurofen.[9] Dr Costello in his statement said that assessment of fever is difficult in the context of regular antipyretic medication. Dr Fuller told the court that for a healthy 15 month old, a normal temperature would be between 36.5°and 37.5° but with an arterial monitor (which was used in

[8] This article was referred to in cross-examination during the hearing (for example at Pp268-272). It does not appear to have been tendered although it was apparently handed up at some stage.

[9] Transcript page 578.

this case) it can be up to 38°. [10] A review of the Observation Chart for the 25th April shows temperatures ranging from 37.6° at 00.30 hours down to 36.4° at midday, up to 38° at 6 PM and then the last reading at 7.10 PM at 37.4° Dr Fuller said that when he saw him on the morning of the 25th April, Leroy's temperature was 4° less than it had been when he had peaked at 40.2° the day before. He said that, according to the literature, ibuprofen reduces temperature by 1.5° and paracetamol by about 1°. When Dr Fuller reviewed Leroy at 11 AM on the 25th April, he had been given a dose of 165 mg paracetamol half an hour earlier. He told the court that this could have been having some effect but the effect would normally peak at one to two hours after administration. The question was raised as to whether Leroy's father, Andre, may have been misled by this effect when he told Dr Fuller that Leroy seemed a little bit better than the day before. To this, Dr Fuller responded that Leroy had been receiving paracetamol and ibuprofen the day before as well.

27. Dr Fuller gave evidence that the measurement of the **pulse rate** is one of the best measurements in terms of detecting infection and that when he saw Leroy at 11.30 AM on the 25th April, it was the lowest it had been (120 bpm) down from 150 bpm on the 24th April at 4 PM. He said that with septic shock you get a progressive rise in pulse rate.

28. Associate Professor Raftos, who was the strongest critic of the medical management, did not disagree that other parameters, such as capillary return and blood pressure readings, were not peculiarly indicative of bacterial infection during the 25th April. [11] As far as the **respiratory rate** was concerned, Associate Professor Eisen agreed that it was trending down at that time and that this was an encouraging sign.

29. In terms of **fluid balance**, none of the medical witnesses expressed concern about this as necessarily indicating one way or another that Leroy was suffering from a bacterial infection as opposed to a viral illness. Similarly, there were no pointers in his **oxygen saturation levels** in this respect.

30. The major area of conflict between the professional witnesses revolved around the interpretation of Leroy's full blood examination results **("FBE" results")** and the C-Reactive Protein result **("CRP result")** as they came to light in the course of the 24th April when read in conjunction with the initial and provisional blood culture result.

---

[10] Transcript page 286.

[11] Transcript page 565.

31. The FBE revealed a mildly elevated neutrophil count of 9.8, a reduced lymphocyte count of 1.4 and a band count of 1.4. Dr Costello explained that the band count is also called the left shift- they are immature neutrophils. The measure informs that the bone marrow is turning on more production of neutrophils in an effort to counteract the infection. Dr Costello agreed with Mr Halley, Counsel for Dr Vuillerman, that the FBE results on the 24th April are not helpful in that the lymphocyte count, being low at 1.4 and the IT ratio (the ratio of immature to total neutrophils) being only slightly elevated at .125, were not uncommon in viral infections. It was this combination that prompted Dr Lubitz to say *"If the white cell count (or neutrophil count) is just up a little bit and lymphocyte count is down you'd think gee, this fits more with a viral picture. Maybe I'll just sit and wait. So that's why this particular case is so difficult because there are so many confounding results that make it difficult to make a decision."*[12]

32. Associate Professor Raftos disagreed with this interpretation of the band count of 1.4. Dr Costello had told the court that he did not think that it added much further weight to the assessment.[13]This was in line with an article produced by Associate Professor Eisen, written by N Kupperman and E Walton, which concluded that the band count in the peripheral blood smear did not routinely help to distinguish bacterial infections from respiratory viral infections in young febrile children.[14] Associate Professor Raftos distinguished this article by making the point that Leroy had no evidence of any respiratory infection- which is correct. He said *"I would be loathe to suggest in a child in this context that it was caused by anything else but a bacterial infection."* [15] I would suggest the significant words in this quotation are "a child in this context" as Dr Raftos relied on what he regarded as the full clinical picture in making his various assessments of individual features. He goes on to say that in such a child band cells in his blood were strong evidence for bacterial infection. "... *if you were given a positive band count in a child who had a fever, elevated CRP, no obvious source of infection, no evidence of respiratory infection, the only possible inference that you can make is that it's due to bacterial infection".*[16]

---

[12] Transcript page 371.

[13] Transcript page 128

[14] See Exhibit E2.

[15] Transcript page 573.

[16] Transcript page 574.

33. The CRP measurement relates to the body's acute-phase response to acute and chronic inflammation and may be suggestive of inflammation or infection depending on the clinical context and the extent to which it is elevated. It plays a key role in the body's defence against infection and is secreted in increasing amounts. It was clear from all the medical witnesses that it is not to be interpreted in isolation but may be an aid to interpreting the clinical picture. It would seem that there is controversy about its usefulness. Dr Fuller told the court that from his previous experience working at the Royal Children's Hospital there were "a number of paediatricians who didn't like CRP as a marker (of infection) and discouraged its use."[17] Dr Lubitz, who has practiced at the Royal Childrens Hospital since 1979, told the court that the CRP is just an indicator and his view, not a very good test. It depends on the reading. The higher the reading is over 100, the more likely it is to suggest a bacterial infection. He gave the example of 250 and over, in which case he said it would be interpreted as definitely bacterial. But that around the 100 mark, and under 100 it is quite often a viral infection. In this case, the reading was 103.7. He said that over the years, he had seen "thousands" of children with raised CRP levels who were suffering from a viral illness.

34. Dr Costello told the court that CRP readings do not discriminate between viral or bacterial infection but *"we do have enough information to tell us that levels certainly beyond 80 and 100 are more closely correlated to bacterial infection than viral infection"*[18]. Associate Professor Eisen told the court that when the CRP is *"extremely elevated, it is a useful, distinguishing factor between bacterial infection and a viral infection....but a level of essentially one hundred is not a clear indicator of whether the infection is bacterial or viral infection".*[19]

35. I have extracted these comments to demonstrate the differing views expressed by highly qualified practitioners about interpretation of levels and also to illustrate the difficulty of taking one item in isolation and being asked to assign clinical significance to it.

36. Associate Professor Raftos was adamant that in his view the elevated CRP along with the initial blood culture result and the presenting fever of 40° suggested a child that was likely to be seriously ill with a bacterial infection and had he been the treating physician he would have started Leroy on empirical antibiotics (Cefotaxime) upon receipt of the blood culture results.

---

[17] Transcript page 300.

[18] Transcript page 119.

[19] Transcript page 467.

The reducing fever he attributed to the analgesia. He relied on the fact that Leroy presented with what he called "features of toxicity". He said that any one of these features was indicative of "serious illness" and listed them as:

A. *Poor arousal, reduced alertness and reduced Activity;*

B. *Breathing difficulty (grunting, tachypnoea, increased respiratory effort etc)*

C. *Circulatory impairment (mottling, tachycardia, decreased respiratory refill, hypotension);*

D. *Decreased drinking, decreased output (feeding less than half usual amounts in the past 24 hours, having fewer than 4 wet nappies in 24 hours).*

37. Dr Raftos said that Leroy had A and D of this list. He agreed that he was relying on an article which was referred to as the Hewson article published in 1990 which lists the "*markers of serious illness in infants under 6 months old presenting to a children's hospital*".[20] He maintained that the 6 month old range had since been extrapolated in practice to children to the age of five years. Mr Cash for Dr Fuller obtained from him a concession that the article was dealing with markers for "*serious illness*" and was not specific for bacterial illness. However, although Dr Raftos agreed with this, he insisted that there were not many other serious illnesses in children and stated that the predominant serious illness was bacterial illness.

38. It has to be said that Dr Raftos is not a paediatrician. Notwithstanding his long career as an emergency physician in which he has over the years been called to see children in the Emergency Department, he has never had the on-going care of a paediatric patient in the wards in which periodic reviews are conducted and the course of illness monitored. I therefore attach less weight to his evidence than I do the other expert paediatric witnesses called.

39. This aspect of monitoring was raised by Dr Costello when he told the court that it was important to watch for "trends" when treating an illness whilst awaiting more definitive diagnosis. At page 156 of the Transcript he stated *"the idea behind admitting this child to hospital was to observe perhaps a trend and the course of the illness and to follow with serial blood examinations confirmation of the trend one way or the other"*

[20] Exhibit E1.

40. In this respect, two possible courses of action stood out as presenting the possibility of a aiding the interpretation difficulties thrown up by the elevated CRP reading and the unresolved, initial blood culture result. They are as follows:

- **Repeating CRP test**
- **Enquiring about time to positivity**

Repeating CRP test

41. Dr Costello told the court that as he had not seen the child, he would not be able to comment on Dr Fuller's assessment that Leroy was clinically improving. But he added *"I still say that I would prefer to have the reassurance on blood examination that that was reflected in those tests*[21]*."* Earlier (on same page) he said that notwithstanding the fever was apparently settling and to the suggestion, why not just wait, Dr Costello answered " *That's why I would repeat the CRP and the-look at what the IT ratio is doing further to look for the trend that you think is going on with the child."* This was put to Dr Lubitz by me at page 373. He replied that *"A rise in the CPR would be helpful but the best information you're going to get is the identification of the organism"*. This view was put to Associate Professor Eisen and he said that there certainly may have been changes to indicate progressive abnormalities which may have been more in keeping with bacterial infections. *"So an elevation of the white blood cell count and a progressive elevation in the C reactive protein would certainly have been useful had those abnormalities been present."*[22]

42. Dr Lubitz said that if the child was getting worse, he would certainly repeat the CRP after 28 hours. *"I may not act on it, but I would repeat it"*.

43. We know from the CRP result on the 26th April that the reading was 298 so, as Dr Costello said, had a further CRP reading been ordered on the morning 25th April it would have been between 103 and 298. He said further that the neutrophil count had dropped to 0.3, which equates to "an overwhelming infective process".[23] The only argument against taking blood for further full blood examination and CRP was the painful process of extracting the blood. Leroy had bruises all down his arms from the earlier attempts to cannulate him had failed. The blood for the tests on the 24th April had been extracted by heel prick. Dr Fuller told the court that for FBE you need a minimum of .5 ml and similarly for the CRP. He said that

[21] Transcript page 170.

[22] Transcript page 468.

[23] Transcript page 133.

"there is some suggestion that (obtaining blood by means of heel prick) actually can be more traumatic for children because of the squeezing nature of it."[24]

44. It is very difficult to assess or judge Dr Fuller in respect of his failure to order repeat blood tests on the morning of the 25th April. Had he done so, he would have had the results in a couple of hours and, as we know now, they would have pointed to a bacterial infection. Whilst I accept that more often than not the result of coagulase tests in these circumstances is likely to demonstrate that the first result was a contaminant and that from the account of Mr Scott, Leroy seemed a little better that morning, the fact was that the outcome of the test *was* awaited. (Dr Fuller asked Dr Raicebe twice about it) and on the second occasion he understood her to be saying that a result would not be available that day. He had not seen Leroy before. It was not clear whether Dr Vuillerman had told him that he thought Leroy had improved over the course of the 24th April, when he handed over to Dr Fuller on Monday morning or that Dr Fuller had read Dr Vuillerman's notes in which he stated this.[25] Had the CRP test been repeated, a reduction in the earlier reading would have been reassuring. On the other hand, an elevation would have been concerning and, depending on the reading, prompted antibiotic therapy, or at the least, the chasing up of the coagulase test result. I consider that this would have been best practice in the circumstances, even though Dr Fuller thought the results would be available later that afternoon. Alternatively, there should have been a process to chase them up and if they were not available by a certain time, a plan for a full blood examination to be arranged along with CRP test.

45. Dr Costello, whilst acknowledging that Dr Fuller was making a clinical assessment of the child at that point and that he may well have felt that the rash *"now on trunks and extremities"* that had been observed by Dr Raicebe, appeared to be viral and that the child did not appear to be overly unwell, stated *"but I would maintain that with the information available I would commence antibiotic treatment".* [26] He said that he would have done this after taking further blood for examination and CRP so as not to mask any outcome. He said that the information already available at that time, would in his view *"tilt the balance of probability towards bacterial infection and towards starting antibiotic treatment."*[27]

---

[24] Transcript page 257.

[25] This was not mentioned in either Dr Vuillerman's statement or Dr Fuller's.

[26] Transcript page 131 Lines 6-19.

[27] Transcript page 132-133.

Conclusion

46. In my view, notwithstanding the differing views about the value of CRP readings at the initial stage to determine whether there is a pathogen present (in that whilst it is sensitive, it is non-specific), the fact that it was elevated, combined with the abnormal result from the blood culture should have prompted further testing when Dr Fuller reviewed Leroy on the morning of the 25th April, if only for the re-assurance that might have provided. As Dr Athan explained, staph aureus is associated with a high mortality rate.

Enquiring about time to positivity

47. The other proposition, that was almost universally accepted amongst the professional witnesses, was that the time to positivity of the blood culture in the first instance would have been a useful pointer as to whether the reading represented in fact a pathogen rather than a contaminant. The actual time was 9 hours 41 minutes.

48. Dr Raicebe, in evidence, agreed with the proposition that the fast time to positivity would indicate that the positive result was very unlikely to have been caused by a contaminant and would have altered her treatment plan.[28]

49. Dr Costello stated the following:

> *"...well I'd certainly like to know from the lab how quickly the culture was detected as being positive, since the earlier that it's detected the greater the likelihood of it being a staph aureus. Coagulase negative staph tend to be a more slowing growing staph appearing on a blood culture between 24 and 72 hours rather than 24 hours, certainly if the culture was positive within 12 hours that would strongly indicate a staph aureus rather than a coagulase negative staph..."* [29]

Mr Cash, for Dr Fuller told Dr Costello that neither Dr Raicebe nor Dr Fuller was made aware of the short time to positivity and he was asked:

> *"If that information had been known to Dr Fuller it would have been strongly indicative of the presence of bacterial infection, wouldn't it have?---- Yes.*[30]

50. The following is an extract of the evidence of Dr Lubitz in this regard:

---

[28] Transcript pages 212-213.

[29] Transcript page 134.

[30] Transcript page 165.

He was asked by me at Page 376 whether, had he taken the call from the laboratory saying that there had been a positive result would it occur to him to ask how quickly the result had become apparent. He answered :

> *"We don't usually ask that. Not a routine question.*
>
> *And yet it would be significant to know?-----It's significant when they tell us that because they are worried about it, because they've watched it-they've observed it. It's not usually something we ask; how quickly did it grow?*
>
> *You rely on them to convey to you the speed with which it became apparent and the way they've interpreted that?----That's the way I've always operated."*

51. Dr Eisen was asked about this by Leading Senior Constable Ramsay:

> *"With specific reference to Leroy's tests, that it would've have been a good indicator that the positive test was very unlikely to have been caused by contaminant, because of the time of nine hours and 41 minutes? ---"...I think that has some validity in increasing the probability that this may have been a true (indistinct) rather than a contaminant."*

52. Dr Athan, referred to in paragraph 3 above, was asked whether he was aware of the time to positivity when he was told the initial results. He told the court that he could not recall. Dr Harris in his statement said that in April 2011, "*time to positivity*" was not available on the system at the time and that the time of 9 hours 41 minutes was ascertained later "*by a laboratory scientist with specific computer skills.*"

53. Dr Athan said that this was testing his memory but his recollection was that they did get some information regarding that "*because of the signalling of the system whereby there is a time measure system accommodating that information...*"[31]

Conclusion

54. Whatever the case may be, this information could presumably have been obtained, whether it is now more easily obtained because of a new system or not. It could have been asked for as soon as the initial results were phoned through at 10 AM on the 25th April, prior to Dr Fuller's first review of Leroy. It could have been an essential part of the report given by Dr Athan to

[31] Transcript page 518.

the treating team or as soon as it was determined.[32] It could have been an enquiry made by Dr Fuller at time of or after his first review of Leroy.

55. Dr Athan told the court:

> *"All positive blood cultures may be significant. About a third of them are contaminants. So a third of cultures done through St John of God Pathology when we reviewed our system are due to harmless simple skin organisms and are benign or harmless. (Two thirds) are real. Significant. Organisms like staph aureus, which we're always concerned about, carries a mortality of about 10 per cent. So having staph aureus in your blood is associated with a high mortality rate."*

56. Given this and the view of all the practitioners that were asked about it that it would have been useful and tending to suggest a bacterial infection, against a background of incomplete information, even with re-assuring clinical signs and a belief by Leroy's father that he seemed a little better on the morning of the 25th April, it offered another means of learning more about Leroy's illness whilst awaiting results that were not due for some hours. There was no evidence that the absence of this information from the laboratory was interpreted by the treating team as equivalent to the laboratory indicating that there nothing unusual about the time to positivity; no evidence that they would have expected the laboratory to pass this on had the opposite been the case. (Dr Lubitz said that he would not seek it at the Royal Children's Hospital as he would expect to be told if it was considered significant). It does not seem to have crossed their minds to confirm the time to positivity, as an aid to diagnosis, in the context of unresolved blood culture results.

CONCLUSION

57. Dr Fuller's assessment of the probability of a positive blood result being a contaminant was based on his experience of treating children and the *clinical picture* to which he accorded great significance. He told the court that "in the context of a clinical picture that doesn't suggest any staphylococcal disease and you then get a staphylococcus in your blood culture, how commonly would that be a contaminant versus a true staphylococcus aureus, I would say of the order of 90% of the time it would be a contaminant...".[33] He could think of only three

---

[32] Dr Athan's lack of recollection, whilst it would seem to undermine the significance of the importance of time to positivity, can be explained by his firm evidence that in his capacity as an Infectious Diseases physician, he would not have awaited the outcome of the coagulase test before administering antibiotics, so the time to positivity in his view would not have influenced him as he would have acted on the original result.

[33] Transcript page 319.

occasions in his experience, Leroy being one of them, in which he had been surprised when he discovered it was a staphylococcal aureus. [34]

58. There were, however, as I have said, two areas of objective investigation that could have been pursued to either support the improving clinical picture that Dr Fuller was perceiving or alternatively to further aid interpretation of the potentially concerning test result. Neither of these was followed.

59. One of the considerations Dr Fuller took into account in deciding whether to conduct further tests was the pain and distress that that would have involved. In this regard, he was of the view that cannulation would have been the best method as it would have afforded the means to administer intravenous treatment should that have become necessary. Whilst it is noted that blood for culture has to be taken from a vein, cannulation is not essential and had not been employed to obtain the original blood for culture.

60. I am mindful of the arguments in respect of the over-use of antibiotics when not sufficiently indicated. I am not suggesting that the initial blood culture results were sufficient on their own to warrant antibiotic therapy. However, the courses of seeking information as to time to positivity and repeating the CRP test were obtainable without risk and would, together, have enabled a more complete picture to have been provided to objectively aid diagnosis and mount a defence. When two outcomes were possible, one relatively harmless, the other potentially catastrophic and there was nothing to contra-indicate either course, I consider both of these courses should have been pursued.

61. The only way to determine whether in fact what I have considered to be omissions on the part of Dr Fuller amount to a departure from the acceptable standards of his profession would be to undertake a much larger study than an inquest in this type of case is capable of. Leroy's presentation was not typical of a child with a serious bacterial infection. There was no identifiable focus of infection. Bacterial infections in immunised children, in any event, are the exception. This is not a case in which there was an obvious course for Dr Fuller to take. For this reason, to suggest what course of action a reasonably sized sample of paediatricians

---

[34] For this reason, I find it difficult to accept the statement made by his Counsel from the Bar Table (Transcript P 171), and in his Submission, that Dr Fuller actually decided to withhold administering antibiotics and performing further blood testing until the evening when there was a clearer picture of the blood culture result, a position which Dr Costello told the court was "within reasonable grounds for treatment". This was not subsequently elicited from Dr Fuller in his evidence and, indeed, does not sit with the tenor of his evidence as outlined in paragraph 55. Had this been the case, one would have expected him to follow up the laboratory results that evening, especially in the face of the new concerning clinical features which he concedes.

would have pursued in Dr Fuller's position is beyond the scope of this investigation. I have attempted to explore what the optimal practice would have been in the situation as presented, rather than to cast doubt on Dr Fuller's competency. There is no evidence to suggest that he did not consider that he was acting in Leroy's best interests.

COMMUNICATION OF RESULTS FROM SJOG PATHOLOGY TO BARWON HEALTH

62. The assessment of Leroy's management at Barwon Health was two-fold. I have dealt with the first part, which consisted of the quality of the clinical observations and blood tests arrangements. The second part was the more objective investigation consisting in receiving of those blood tests, their timeliness and the availability of their follow up from the laboratory.

63. As stated above, the process was in several parts. The blood is placed in an incubator. When a positive result is received, a gram stain test is conducted. The result comes back relatively quickly and then it is transmitted to the Hospital and entered on the BOSS system, accessible to staff at the hospital. Due to the initial result in this case becoming known outside of office hours, the gram stain testing was not performed until the morning of the 25th April and the result was then forwarded to the hospital at about 10.08 AM. The next step was to conduct a coagulase test to determine whether the initial result is truly a pathogen or is a contaminant. This test, in turn, takes between 12 and 24 hours, however readings are emitted at the end of the first 2 and 4 hours.

64. This coagulase test was not commenced until 2 PM on the 25th April. Had it been conducted soon after 10.08 AM, the 2 hour and 4 hour results would have been available to staff within the working hours of that weekend and available for transmission to the hospital. In the event, at the end of the first two hours, staff were still at the laboratory and, as Dr Harris commented, the results would have been available to be read prior to 5 PM. But, as he commented, "*this did not happen*".[35]

65. A complicating factor in this case was due to the fact that it all took place over a weekend and staff left the laboratory at 5.30 PM. On a normal weekday, there would have been staff there until 10.30 PM. The arrangement was that there would be a Consultant on duty at the hospital to whom the results could be conveyed. He/she in turn would pass the information on to the treating medical team. Dr Athan was that person on this weekend. The court heard evidence from him and also from Dr Owen Harris, Head of Microbiology at St John of God Pathology.

---

[35] See Transcript page 78 Lines 24-26.

66. The relevant times are set out in the table below:

Sunday 24/4/2011		
	5.50 AM	Bloods sent to SJOG laboratory via pneumatic tube.
	9 AM	Pathology Laboratory Assistant arrives at work.
	10.18 AM	Samples placed in incubator
	12.00 noon	FBE and CRP results communicated to Barwon Health
	5.30 PM	Staff leave SJOG laboratory for day.
	8 PM	Positive result re blood culture
Monday 25/4/2011		
	9 AM	Staff arrives
	10.15 AM	Positive Result telephoned through to Dr Athan at Barwon Health who in turn telephones the ward and conveys result.
	2 PM	Coagulase test commences at laboratory. Readings every 2 hours and 4 hours.
	5.30 PM	Staff leaves (public holiday)
Tuesday 26/4/2011		
	10.18	Coagulase results phoned through to Barwon Health.

67. The fact that it was a holiday weekend led to misunderstandings. Dr Raicebe expected that the laboratory would be closing at lunch time on Monday. She had expected a call by then, however when it did not eventuate, she assumed that the results had shown a contaminant and for this reason, no call had been made to the hospital. She nevertheless conceded in evidence that she should have followed up the results but had been very busy and forgot to do so.[36] Dr Fuller told the court that he did not know what time the laboratory would close but expected

[36] Transcript page 199.

that if there was going to be result that afternoon there would be somebody in the laboratory to communicate the result. He said he had been surprised that Dr Raicebe expected a result that afternoon, not because the laboratory might be closed but because he thought the coagulase test took longer than a few hours.

68. Dr Harris told the court that it was "*routine advice*" from the laboratory to the hospital that whenever there was a positive blood culture to advise the medical staff in the ward to treat the patient as if the patient had a bacterial infection until proven otherwise. Dr Fuller told the court he had never heard of this advice being given to the treating team.[37] On the face of it, it seems strange that such should be the advice conveyed to treating clinicians who would be well aware, from their training, of the dangers of untreated bacterial infections. Nobody sought to elevate this communication to any position higher than a "routine *advice*". In any event, as I have stated above, the administration of antibiotics on the sole basis of the preliminary positive result would not appear to be warranted in the absence of clinical indications or concerning biochemical markers.

69. Another example of conflict between what the hospital staff knew or believed and what SJOG Pathology insisted was the case, was the availability of an on-call scientist for urgent blood results. SJOG Pathology in its submission stated that "*it was well known*". Dr Raicebe was unaware of it. Dr Fuller was not asked about it but did not volunteer it. There is no suggestion that it occurred to either Dr Raicebe or Dr Fuller to contact the laboratory in any event to seek results on the afternoon or evening of the 25th April.

70. No explanation was proffered on behalf of SJOG Pathology as to why it took from 10.15 AM to 2 PM to commence the coagulase test. Given that staff would be leaving at 5.30 PM, this narrowed the opportunity to read the 2 hour / 4 hour interim results significantly, although as Dr Harris conceded, results could have been read and "*that didn't happen*". In his submission, Mr Goetz, Counsel for SJOG Pathology stated at paragraph 41 that the tests were not read at the 2 hours interval "*because of the laboratory's workload*". No citation was given for this and I was unable to find it in the transcript of the evidence. In terms of why it took almost four hours to set up the coagulase test on the 25th April, Dr Harris told the court: *"I can't be absolutely sure of that. I believe it may well have been because they were busy at the time and they were receiving a lot of telephone calls about other blood cultures and the*

[37] Transcript page 235.

scientist elected to check the existing blood cultures in preference to setting up the coagulase result on this one.."

He later said that he had spoken to the scientist at the time and that's why she said there was a delay. He had not put this any more strongly *"as it was hearsay"*[38]. He said it can get very busy at weekends.

71. At the conclusion of this very sad inquest, Mr Scott made a very moving speech on behalf of his wife and himself in which he thanked everyone for participating in the hearing and whilst acknowledging that they may never have all the answers they wanted the Finding to cover as many aspects of the case as possible *"..primarily to prevent this from happening to any child in Geelong, to any child in Victoria, to any child in Australia"*.

72. I have endeavoured to do that and I now list the changes that have been made at Barwon Health and St John of God Pathology since Leroy's death that I believe will go some way towards preventing another death in similar circumstances.

Changes at Barwon Health

73. These are outlined in the Submission provided on behalf of Barwon Health and I re-state them below:

i. **The Paediatric Medical Team (MET)**

Prior to Leroy's death, parental concern was not highlighted as a definitive indicator of patient deterioration requiring clinical acknowledgement and action. In line with developments at the Royal Children's Hospital ("RCH") the Geelong Hospital has now adopted new MET call criteria. Those criteria include a criterion which permits a MET call to be made based on parental or carer concern. The concept is built on the notion that parents and carers are the best placed to observe worrying change in their children.

The Geelong Hospital has also sought greater involvement of the MET call team, which features an ICU doctor, in assessing paediatric patients. This represents a cultural shift in practice from April 2011. At that year there were only 2 MET calls for paediatric patients. In the year 2013 there were 119 such calls made. This greater number of MET calls, which result in ICU assessment of paediatric patients, is seen as a great benefit to patients as it allows a "fresh set of eyes" to be brought to a patient's condition. To allow

[38] Transcript page 92.

this cultural change to occur the Hospital has significantly increased its training of ICU and paediatric staff and liaison with RCH.

ii. **A new system of Patient and Carer Escalation of concerns (PACE)**

The Hospital has also formalized a process by which parents and carers can escalate their concerns in the event they feel there is worrying change in their loved one during their hospital stay. This system provides families with a way to ensure escalation and review if they feel their concerns are not being appropriately addressed. The end point of this process is the parent or carer may call a MET. Information is provided to carers and parents and is posted in rooms and corridors within the paediatric Unit. Dr Fuller as head of paediatrics explained the PACE system at T326-327.

iii. **Bedside Nursing Handover**

The handover of patients between nursing staff on paediatric wards now occurs at the bedside. This has the following impact; it allows the parents to understand what the symptoms are the nursing staff have charted and what clinical significance they place on it. The nursing staff also communicate the diagnosis that the doctors have made and what the plan of care is. It allows for parents and carers, those who best know the child and are most often present throughout the period of illness to have input as they deem necessary. The Hospital has produced a brochure which is provided to all parents and carers explaining bedside handover and what to expect.

iv. **New charting systems for Fluid Balance and Observations**

The Hospital has developed new observation and fluid balance charts which it believes are more sensitive to patient changes and also provide easier, clearer guidance to treating staff.

v. **Greater focus of education in both skills and cultural changes**

There has been extensive education training carried out in the areas of:

a) New MET call criteria;

b) The PACE system;

c) Greater interaction between Paediatrics and ICU;

d) Intensive care of sick children;

e) New observation and fluid charts.

vi. **Treatment in the Emergency Waiting Room**

The Hospital recognizes that patients presenting the Emergency Department sometimes have long waits to be reviewed by a doctor. Since November 2011 the Hospital has placed an additional nurse into the waiting room to take observations of presenting patients while they wait to be called in the Emergency Department. The Geelong Hospital is intending to increase the hours of this nursing position so there is a nurse circulating in the emergency waiting room from 07.00 to 11.30 hours each day.

Changes at St John of God Pathology

74 A new model blood culture incubator is now available to SJOG Pathology staff which records "time to productivity" information n relation to blood culture results.

75 An electronic timer now prompts staff to review the tube coagulase tests at intervals of two and four hours.

76 All tube coagulase test must be reviewed before the laboratory closes regardless of when the test was started.

RECOMMENDATIONS

In addition to these welcome reforms, **I RECOMMEND** in addition:

1. That there be clearer protocols between the hospital and SJOG Pathology so that information is readily available to inform hospital staff in relation to the following:
    - The hours of operation over public holidays and weekends.
    - The name and contact details of the on-call scientist for urgent blood results on evenings, weekends and public holidays.
2. That SJOG Pathology should inform Barwon Hospital, via the on-call physician liaison officer with the laboratory, if a coagulase test is to be commenced less than two hours before staff leave in order that a decision might be made by clinical staff as to whether they require the attendance of the on-call scientist to read the results at the 2 hour, 4 hour intervals. Similarly, the same should apply if the 2 hour result is known but the laboratory will be closed when the four hourly interval result is to be known. It would be expected that that physician should then pass on that information to the treating team.

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

The Next of Kin, Andre and Kristine Scott;
Dr Simon Costello;
Dr David Fuller;
The Medical Director, Barwon Health;
The Director, St John of God Pathology;
Dr Peter Vuillerman.

Signature:

JACINTA HEFFEY
CORONER
Date: 4th December 2014.