

IN THE CORONERS COURT  
OF VICTORIA  
AT MELBOURNE

Court Reference: COR 2014 4205

**FINDING INTO DEATH WITH INQUEST**

*Form 37 Rule 60(1)*

*Section 67 of the Coroners Act 2008*

*Amended pursuant to Section 76 of the Coroners Act 2008 on 8 January 2017<sup>1</sup>*

**Inquest into the Death of: Lachlan BLACK**

Delivered On: 13 December 2017

Delivered At: Coroners Court of Victoria  
65 Kavanagh Street  
SOUTHBANK Vic 3006

Hearing Dates: 17, 18 July and 8 September 2017

Findings of: Coroner Rosemary Carlin

Representation: Ms N Hodgson for Monash Health  
Mr J Goetz for Dr Cheek  
Mr P Halley for the family of the deceased

Police Coronial Support Unit Leading Senior Constable Tracey Ramsey, Coroner's Assistant

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<sup>1</sup> This document is an amended version of the finding into Lachlan Black's death dated 13 December 2017. Corrections have been made to a date in paragraph 81 and the subtitle preceding that paragraph, pursuant to Section 76 of the *Coroners Act 2008 (Vic)*, in response to a letter from K&L Gates received on 21 December 2017.

## INTRODUCTION

1. Lachlan Black was two years and seven months old when he died on 18 August 2014 of Group A beta Haemolytic streptococcal septicaemia. He was the much loved first child of Tim and Angela Black. Mrs Black described him as a happy, healthy and active child.
2. Lachlan was fully immunised and apart from suffering benign febrile convulsions, he had no known health issues.<sup>2</sup> His death followed several days of being unwell and multiple consultations with medical professionals. He died during his third presentation to the Monash Medical Centre (**MMC**) in Clayton Victoria.
3. An inquest was held to examine the adequacy of the hospital medical management of Lachlan and in particular whether there were any shortfalls in the diagnosis and treatment of his developing septicaemia.

## CORONIAL INVESTIGATION

### General purpose of a coronial investigation

4. Lachlan's death was reported to the Coroner on 18 August 2014. His death was unexpected and as such, clearly reportable under the Act.
5. Section 67 of the *Coroners Act 2008 (Vic)* (**the Act**) requires a coroner investigating a reportable death to find, if possible:<sup>3</sup>
  - (a) the identity of the deceased;
  - (b) the cause of death; and
  - (c) the circumstances in which the death occurred.<sup>4</sup>
6. *Cause of death* in this context is accepted to mean the medical cause or mechanism of death. The *circumstances* in which death occurred is confined to background or surrounding circumstances which are sufficiently proximate or causally related to the death.

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<sup>2</sup> Febrile convulsions are seizures associated with a fever usually in the context of a viral illness. They occur in 3 per cent of children and are most common in the 6 month to 6 year age group. Lachlan required no treatment other than to reduce any fever that developed.

<sup>3</sup> Reportable death is defined in Section 4 of the Act. Most commonly it refers to unexpected, unnatural or violent deaths, or deaths resulting from accident or injury.

<sup>4</sup> Section 67 of the Act provides that a coroner need not make findings as to circumstances if an inquest was not held, the deceased was not in state care and there is no public interest in doing so.

7. Under the Act, coroners have another important function and that is, where possible, to contribute to the reduction in number of preventable deaths and the promotion of public health and safety by way of making comment or recommendations about any matter connected to the death they are investigating.
8. When a coroner examines the circumstances in which a person died, this is not to lay blame or attribute legal or moral responsibility to any individual or institution. Rather, it is to determine causal factors and identify any systemic failures with a view to preventing, if possible, deaths from occurring in similar circumstances in the future. Coroners do not make determinations of guilt or negligence; they are the province of other jurisdictions. Indeed, the Act specifically prohibits coroners from making a finding or comment that a person has, or may have, committed an offence. A coroner should set out relevant facts, leaving others to draw their own conclusions from the facts.
9. Although it will sometimes be necessary to examine whether particular conduct falls short of acceptable or normal standards, or was in breach of a recognised duty, this is only to ascertain whether it was a causal factor or a mere background circumstance. That is, an act or omission will not usually be regarded as contributing to death unless it involves a departure from reasonable standards of behaviour or a recognised duty. If that were not the case many perfectly innocuous preceding acts or omissions would be considered causative, even though on a common sense basis they have not contributed to death.
10. When the conduct of a professional person is under scrutiny, it is to be judged according to the prevailing standards of their particular profession or specialty. Further, it is important to recognise the benefit of hindsight and to discount its influence on the determination of whether a person acted appropriately.
11. The standard of proof applicable to findings in the coronial jurisdiction is the balance of probabilities with the *Briginshaw* qualification.<sup>5</sup> A finding that a person has caused or contributed to death should only be made after taking into account the possible damaging effect of such a finding upon the character and reputation of that person and only if the evidence provides a comfortable level of satisfaction as to the finding.

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<sup>5</sup> *Briginshaw v Briginshaw* (1938) 60 CLR 336, especially at 362-363. ‘The seriousness of an allegation made, the inherent unlikelihood of an occurrence of a given description, or the gravity of the consequences flowing from a particular finding, are considerations which must affect the answer to the question whether the issues had been proved to the reasonable satisfaction of the tribunal. In such matters “reasonable satisfaction” should not be produced by inexact proofs, indefinite testimony, or indirect inferences...’

12. The *Briginshaw* qualification is of particular significance in this case as the professional conduct of medical practitioners falls to be examined. Given the serious consequences for such a professional person of an adverse finding or comment by a coroner, such comment or finding should not be made without clear and cogent evidence.<sup>6</sup>

### **History of this investigation**

13. Mr and Mrs Black first raised concerns in relation to MMC's medical care of Lachlan and requested an Inquest in a letter dated 18 November 2014. Thereafter I reviewed the matter with independent medical professionals from the Coroners Prevention Unit<sup>7</sup> and obtained a statement, dated 11 August 2015, from Dr Adam Lawrence West, the Director of Paediatric Emergency Medicine at MMC and an expert opinion, dated 6 April 2015, from Dr Nigel Crawford, consultant general paediatrician at the Royal Children's Hospital (RCH).
14. Solicitors for the Blacks submitted further expert opinions from emergency medicine physician, Associate Professor John Raftos, dated 20 March 2016, and infectious diseases physician, Professor Damon Eisen, dated 31 January 2017.
15. At my request MMC provided statements from Lachlan's treating clinicians which were dated variously, but generally in 2016.
16. Leading Senior Constable Tracey Ramsey from the Police Coronial Support Unit assisted in preparing a coronial brief of evidence comprising relevant medical records, statements and material gathered during my investigation. I conducted a mention hearing on 30 May 2017 and an inquest on 17 and 18 July and 8 September 2017. Submissions were filed by interested parties on 2 and 3 October 2017.

### **Focus of the coronial investigation and inquest**

17. There were no issues in relation to Lachlan's identity, the date and place of his death, nor the medical cause of his death. As is often the case the primary focus of the coronial investigation and inquest into Lachlan's death was the circumstances in which he died, specifically the adequacy of his medical management on 15 and 17 August 2014 at MMC.

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<sup>6</sup> *Anderson v Blashki* [1993] 2 VR 89 at 95 and *Secretary to the Department of Health and Community Services v Gurvich* [1995] 2 VR 69 at 74.

<sup>7</sup> The Coroners Prevention Unit is a specialist unit within the Coroners Court staffed by researchers and independent medical professionals, including emergency medicine physicians, with the function of assisting coroners in their investigations and prevention role.

Particular issues were whether there was a failure to recognise Lachlan's developing septicaemia and whether Dr Chong's assessment and treatment was appropriate.

18. At inquest evidence was given by Mrs Black, four MMC clinicians involved in Lachlan's care (Dr Annie Kilpatrick, Nurse Jessica Renfrew, Dr Vi Chong and Dr John Cheek), the head of MMC's Biochemistry Unit, Dr Doery and a panel of four medical experts (**the panel**) comprising Dr Crawford, Associate Professor Raftos, Professor Eisen and Dr West. These medical experts gave their evidence concurrently, a procedure commonly referred to as a '*hot tub*'.

### Sources of evidence

19. This finding is based on the totality of the material the product of the coronial investigation of Lachlan's death. This includes the Coronial Brief (version 3 as at 10 July 2017), the oral evidence of all witnesses who testified at inquest, any documents tendered at inquest and the final submissions of Counsel who appeared. It is unnecessary to summarise all of this material. It will remain on the Court file.<sup>8</sup> I will refer only to so much of it as is relevant or necessary for narrative clarity.

### CIRCUMSTANCES OF DEATH

20. In the evening of **13 August 2014** Mrs Black noticed that Lachlan had developed a fever (his temperature was just over 38 degrees). She gave him Panadol and Nurofen before putting him to bed.
21. The next morning, **14 August 2014**, Lachlan still had a fever. He was also thirsty and tired. After he suffered a febrile convulsion his parents took him to the MMC Emergency Department (**ED**) where he vomited on arrival. He was afebrile at 1.30pm. He was reviewed by house medical officer Dr Tara Krishnan, who noted that Lachlan was lethargic, drowsy and grizzly and that his temperature was 39.4 degrees at home. Dr Krishnan diagnosed a febrile convulsion and made a plan to observe Lachlan in the Short Stay Unit (**SSU**) owing to his lethargy. He improved after sleeping and was discharged after a number of hours. The Discharge Summary took the form of a letter to Lachlan's general practitioner (**GP**) at Highett Medical Centre Dr Vanessa Feakes and described Lachlan as '*activ(e)*,

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<sup>8</sup> From the commencement of the *Coroners Act 2008* (Vic) (**the Act**), that is, 1 November 2009, access to documents held by the Coroners Court of Victoria is governed by s 115 of the Act.

*happy, running around SSU*'. It advised Dr Feakes to test Lachlan for a urinary tract infection (UTI) *'if brought in'*. A copy was given to Mrs Black.

22. In the morning of **15 August 2014** Mrs Black described Lachlan as tired, *'wobbly'* on his feet, thirsty, but lacking appetite. He had a minor cough but no noticeable runny nose. His temperature was 41.5 degrees. He had a fine spotted light pink *'pin prick'* rash all over his torso which felt like *'tiny Braille dots'*. She alternated administration of Panadol and Nurofen.
23. Mrs Black and her parents took Lachlan back to MMC ED at about 4.15pm. He was reviewed by Dr Annie Kilpatrick, a senior, albeit first year paediatric registrar.<sup>9</sup> She read the history from the previous days and documented: *'COugh [sic] and coryzal<sup>10</sup> symptoms. Fever intermittently. ... Urticarial rash today - moving from regions of body. Nil petechiae. Nil diarrhoea nil vomiting. Nil complaints [sic] of pain<sup>11</sup>*. Her clinical assessment was that Lachlan looked well despite being febrile. His temperature was 39 degrees whereas normal temperature for a child of Lachlan's age was less than 38 degrees.<sup>12</sup> He was squirming during her examination. His chest was clear and his abdomen was soft and non-tender. He had flushed cheeks, an erythematous<sup>13</sup> throat and was hydrated. She considered that it was likely he had an on-going viral illness. She believed that she did not see a rash herself (it would have been a significant finding and she did not document it and could not recall it<sup>14</sup>), but from the description (including its transient nature) thought it typical of *'a viral rash that can occur in children'*. She noted that Lachlan's mother and grandfather had each experienced recent flu-like symptoms which made *'viral infection more likely than bacterial infection'*.

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<sup>9</sup> In August 2014 Dr Kilpatrick had completed two and a half years as a paediatric doctor. Her job title was senior registrar in the ED. This was her first year as a paediatric registrar, but prior to that she had been a neonatal intensive care unit registrar and had experience in general paediatric and emergency care. She completed her clinical and written paediatric exams in July 2014 - T 16, 23, 38, 85-86.

<sup>10</sup> Irritation and inflammation of the mucous membrane inside the nose.

<sup>11</sup> Dr Kilpatrick described an urticarial rash as a slightly raised red rash, sometimes itchy and often associated with a viral infection to be contrasted with a petechial rash (pin point or dot like, purple or red, semi-permanent and non-blanching) which could indicate bacterial infection. She was not aware of and had never seen an urticarial rash in a bacterial infection - T 17, 41- 44.

<sup>12</sup> Dr Kilpatrick - T 18.

<sup>13</sup> Red.

<sup>14</sup> T 83. In earlier evidence she was certain that she did not.

24. Nursing observations at 4.10 pm were: temperature 37.2 degrees and respiratory rate 28 (pulse not taken). At 4.55pm nursing observations were: temperature 38.2 degrees and pulse 141 (respiratory rate not taken). Dr Kilpatrick decided Lachlan was fit to go home and he was discharged at 4.57pm. She did not consult with anyone else, as was her prerogative. Her Discharge Summary, which was sent to Dr Feakes, advised to continue with paracetamol<sup>15</sup> and ibuprofen<sup>16</sup> and to return if there were further concerns, including increase in work of breathing, a different rash, or decreased oral intake. She advised Mrs Black to attend the GP the next day.
25. In the morning of **16 August 2014**, Lachlan's rash appeared darker. He was still very thirsty but otherwise seemed normal. Mr and Mrs Black took him to see Dr Feakes. Dr Feakes reviewed the MMC Discharge Summaries. On examination she noted a red throat, clear chest, mild otitis media<sup>17</sup> in his ears bilaterally and a fine rash over his body. She suspected 'slapped cheek disease' caused by parvovirus and suggested supportive management.<sup>18</sup> She also requested parvovirus serology on Mrs Black following a discussion about parvovirus and the management options.
26. At home that evening, Lachlan was very thirsty, much more grizzly than normal, had little to no appetite, was very tired, did not want to stand up or walk and had a slightly loose bowel movement. He had difficulty sleeping, was distressed and extremely unsettled. His parents managed him at home with paracetamol and ibuprofen. According to Mrs Black although he *'had the worst night's sleep we had ever experienced...we did not take Lachlan to hospital at that point as we kept being told "it's just a virus" and "keep doing what you are doing" by doctors so we started to doubt our own judgment'*.
27. In the morning of **17 August 2014** Lachlan twice asked *'is it cold?'*. His urine was dark, he was not walking at all, he wanted to be held and *'just didn't seem right'*. His parents were very worried and as the Highett Medical Centre was closed that day, took him to another clinic in Highett where they saw GP, Dr Victor Kelmann soon after 8.00am. Dr Kelmann

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<sup>15</sup> An analgesic and antipyretic (for preventing or reducing fever) drug. It is used for the relief of mild to moderate pain and fever.

<sup>16</sup> A common over-the-counter antipyretic medication.

<sup>17</sup> Infection of the middle ear.

<sup>18</sup> Parvovirus is a common childhood virus that characteristically causes a fine reticular rash and coryzal symptoms. Severe complications include aplastic anaemia (bone marrow failure) and congenital infection if a pregnant woman is infected.

noted that Lachlan was drinking in the consultation room, had a slightly itchy rash over his trunk and face, a slightly red throat and small cervical glands. His temperature was 37.2 degrees. He thought Lachlan had either ‘slapped cheek disease’ or a different viral illness. Dr Kelmann advised lukewarm bathing, calamine lotion for the rash and continuation of paracetamol and ibuprofen.

28. Around midday Lachlan’s parents took him back to MMC ED. The paediatric ED was particularly busy that afternoon with many patients overflowing into the main ED waiting room.<sup>19</sup> Hospital records document Lachlan as presenting at 1.06pm due to on-going concern with lethargy, poor oral intake and fever. At 1.12pm he was seen by a nurse and triaged as category 3 (to be seen within 30 minutes). At that time he had an elevated pulse of 180 (tachycardia),<sup>20</sup> his temperature was 37.3 degrees (normal) and his pain score was 5. His last dose of Nurofen was noted as 8.00am.

29. At around 1.49pm Lachlan was reviewed by Dr Vi Chong, senior ED registrar. She thought his elevated pulse at 1.12pm was possibly attributable to his high level of distress and/or dehydration.<sup>21</sup> She documented as the presenting problem that he was ‘*more lethargic and had a very unsettled night. Not wanting to walk today and gets very upset when picked up*’. She noted that he was miserable with a snotty nose, mild increased work of breathing, mild dehydration, a fine blanching rash over his body, no temperature, clear chest and soft and non-tender abdomen. Neurologically, he was not photophobic or meningitic. She thought he had an appropriate demeanour and level of activity and did not believe that he showed signs of sepsis. She stated that rashes such as Lachlan’s ‘*can appear in children with a viral illness*’.<sup>22</sup> She considered his lack of fever to suggest a resolving viral illness.<sup>23</sup> Her provisional diagnosis was viral illness associated with mild dehydration and she decided to admit him to the SSU for oral hydration and pain relief by way of Panadol or Nurofen.

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<sup>19</sup> See statements of Dr Wilson, Nurse Quinn, Dr Cheek.

<sup>20</sup> The normal range for his age being between 76 and 142 (1<sup>st</sup> to 99<sup>th</sup> per centile) based on population data. Fleming S, Thompson M, Stevens R. Normal ranges of heart rate and respiratory rate in children from birth to 18 years: a systemic review of observational studies. *Lancet*. 2011;377(9770):1011-1018. A heart rate above 160 breached the MET criteria - T 97.

<sup>21</sup> T 166 - 171. She had not previously been informed of it.

<sup>22</sup> Statement of Dr Chong dated 21 October 2016.

<sup>23</sup> T 211, 218. An interpretation supported by Dr Kilpatrick at T 84 - 87.



30. Dr Chong gave evidence that she did not at that time consider that a bacterial infection might have been the cause for Lachlan's condition. Indeed it was not until his Venous Blood Gas (VBG) results some hours later that the thought occurred to her. She conceded that it should have been a consideration at 1.49pm, but denied that the rash was more indicative of a bacterial, rather than viral infection.<sup>24</sup>
31. Nursing notes at 2:32pm described Lachlan as alert but lethargic, rosy cheeks and dry lips with normal work of breathing, warm and well perfused and tolerating milk.
32. At approximately 3.00pm Mrs Black noticed that Lachlan's knees were swollen and he appeared to have a raised red lump on the inside of his left knee. At 3:13pm Nurse Renfrew measured his heart rate at 183 beats per minute, temperature 37 degrees, respiration rate 28. She noticed he did not want medical staff to touch him and documented '*1515 pt agitated +++ parents concerned about several spots on his legs, Dr aware and advised EMLA*'.
33. At around 3.15pm Dr Chong examined Lachlan in response to the parents' concern about his knees.<sup>25</sup> She claimed not to have been informed of his persistent tachycardia.<sup>26</sup> She made a retrospective note in the records:

*Patient reviewed, drinking but still not wanting to move around very much. Mum notes a rash around the knees & ? knees quite painful to touch. On examination, rash on knee insignificant, ? mild swelling medial aspect of both knees, not hot/red. Upset being touched or moving knees. Hips ok, foot ok. Elma [sic] applied – for admission and bloods ?viral myositis/? post viral joint swelling.*

Dr Chong elaborated that she saw a fine blanching rash on his knees and legs, very similar to that previously observed on his body.<sup>27</sup> She explained that she considered all symptoms to be consistent with viral illness. She thought his knee swelling and reluctance to walk

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<sup>24</sup> T 176 - 181, 236 237 and 256 '*the thought didn't occur to me that this could be a bacterial infection at that time*'. It is unclear whether she resiled from this concession at T 237.

<sup>25</sup> Dr Chong believed her review was between 3.30 and 4pm but Nurse Renfrew's note, the parents' recollection and photographs of Lachlan taken at 3.24pm with a bandaged hand indicate that her examination occurred and the EMLA was applied before 3.24pm. Nurse Renfrew believes she also told Dr Chong of the heart rate - T 102.

<sup>26</sup> T 193. Nurse Renfrew recalled telling a female doctor – T 98 and 102.

<sup>27</sup> Statement and T 183 - 184.

gave rise to the differential diagnoses of viral myositis<sup>28</sup> and/or post viral joint swelling. She decided to perform blood tests and admit Lachlan to the general paediatric ward. In preparation for the blood tests EMLA anaesthetic cream and patches were applied to Lachlan's hands and inner elbows.

34. After her examination Dr Chong left Lachlan to allow the EMLA cream to take effect (between 30 to 40 minutes). Photographs of Lachlan taken by the parents at 3.24pm and 3.25pm show Lachlan lying in bed with closed eyes, bare legs and a crepe bandage on his hand post application of the EMLA cream.
35. Dr Chong then became occupied with a procedure on another patient, so at 4.30pm she asked Dr Kilpatrick to insert the intravenous cannula (**IVC**) and take bloods for a full blood examination (**FBE**), C-reactive protein (**CRP**)<sup>29</sup> and blood culture.
36. Upon meeting Lachlan, Dr Kilpatrick noticed that he had deteriorated since 15 August. She gave evidence: *'he was not the happy boy that was running around the department that I recollected. ... he was in bed, laying in bed and looking quite unhappy'*.<sup>30</sup> She took Lachlan and his parents to the procedure room of the main paediatric ED. She noticed that Mr Black carried Lachlan because he was refusing to walk. There was a delay of about 30 minutes whilst she found someone to assist. She then made an initial unsuccessful attempt to insert the cannula into Lachlan's hand before successfully inserting it in his left cubital fossa. She was satisfied that the cannula was in the correct position as it flashed back immediately and she was able to take sufficient blood samples.<sup>31</sup> At some stage Dr Chong briefly entered the room to observe progress. Hospital records indicate that the blood was collected at 5.30pm (Specimen **ID 14068429**).
37. Mrs Black asserted that Dr Kilpatrick tried at least six times to insert the cannula. Dr Kilpatrick responded that the same doctor would never attempt the procedure so many times. She was adamant that she succeeded on the second attempt. Dr Kilpatrick

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<sup>28</sup> Inflammation of the muscles.

<sup>29</sup> The C-reactive protein (**CRP**) is a marker of inflammation. It is generally non-specific, but a level greater than 100 can be highly suggestive of bacterial infection rather than viral infection. Other inflammatory conditions can result in a significantly raised CRP.

<sup>30</sup> T 23-24.

<sup>31</sup> T 67, 81-82.

demonstrated a clear memory of this event, her account was inherently credible and I accept her version on this point.

38. When the tourniquet was removed Dr Kilpatrick noted petechiae on Lachlan's arm. This was the only place she noticed the rash, but she could not be certain the rash was not elsewhere as she did not do a thorough examination.<sup>32</sup> She thought the rash was likely due to the tourniquet, but because it had only been in place for five minutes she was concerned there may have been another cause such as a low platelet count from a bacterial infection. She took the blood vials to Dr Chong and explained that because of the petechiae the bloods should be tested urgently. She then returned to the procedure room, ascertained that the cannula was still patent by flushing it, and bandaged Lachlan's hand.
39. Mrs Black described Lachlan as drifting in and out of consciousness or sleep during the procedure,<sup>33</sup> with breathing that was fast and shallow. She could not recall if she brought that to anyone's attention, but said it was immediately apparent. Dr Kilpatrick denied that Lachlan was lapsing into unconsciousness and gave evidence that if that had happened she and her assistant, also a doctor, would have escalated his care and notified a senior consultant. She claimed he was alert and interacting throughout the procedure. She did not examine Lachlan to determine the extent of his petechial rash, nor conduct any other investigations because as far as she was concerned she was simply carrying out a procedure at the request of the treating doctor. It appears she did not tell Dr Chong that Lachlan was noticeably worse than two days before as neither she, nor Dr Chong recalled such a conversation, but in any event she was satisfied that taking bloods was appropriate treatment.
40. Dr Chong was told by Dr Kilpatrick that Lachlan was interacting with his parents during the procedure.<sup>34</sup> She stated:

*I did not at that time consider it appropriate to administer antibiotics on the basis that the patient remained clinically unchanged, he remained interactive and he had no fever the*

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<sup>32</sup> T 48. She only recalled seeing his other arm, although the photographs reveal that Lachlan's legs would have been visible.

<sup>33</sup> T 10.

<sup>34</sup> T 200 - 201.

*entire afternoon in the ED. I therefore decided to wait for the blood test results to provide additional information regarding the patient's inflammatory markers.*<sup>35</sup>

41. Dr Chong was shown her signed pathology request slip which listed the several '*tests requested*' in typeface except for '*blood culture*' which was handwritten. She explained that she had completed the form on the computer and added the words '*blood culture*' after the form had printed, but could not now recall the reason for this as it was routine to order a blood culture for patients with a history of fever.<sup>36</sup> The reason for the tests was stated to be '*? pots [sic] viral joint swelling*'.
42. Dr Chong did not examine Lachlan after being told about his petechial rash as, she claimed, Dr Kilpatrick told her it was only on the arm with the tourniquet and it had been a lengthy procedure requiring '*a lot of immobilisation and handling*'.<sup>37</sup> Dr Kilpatrick gave evidence that she would have examined Lachlan in that situation (as did Dr Cheek<sup>38</sup>) and, somewhat reluctantly, Dr Chong admitted that she should have done so.<sup>39</sup> Further, since bloods had been taken, Dr Chong agreed there was no downside to administering antibiotics at that time and if the rash had been elsewhere she would have administered antibiotics.<sup>40</sup>
43. Dr Chong did not recall precisely what she did with the blood vials given to her by Dr Kilpatrick but was confident she would have promptly put them in the '*chute*' to go to pathology in accordance with her '*automatic*' practice. The chute was in the ED just outside the procedure room where the IV cannulation took place and items placed in the chute were conveyed by means of internal piping throughout the hospital.<sup>41</sup> Blood tests from ED are usually placed in a red bag and are given priority so she did not see the need to mark the pathology request slip '*urgent*' or to call the laboratories. She could not account for the fact there was a 28 and 29 minute delay between collection of Specimen **ID 14068429** and its

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<sup>35</sup> Statement of Dr Vi Chong dated 21 October 2016.

<sup>36</sup> T 124 - 127, 198 - 199.

<sup>37</sup> T 133 - 136, 138 - 139. Dr Kilpatrick, who gave evidence before Dr Chong, was not asked whether she had said this.

<sup>38</sup> T 268.

<sup>39</sup> T 139 - 140.

<sup>40</sup> T 190 - 192.

<sup>41</sup> T 158 - 159

reception in the haematology and biochemistry laboratories respectively, but did not believe she had been distracted by her involvement in the other procedure.<sup>42</sup>

44. After the cannulation Dr Chong spoke to the paediatric ward registrar, Dr Wilson to arrange Lachlan's transfer to the ward (although it never eventuated).

45. At 5.30pm ED consultant Dr Cheek took over management of the paediatric ED after receiving a handover in relation to all patients, including Lachlan, from the day ED consultant, Dr Craig. Dr Cheek gave evidence that when he first heard about Lachlan his diagnostic bias was towards viral infection.<sup>43</sup>

46. At around 5.45pm Lachlan returned to SSU from the main ED. Nurse Renfrew took his pulse and other vital signs. At 5.45pm his pulse was 189, temperature 37.2 degrees, respiration rate 28. She recorded '*vitals are now breaching MET Call Criteria*',<sup>44</sup> *Dr aware, allow[sic] pt to settle then re check with aim to go to ward*'. The evidence is not clear to whom Nurse Renfrew conveyed this information.<sup>45</sup>

47. At 6.21pm the haematology laboratory called Nurse Renfrew to report that FBE was not available as specimen **ID 140684829** had clotted and a new sample was required. Simultaneously this result became viewable on hospital computers by accessing the pathology results program.

48. At 6.28pm Nurse Renfrew repeated Lachlan's measurements - pulse 182, temperature 37.5 degrees, respiration rate 28 - and documented that he was resting comfortably. Her recollection was that generally throughout the afternoon '*when medical staff were not touching him, [he] was able to be distracted, watched television and cuddled his parents*',<sup>46</sup> but agreed she could not be certain about that.<sup>47</sup>

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<sup>42</sup> T 163 - 164, 219 - 220.

<sup>43</sup> T 265.

<sup>44</sup> MET stands for the Medical Emergency Team. Criteria have been established based on vital sign observations (heart rate, respiratory rate, oxygen saturations, blood pressure and neurological status) which if breached prompt notification of the MET who attend to assess the patient on an urgent basis. The role of the MET process is to acknowledge and assess sick or deteriorating patients earlier to prevent terminal events.

<sup>45</sup> T 103, 111 - 112. Her statement says Dr Cheek, but she agreed it might not have been him.

<sup>46</sup> Statement of Nurse Jessica Renfrew dated 11 May 2017.

<sup>47</sup> T 115.3.

49. Nurse Renfrew advised Dr Chong and Dr Cheek, who were together in the write up area, about the heart rate and presumably the FBE result. Dr Cheek suggested a fluid bolus and Dr Chong ordered the fluid bolus followed by continuous fluid infusion. Dr Chong then handed the care over to Dr Cheek as she was about to finish her shift. Dr Cheek had '*some concern*' at the reporting that Lachlan was reluctant to walk as it suggested a neurological condition.<sup>48</sup> He regarded Lachlan's persistent tachycardia as the most concerning symptom.<sup>49</sup>
50. About this time it was discovered that Lachlan's IVC had dislodged. Dr Cheek immediately arranged for Lachlan's transfer from the SSU to an ED procedure room where he quickly inserted a repeat IVC with help from Nurse Renfrew and between 6.55pm and 6.59pm took blood for testing.<sup>50</sup> Specimen **ID 14684905** was recorded as collected at 6.55pm and tested for VBG within the ED, with results available for viewing within minutes. Specimen, **ID 140684906** was sent for FBE testing and culture. This sample was marked as '*collected*' at 6.59pm by the microbiology laboratory and '*received*' at 6.59pm by the haematology laboratory (collection time not stated), indicating that on this occasion there was no delay in the bloods being received by the laboratories.
51. Dr Cheek noted the VBG results were indicative of, he believed, mild acidosis and mildly raised lactate levels (pH 7.29 mmHg, pCO<sub>2</sub> 36 mmHg, bicarbonate 17 mmol/L, base excess -8, lactate 5.4 mmol/L),<sup>51</sup> sodium (136 mmol/L), potassium (5.2 mmol/L), urea (13.4 mmol/L) and creatinine (67 umol/L).<sup>52</sup>
52. Dr Cheek explained that he did not order a new CRP analysis when he took the blood samples because he did not know or suspect there was a problem with the first CRP test at that time. However, only minutes later - at 7.01pm - the biochemistry unit reported on the hospital pathology results program that the CRP analysis of specimen **ID 140684829** had also failed due to insufficient sample. Dr Cheek gave evidence that he was not told of this

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<sup>48</sup> T 266.

<sup>49</sup> T 269.

<sup>50</sup> According to the family Dr Cheek took blood from Lachlan's foot.

<sup>51</sup> This VBG result is consistent with metabolic acidosis. The potential causes are wide-ranging but sepsis and kidney failure would be considered high on the differential diagnoses list given the clinical picture.

<sup>52</sup> The potassium was mildly elevated and the urea and creatinine were elevated. This is consistent with acute kidney injury (**AKI**). AKI can cause metabolic acidosis or can be a result of another cause of metabolic acidosis such as sepsis. Other possible causes of AKI in this setting were HUS, TTP (see footnotes 21 and 22 for definitions) or hypovolaemia (a decreased volume of blood circulating in the body) due to sepsis or dehydration.

failure and explained that it would have been possible for him to take more blood at that stage if necessary. However, as he had already decided on his course of treatment this lack of knowledge was not critical.<sup>53</sup>

53. During the cannulation procedure Nurse Renfrew noticed that Lachlan had started grunting. This was the first time she noticed a real change in his presentation.<sup>54</sup>
54. After insertion of the new IVC Lachlan was returned to the SSU where he was given a bolus of IV fluid followed by maintenance IV fluid. According to his parents his tummy became bloated, he was moaning and grunting and his breathing was very fast and shallow. At 7.30pm Nurse Renfrew documented that the bolus was complete, Lachlan's heart rate was 178 beats per minute, his temperature was normal and he was still grunting when breathing. She informed Dr Cheek.
55. Dr Cheek transferred Lachlan back to a resuscitation cubicle in the main paediatric ED at around 7.30pm as there was a higher ratio of nurses and it meant Lachlan was visible from his desk. At 7.35pm Lachlan's pulse was 179 and his respiration rate was 28 (temperature not taken).
56. Although Dr Cheek was concerned about the blood gas results, persistent tachycardia and refusal to walk, he did not administer antibiotics as '*I suppose I required a weight of evidence to derail me from the initial cognitive bias*', that is, towards a viral illness.<sup>55</sup> Instead he spent about 20 to 30 minutes examining Lachlan and taking a detailed history from his parents. He found Lachlan's communication to be inconsistent, sometimes appropriate and sometimes not. He observed him to be alert and conscious, but was concerned at the parents' advice that he was in and out of consciousness, which he took to mean Lachlan was of variable verbal responsiveness.<sup>56</sup>
57. Nursing observations at 8.00pm included that Lachlan was saturating well on room air, was alert but lethargic and able to be distracted by the television. His pulse was 179,

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<sup>53</sup> T 273.

<sup>54</sup> T 109.

<sup>55</sup> T 275.

<sup>56</sup> T 263.

temperature 36.5 degrees and respiration rate 60. Lachlan's blood pressure was measured for the first time since his admission and was 110/57.

58. Subsequent progress notes and observations were:

**2022 hrs**      **Progress note 2:** *“Patient failed SSU. Tachycardic, tachnopeic, Grunting. Does not appear to be distressed. Saturating well on room air. Plan maintain fluid running as per chart. Dr John reviewing patient. Awaiting further plan.” (Quinn)*

**2030 hrs**      **Observations:** *“temp 36.7°C, pulse 183, RR 64, sat O2 99%, GCS 15”*

**2035 hrs**      **Progress note 3:** *“lights dimmed in room and TV reduced to suitable level to attempt to get the child to settle. Remains on cardiac monitoring HR 180's and RR 65/min, child grunting intermittently.” (Sage)*

59. After examining Lachlan Dr Cheek became concerned that Lachlan may have sepsis or bacterial meningoenophalitis.<sup>57</sup> This was due to his persistent tachycardia, fluctuating mental state, irritability and deteriorating renal function. He did not immediately order antibiotics because he wanted to check with the on-call paediatrician that it was appropriate to do so in the absence of a full septic screen (given the potential to complicate later treatment).<sup>58</sup> At 8.30pm Dr Cheek called Dr Peter Gowdie, General Paediatrician, who approved the administration of antibiotics and Dr Cheek verbally ordered Ceftriaxone<sup>59</sup> and Flucloxacillin during the telephone call. He did not 'chart' (write down) this order because he was on the telephone and he considered it was a 'resuscitation situation', in that *‘I was trying to get a lot of things done quickly to Lachlan at the same time and I expected that he was receiving - and he was receiving one on one nursing during that period when I was trying to work out what was going on’*.<sup>60</sup> He did not recall to whom he gave the order, but recalled there were nurses present.<sup>61</sup> He did not check to see whether the antibiotics were in fact administered.<sup>62</sup>

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<sup>57</sup> He did not rule out viral conditions particularly given Lachlan's afebrile status. Dr Cheek's hospital notes at 1.15am incorrectly record 'fever', which was not the case, page 188 of the Coronial Brief.

<sup>58</sup> T 276.

<sup>59</sup> A broad-spectrum antibiotic used in the empirical management of sepsis.

<sup>60</sup> T 277.

<sup>61</sup> T 277, 289.

<sup>62</sup> T 277.



60. Thereafter Dr Cheek discussed Lachlan's case with several other specialist colleagues namely, Dr Peter Downie, Paediatric Haematologist, and Dr Amelia Le Page, Paediatric Nephrologist, and the laboratory scientist. The full blood picture from Specimen, **ID 140684906** was called through to ED at 8.59pm and uploaded onto the system at 9:00pm. It showed haemoglobin of 125g/L, white cell count  $5.9 \times 10^9/L$ , platelet count  $26 \times 10^9/L$  with a blood film showing occasional fragmented cells and rare bite cells;<sup>63</sup> and ESR 15 mm/hr.<sup>64</sup> At this stage the differential diagnoses were widened to Haemolytic Uraemic Syndrome (**HUS**)<sup>65</sup> and Thrombotic Thrombocytopenic Purpura (**TTP**).<sup>66</sup>
61. Dr Cheek referred Lachlan for admission to the Intensive Care Unit (**ICU**) and he was reviewed by ICU registrar, Dr Bourke, at 9.05pm. She documented a miserable child who was groaning and grunting with breathing, had tachycardia and tachypnea,<sup>67</sup> normal blood pressure, and a distended, but soft, abdomen. Her working diagnosis was TTP. She accepted Lachlan for admission to the ICU pending a plan from the ED team following discussion with the General Paediatric Team.
62. At 9:35pm Lachlan's nurse, Ms Rushton, observed him to be tachycardic, tachypnoeic with expiratory grunting, clenching teeth and arching his back. She also noted a tight distended abdomen, puffy face, especially around the eyelids, and a mottled petechial rash '*now on upper thighs which parents have not noticed before*'. He was very distressed.
63. At approximately 10:10pm nursing staff noted Lachlan to be cyanotic.<sup>68</sup> He was immediately reviewed by Dr Cheek and Dr Slaa, the paediatric ward registrar. Dr Slaa documented her findings as '*acutely unwell child; grunting, mottled, irritable +++; unable*

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<sup>63</sup> The haemoglobin is normal, the white cell count is normal and the platelet count is markedly reduced. The presence of bite cells and fragments on the blood film could be suggestive of multiple causes including haemolysis, disseminated intravascular coagulation, HUS and TTP. The picture could be consistent with sepsis, but other causes are not excluded, including HUS and TTP.

<sup>64</sup> ESR is the Erythrocyte Sedimentation Rate and is a non-specific marker of inflammation. This level is mildly elevated.

<sup>65</sup> A rare immune mediated condition usually triggered by bacterial infection that is characterised by breakdown of red blood cells (haemolysis), kidney failure (leading to uraemia) and destruction of platelets causing a low platelet count (thrombocytopenia).

<sup>66</sup> A rare disorder of blood coagulation characterised by clots (thrombi) in small blood vessels, low platelet count (thrombocytopenia) and a deep purple rash (purpura).

<sup>67</sup> Rapid breathing.

<sup>68</sup> The appearance of a blue or purple coloration of the skin or mucous membranes due to the tissues near the skin surface being low on oxygen.

to obtain blood pressure (BP), unable to record saturations; heart rate (HR) 190 bpm, respiratory rate (RR) 50 bpm'. In her statement she described Lachlan as having a fine petechial rash over his body, clenching his teeth, shaking his head and making a high pitched squeal. Lachlan was provided oxygen via face mask, a second IV cannula was inserted, further blood tests were taken at 10.14pm (blood gas) and 10.20pm (CRP and others) and a saline bolus given. At 10.15pm Dr Cheek asked Dr Slaa to 'make sure' the Ceftriaxone was charted.

64. At 10.16pm the blood gas results showed a deterioration in his VBG (pH 7.23 mmHg, pCO<sub>2</sub> 38 mmHg, bicarbonate 15 mmol/L, base excess -11 and lactate 6.4 mmol/L)<sup>69</sup> At 10.58pm his other blood results were available, including his CRP which was elevated at 275 mg/L.<sup>70</sup> This was the first CRP result.
65. Hospital records show that IV antibiotics (Ceftriaxone) were first administered at 10:35pm. Dr Cheek was certain that he did order antibiotics at 8.30pm. He said there were a number of nurses around and he could not remember to whom he spoke. The reason he asked Dr Slaa to chart them at 10.15pm was because Lachlan's mental state had deteriorated, he was re-assessing his diagnostic suspicions and he was checking that all the things that should have been done had been done.<sup>71</sup> He could not explain why his first order was not carried out other than to say it must have been human error. He indicated he has now changed his practice, so that if he is on the telephone he takes the telephone to the bedside and watches the antibiotics being given, or gives them himself.<sup>72</sup>
66. Lachlan was intubated at 10:42pm after a rapid sequence induction involving sedation and paralysis. Dr Gowdie, who was on call, but not on site, instructed broadened antimicrobial management including Flucloxacillin and Acyclovir to complete sepsis cover, further blood tests (Specimen **ID 140685225** is recorded as having been collected at 11.25pm) and a platelet infusion.

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<sup>69</sup> This shows a progression of the previously documented metabolic acidosis.

<sup>70</sup> This CRP was significantly raised. Whilst non-specific for infection or inflammation, a CRP greater than 100 is more suggestive of a bacterial infective process than a viral infection.

<sup>71</sup> T 278.

<sup>72</sup> T 280.

67. A computerised tomography (CT) scan was organized, however it was not conducted as Lachlan deteriorated rapidly and was transferred to ICU at approximately 11.30pm. Dr Gowdie arrived just prior to 12:00am. Lachlan continued to deteriorate in the ICU where cardiopulmonary resuscitation (CPR) was commenced at 12.15am and continued for 30 minutes until Lachlan was declared deceased.
68. Dr Cheek described the deterioration that he witnessed in Lachlan late in his shift as '*extraordinarily rapid*'.<sup>73</sup>
69. At 7.06am the next morning the blood cultures from **Specimens 140684829** and **140684906** flagged positive. The bacteria was subsequently identified as *Streptococcus pyogenes* susceptible to penicillin.

## **LACHLAN'S CAUSE OF DEATH**

### **Post mortem examination**

70. On 20 August 2014 Forensic Pathologist Dr Joanna Glengarry conducted an autopsy on the body of Lachlan at the Victorian Institute of Forensic Medicine (VIFM). After reviewing all the evidence including the MMC medical records and post mortem microbiological samples, she formulated the cause of death as:

*Ia. Group A Beta-Haemolytic Streptococcal Septicaemia*

71. Microbiology revealed widespread growth of beta-haemolytic group A *Streptococcus* within the lungs, liver, spleen and middle ears. A nasopharyngeal aspirate also detected coronavirus RNA, a common cause of mild to moderate upper respiratory tract illness.

### **Group A Streptococcus**

72. Dr Crawford explained in his statement that *Streptococcus* are a type of bacteria that are divided into a number of serotypes including alpha and beta haemolytic. The beta haemolytic subtype includes *Streptococcus pyogenes*, also known as Group A *Streptococcus* (GAS). GAS is a common infective agent in children and adults that causes the widest

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<sup>73</sup> T 287.

range of clinical disease in humans of any bacterium. The spectrum of GAS disease can be divided into superficial, invasive, toxin-mediated and post-infectious diseases.

73. The most common infections caused by GAS are superficial infections, including of the throat and skin, which occur particularly in children. Invasive Group A Streptococcus (IGAS) diseases are less common but have high rates of mortality and long-term morbidity. They include bacteraemia,<sup>74</sup> necrotising fasciitis<sup>75</sup> and meningitis. The incidence of IGAS infection in Victoria is approximately 2.7 cases per 100,000 of the population.<sup>76</sup> Rates are highest in the elderly and in children under 5 years.

74. GAS toxin-mediated diseases include scarlet fever and streptococcal toxic shock syndrome (STSS). STSS is a serious complication of IGAS infection and has been found to have a case fatality rate of 23 per cent. It is defined by the following criteria:

- GAS isolated from a normally sterile site; and
- Hypotension in combination with at least two of the following: renal impairment, coagulopathy, liver abnormalities, acute respiratory distress syndrome, extensive tissue necrosis or erythematous rash.

75. Dr Crawford was of the view that Lachlan fulfilled the criteria for STSS as he had GAS isolated from a normally sterile site (lung, liver and spleen at post mortem) and he had hypotension in combination with five of the required features, namely renal impairment, coagulopathy, liver abnormalities, acute respiratory distress syndrome, erythematous rash. He formulated Lachlan's cause of death as sepsis related to IGAS and, more specifically, STSS.

## **EVIDENCE OF THE EXPERT PANEL**

76. In advance of giving evidence each panel member was provided with the Coronial Brief, the transcript of the evidence of the treating clinicians and a document headed 'Summary For

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<sup>74</sup> Bacteria in the blood stream.

<sup>75</sup> A severe and aggressive infection of the skin and subcutaneous tissue.

<sup>76</sup> O'Grady KF, Kelpie L, Andrews RM, et. al. The epidemiology of invasive group A streptococcal disease in Victoria, Australia. *Med J Aust.* 2007;186(11):565-569; Lithgow A, Duke T, Steer A, Smeesters PR. Severe group A streptococcal infections in a paediatric intensive care unit. *J Paediatr Child Health.* 2014;50:687-692.

Experts', which was essentially identical to the above Circumstances of Death.<sup>77</sup> The panel members were instructed to rely on the Summary For Experts, although they were not limited to it.

77. On the day the panel gave evidence, the panel was presented with a list of questions and allowed to consider their answers in private. The Court reconvened in the afternoon to hear their evidence, which is summarised below. Unless otherwise indicated, I accept the evidence of the expert panel, and in the case of divergence, the majority.

### **General observations about viral and bacterial illnesses**

78. Viral illnesses, such as influenza, can cause severe illness and death in young children. By far the vast majority of children who present to hospital EDs with fever have a viral illness. With the advent of immunisations Associate Professor Raftos estimated the ratio to be over 95%. Dr West put it at over 99% and Dr Crawford explained that the older the child, the less likely it is that the child will have a bacterial infection. It was therefore understandable that treating clinicians would have a cognitive bias towards viral illness.

79. There is also considerable overlap in the symptoms of viral and bacterial or other serious illnesses. Associate Professor Raftos expressed it thus: *'The differences in symptomatology and presentation between viral illness and bacterial illness are very subtle and they're often very difficult to pick up in the first instance until the patient becomes very unwell. So we rely on the objective things ... like fast heart rate or low blood pressure or fast respiratory rate ... to provide the triggers'* for further action.<sup>78</sup> Abnormal VBG would be another trigger. Hospitals should have systems in place to govern the mandatory responses to those triggers and to eliminate as far as possible, human error.

80. Commonly observed symptoms of IGAS in children include (in roughly descending order of frequency) temperature for two to three days, limb and joint pain, inability to walk, pain in other areas and vomiting and diarrhoea.

### **The medical management of Lachlan**

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<sup>77</sup> The main differences being the omission from the Summary For Experts of any commentary and footnotes.

<sup>78</sup> T 49.

15 August 2014<sup>79</sup>

81. Dr Kilpatrick's assessment and treatment on 15 August 2014 was reasonable,<sup>80</sup> save that Associate Professor Raftos believed that blood should have been taken for testing given it was Lachlan's second presentation and high fever was reported.

17 August 2014

82. The possibility that Lachlan had a bacterial infection should have been considered when he presented to hospital on 17 August 2014 as it was his third presentation, his heart rate was elevated (180 ppm) and he complained of pain in his leg.

83. Although Lachlan had symptoms of a viral infection upon presentation to MMC on 17 August 2014, his history of persistent fever including very high temperature, his difficulty in walking and his tachycardia all pointed towards a bacterial infection.

84. Lachlan's (relatively<sup>81</sup>) afebrile status on 17 August was not inconsistent with bacterial infection. However it may have given false reassurance to clinicians and delayed recognition of the possibility of bacterial infection. Patients with a bacterial infection usually present with a fever, but not always. There can be many reasons for absence of fever including simple fluctuation, previous administration of antipyretic medication (Lachlan had Nurofen in the morning) or, in the case of bacterial sepsis, the advanced state of the infection may render the body incapable of mounting an increase in temperature.

85. It is not possible to determine the precise time that Lachlan's bacterial infection became invasive however, it was almost certainly invasive by the time he presented to MMC on 17 August 2014. His sepsis was likely the reason that he remained afebrile during this admission and was also a likely cause of his petechial rash upon removal of the tourniquet and his ultimately normal white cell count.

86. There were no issues with the actual manner of taking the initial blood sample from Lachlan, how it was conveyed to the various laboratories, nor the time taken for it to be received in those laboratories, although Dr West thought 30 minutes was at the upper limit

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<sup>79</sup> Amended from '16 August 2014' to '15 August 2014' pursuant to s 76 of the *Coroners Act 2008*.

<sup>80</sup> Amended from '16 August 2014' to '15 August 2014' pursuant to s 76 of the *Coroners Act 2008*.

<sup>81</sup> Associate Professor Raftos alone considered that any temperature above 37 was a fever.

of acceptable.<sup>82</sup> This is because the results of those blood examinations would not be expected to dictate treatment.

87. MMC had a procedure (the ED Mandatory Alert Procedure and Mandatory Alert Criteria Implementation Tool<sup>83</sup>) which should have led to Lachlan's care being escalated, but it was not. In particular, Lachlan's initial elevated heart rate (at 1.12pm) should have triggered a review within '*the next hour or so*' (it was not repeated for 2 hours) and if it had not normalised, the consultant and nurse in charge should have been specifically notified of this fact (this was not done even at 3.13pm).
88. Dr West clarified that whilst it is very common for children to present with tachycardia, persistent tachycardia that is not otherwise explained raises the concern of a serious bacterial infection and even makes it '*a more likely diagnosis*'.<sup>84</sup> The panel was unanimous that Lachlan's persistent tachycardia was the single most significant sign that he was critically unwell.
89. Escalation serves the purpose of obtaining '*a second opinion and another set of eyes*' and therefore it should occur regardless of the seniority of the treating doctor. Escalation ought ameliorate cognitive bias and, in this case, should have led to the recognition of the possibility of a serious bacterial infection and appropriate treatment. The person measuring the abnormal vital signs should initiate the alert.
90. If Lachlan's pulse had not normalised by 2.30pm, appropriate treatment would have consisted of ordering bloods at that time, allowing for the fact there would be a delay of 45 - 60 minutes whilst the EMLA cream took effect. The appropriate blood tests would have been FBE, blood cultures, VBG and, depending on the panel member, CRP.<sup>85</sup> Within 30 to 60 minutes of the cannula being inserted for the taking of blood, that is, by 4 to 4.30pm, antibiotics (Ceftriaxone and Flucloxacillin) should have been administered and other

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<sup>82</sup> The panel was informed that Dr Doery had earlier given evidence that the approximately 30 minute delay was unacceptable.

<sup>83</sup> This was the ED equivalent to the MET call system which operated in the wards. The ED Mandatory Alert Procedure incorporating the Mandatory Alert Criteria Implementation Tool which appears at pp 330 to 333 of the Coronial Brief.

<sup>84</sup> T 64.

<sup>85</sup> The difference of opinion in relation to CRP related to its potential to confuse diagnosis, but the panel agreed if it was substantially elevated (over 100) it was indicative of bacterial infection. Specifically, Associate Professor Raftos stated that a CRP of about 250 was '*clearly bacterial*'. Lachlan's CRP was 275 at 10.20pm and, the evidence indicates, was likely to have been a similar level earlier in the day.

intensive support given as required. This treatment was not dependent on the results of the blood tests, although it may have been supported by VBG (the only immediate blood result), as acidosis and high lactate in combination with tachycardia points to a serious bacterial infection.

91. Appropriate management would also have consisted of taking a baseline blood pressure (it was not taken until 8.00pm) and more frequent measurement of Lachlan's vital signs, including but not limited to heart rate. Dr Crawford explained that a drop in blood pressure is particularly significant in paediatric medicine.
92. In the setting of Lachlan's persistent tachycardia, the discovery of the petechial rash upon removal of the tourniquet (at about 5.30pm) should have prompted a repeat examination to determine the existence of petechiae elsewhere and a reassessment generally. Three panel members agreed that it was not reasonable for Dr Chong not to have done so. Dr West added the qualification that it was only unreasonable if she knew that his heart rate was significantly elevated.
93. Notwithstanding that the appropriate response to the VBG results at about 6.55pm would have been the administration of intravenous antibiotics, the panel, with the exception of Professor Eisen, considered Dr Cheek's initial management to be reasonable. This was because he had just taken over management of the entire paediatric emergency department and it was '*understandable*' that he would be influenced by the working diagnoses of viral illness. Professor Eisen, who acknowledged that he was lacking in experience in an ED setting compared to the other panel members, was of the view that the VBG results were so significant that Dr Cheek should have administered antibiotics.
94. Ordering antibiotics verbally is sometimes necessary, however the prescribing doctor needs to check that they have been administered. In this case Dr Cheek's decision to verbally order antibiotics was reasonable, but he should have '*closed the loop*' by checking within the next hour that they had been given. Allowing for preparation time the antibiotics should have been given within 30 to 60 minutes of Dr Cheek's order.
95. On behalf of the panel Associate Professor Raftos answered the questions '*in so far as not already covered*' whether the medical management by Dr Chong and Dr Cheek was



reasonable.<sup>86</sup> After explaining that it was understandable that both doctors had a cognitive bias towards viral infection, he said:

*'medicine in these circumstances is extraordinarily complex, so it's not difficult ... for an individual to make a misjudgement. ... [I]n the context that both doctors ...had cognitive biases, then their management in that context was reasonable and it was then the responsibility of the system to ... detect the apparent error and to correct it before any harm came'.*

However, Associate Professor Raftos agreed that at the time of Lachlan's death MMC did have a system whereby Lachlan's elevated heart rate should have prompted review by the most senior doctor and nurse and that it appeared there had been a failure to comply with it.

96. When pressed, Associate Professor Raftos specifically declined to elaborate on whether the treatment of Dr Chong and Dr Cheek was reasonable, saying:

*'I think that's for you to decide isn't it?'*

Significantly he then said:

*'I think that all of us are saying that these are very very difficult situations and ... we know that it happens that - that people do decide perhaps on viral illness for some particular reason, as against bacterial ... it's often difficult to criticise that subjective judgement except if there are objective factors present such as the ... rapid heart rate and as well later down the track the abnormal venous blood gas' [my emphasis].*

97. In cross-examination three panel members confirmed that their only criticism of Dr Cheek was his failure to ensure that his verbal order for antibiotics was carried out in a timely fashion. The exception, Professor Eisen, believed Dr Cheek should have ordered antibiotics earlier.
98. Dr West's explanation for why the ED Mandatory Alert procedure had not worked in this instance was that *'the mechanisms we had in place to first recognise that a vital sign was abnormal and then secondly to respond to it were far less clear than they needed to be in*

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<sup>86</sup> T 46 - 51. Professor Eisen noted that he deferred to his colleagues on this question, particularly Dr Crawford and Associate Professor Raftos, who were independent.

*scenarios like this*'.<sup>87</sup> That is, the system relied on individual clinicians knowing that a vital sign was abnormal and by how much. Because children's vital signs change as they grow, this can be difficult. He believed the absence of a response in this case was the failure to appreciate the magnitude of the abnormality of Lachlan's heart rate and therefore not attributing to it the importance it deserved.

99. Dr West also believed the fact Lachlan had a common cold - as demonstrated by the post mortem finding of coronavirus - was one of the confounders to diagnosis. He said the cold may have been the initial phase of his illness.

### **Whether Lachlan's death could have been prevented**

100. Current research indicates that a combination of antibiotics and intensive treatment such as fluids, resuscitation, inotropes and extra-corporeal membrane circulation (**ECMO**), leads to survival in 90 to 95% of cases of severe invasive streptococcal infection, as suffered by Lachlan. Antibiotics are the first part, but only one part of, the management of such cases.

101. Not all of the possibly necessary interventions, for example ECMO, are available for small children at MMC. If required the child would need to be stabilised and transferred to an appropriate facility such as the Royal Children's Hospital.

102. It is not possible to determine at what point the administration of antibiotics (and other treatment) would have been too late to have an impact on Lachlan's condition. Obviously the earlier the better, 4 - 4.30pm being ideal, and the later and the closer to acute deterioration, the less likely they will be effective.

103. It is also not possible to determine whether Lachlan would have fallen into the 90 - 95% of children who survive with appropriate treatment.

### **CONCLUSIONS AS TO CAUSE AND CIRCUMSTANCES OF DEATH**

104. As previously explained my examination of Lachlan's medical management is not to find fault, but to find cause with a view to identifying prevention opportunities. My assessment of any particular individual must be according to the reasonably expected behaviour of a person with that expertise confronted with the same scenario and with due regard to the principles of *Briginshaw*.

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<sup>87</sup> T 65.

105. I take into account that Emergency Departments are high pressured environments. Doctors and nurses are faced with many patients and competing priorities, especially on busy days such as 17 August 2014. I accept, unhesitatingly, that all of the medical professionals involved in Lachlan's care were acting conscientiously and with the best of intentions. No one wanted him to die. I acknowledge that the manner and circumstances of Lachlan's death will have profoundly affected them.

106. Further, there is no doubt that this case is particularly susceptible to the danger of hindsight bias. The repeated efforts of Mr and Mrs Black to get their son treated make it tempting to regard Lachlan's diagnosis as obvious from the start and the course of events, predictable. However, that simple temptation must be resisted in favour of fair and reasoned assessment of the situation then pertaining, rather than what we now know. The relative rates of bacterial and viral infections in children must always be borne in mind as must the need to prescribe antibiotics responsibly.

107. That said, it is immediately apparent from an examination of the panel evidence that the medical management of Lachlan on 17 August 2014 was not ideal. There were a number of missed opportunities for diagnosis including:

- the failure to take a baseline blood pressure;
- the failure to repeat Lachlan's vital signs within one hour of the initial readings (there being little doubt his heart rate would have remained elevated);
- the failure to escalate Lachlan's care at any time, even when his heart rate remained elevated at 3.13pm;
- the failure to order VBGs with the other initial blood tests (which would have provided a result at approximately 5.30 pm);
- the failure to examine and reassess Lachlan after the petechial rash was noticed at about 5.30pm.

106. At the time of Lachlan's death MMC did have a procedure, the Mandatory Alert procedure, which should have led to Lachlan's care being escalated after his pulse was first taken at

1.12pm, but it was not.<sup>88</sup> This procedure, which was expressed to apply to all ED medical, nursing and allied health staff, clearly stated [emphasis within document]:

‘2. If any mandatory alert criteria are present, the most senior Emergency Department Doctor (Emergency Department consultant or senior registrar overnight) and nurse in charge **must** be notified.

...

6. Senior Emergency Doctor/nurse in charge must review the patient within 2 minutes and directly supervise management of patient.’

107. Thus, compliance with this procedure should have led to Lachlan’s management being supervised by the daytime ED consultant soon after his admission. According to the panel the likely result of such escalation would have been recognition of the possibility of serious bacterial infection and appropriate treatment.

108. Dr West’s explanation for why escalation did not occur was that the system failed in that it did not sufficiently alert clinicians to the fact or extent of a child’s elevated heart rate (something that has now been rectified). This may be true, but it was not the reason proffered by the clinicians themselves. Further, the ‘*mandatory alert criteria*’ referred to in the procedure did specify the different heart rates applicable to children of different ages. For a child aged between 1 to 4 anything above 165 was too fast. Lachlan’s heart rate at presentation was 180.

109. When Dr Chong first examined Lachlan she knew that his heart rate was elevated at presentation, but she attributed it to his distress and/or dehydration. This assumption may have been reasonable, but in my view it was incumbent upon her to ensure that it was correct. Her failure to ascertain whether Lachlan’s heart rate had normalised within an hour was critical as it prevented him from receiving appropriate treatment at that early stage when he had the best chance of survival.

110. Dr Chong’s evidence was clear that she did not even consider the possibility that Lachlan was suffering from a bacterial infection until the VBG results at 6.55pm. It is difficult to

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<sup>88</sup> The panel’s view was that escalation should have occurred when Lachlan’s heart rate did not normalise after a repeat reading within the hour. In fact the Mandatory Alert Procedure made no provision for a repeat of the abnormal result and required immediate escalation.

understand this position as bacterial infection was plainly a possibility. Lachlan's history of high fever, elevated heart rate, reluctance to walk and the fact it was his third presentation should have raised the possibility of bacterial infection in her mind. Moreover, those symptoms should have increased her suspicion of it. Her failure to recognise from the outset the possibility, no matter how unlikely she considered it, that Lachlan may have had a bacterial infection was a significant oversight.

111. Dr Chong's certainty that Lachlan was suffering from a virus no doubt coloured her future decision making and may explain why she did not feel the need to ensure his heart rate had returned to normal and why she did not examine him when informed of his petechial rash. It possibly also explains why she did not order VBG when she ordered the other blood tests for suspected post viral joint swelling.<sup>89</sup>

112. In relation to the petechial rash, I find it unlikely that Dr Chong was told by Dr Kilpatrick that the rash was confined to Lachlan's arm as Dr Kilpatrick was clear that she did not determine the extent of his rash. Further, I find it likely that Dr Chong was told that Lachlan's heart rate was still elevated at 3.13pm. This is because Nurse Renfrew and Dr Chong clearly spoke about Lachlan at that time as evidenced by Nurse Renfrew's contemporaneous note from 3.15pm which states '*Dr aware*' and Dr Chong's prompt examination of Lachlan thereafter. It is difficult to imagine that Nurse Renfrew only told Dr Chong about Lachlan's sore knees without mentioning the vital signs she had only just taken. Further, Nurse Renfrew's evidence was that she would have told '*the doctor*', who was likely to be Dr Chong, about Lachlan's elevated heart rate.<sup>90</sup>

113. In any case, I am satisfied that Dr Chong should have examined and reassessed Lachlan after notification of the petechial rash whether or not she knew of his persistent tachycardia. If she did not know about the 3.13pm reading she should have enquired, given she knew of the initial elevated reading. Moreover, if she had not established that Lachlan's heart rate had normalised, that was even more reason to examine him upon being informed of the petechial rash.

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<sup>89</sup>The actual request stated '*?pots [sic] viral joint swelling*'. She did order blood culture which she described as routine.

<sup>90</sup> T 98, 102.

114. The failure to carry out interventions and examinations which would have assisted diagnosis produced a consequential delay in treatment for bacterial infection. Even when it was appreciated that Lachlan may be suffering from a bacterial infection and antibiotics were ordered, there was a two hour delay in their administration. This delay was also extremely unfortunate and unacceptable and highlights the dangers of verbal orders. It is impossible to determine the effect of this delay on Lachlan's outcome, save to say that I cannot be satisfied that it contributed to his death given his parlous condition by that time. The reason for the delay remains unclear, save that it appears to come down to human error. The panel considered, and Dr Cheek readily conceded, that he should have ensured their prompt administration.

115. In my view the shortfalls in Lachlan's medical management outlined above constituted a departure from a reasonable standard of care. They appear to have been caused by a combination of human errors and failures of the system to prevent or counteract human errors.

116. Whilst it could never be said that Lachlan would necessarily have fallen within the 90 - 95% of children who survive IGAS with appropriate treatment, there is also nothing to indicate that he would not. Therefore as a matter of pure probabilities I am satisfied that it is likely his death would have been prevented had he received appropriate care from the outset of his attendance at MMC on 17 August 2014.

## **FINDINGS**

**Pursuant to section 67(1) of the *Coroners Act 2008*, I make the following findings in respect of the death:**

- (a) the identity of the deceased was Lachlan Black, born 28 December 2011;
- (b) Lachlan died on 18 August 2014 at Monash Medical Centre in Clayton, Victoria, from Group A beta Haemolytic streptococcal septicaemia;
- (c) the death occurred in the circumstances described above.

## **COMMENTS**

**Pursuant to section 67(3) of the *Coroners Act 2008*, I make the following comment(s) connected with the death:**

1. On 1 November 2017 the Chief Health Officer for Victoria issued an alert with the self-explanatory title '*Recent increase in Invasive Group A Streptococcal disease in Victoria*'.<sup>91</sup> The alert noted that from July to August 2017 11 cases of children with IGAS were admitted to the RCH, compared to only 12 cases for the entire year in 2016 and 11 cases in 2015. The alert described symptoms of IGAS as including '*high fevers, severe muscle aches, sore throat, cellulitis, diarrhoea or vomiting, or severe headache*'.
2. A recent article in the Journal of the Pediatric Infectious Diseases Society, '*Prospective Surveillance of Pediatric Invasive Group A Streptococcus Infection*' of which Professor Crawford was an author, contained a study of 28 RCH patients with a median age of 3.5 years and identified that more than half of those patients attended a medical practitioner for assessment within 48 hours of their admission to hospital. The study concluded that this suggested a possible window for earlier diagnosis.
3. Lachlan's tragic death highlights the need for medical practitioners to be ever vigilant as to the possibility of IGAS, or indeed any bacterial infection, in unwell children. This is especially so if the upward trend in cases of IGAS continues. Whilst the likelihood of bacterial infection is low, the consequences of failing to diagnose it can be dire.
4. There were two features of this case which may have confounded diagnosis and given false reassurance to clinicians. First was the fact that Lachlan was afebrile during his admission on 17 August, and second was the fact he appeared to be suffering a respiratory tract infection, later confirmed at autopsy. In explaining their diagnostic reasoning both Dr Chong and Dr Cheek referred to Lachlan's afebrile status as potentially pointing away from bacterial infection or sepsis.<sup>92</sup> Dr Chong further explained that she considered his lack of fever to suggest a resolving viral illness.
5. As the panel evidence makes clear, far from indicating an improving condition, Lachlan's afebrile status likely reflected the extent of his deterioration. It is important that clinicians are aware that the lack of a fever at the time of presentation does not exclude IGAS or other bacterial infection. To the contrary, lack of fever may be the product of advanced infection and, if accompanied by persistent tachycardia, it warrants a high suspicion for sepsis. Further, clinicians should always be conscious of the fact that the existence of a viral

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<sup>91</sup> Published on the Department of Health and Human Services website.

<sup>92</sup> For example in each of their respective statements.

infection does not exclude a bacterial infection, as the two can coexist and may even be related.

6. Since Lachlan's death a number of changes have been implemented across the State of Victoria and within Monash Health to improve sepsis management of children and adults. Significantly a 'Statewide Paediatric Sepsis Pathway' has been developed and introduced in hospitals delivering paediatric care, including Monash Health. Monash Health also introduced the 'ViCTOR Chart' which is a 'Statewide Observation Chart' that enhances the ability of practitioners to recognise, track and action abnormal vital signs in children by providing a visual display and instructions on how to respond. Software within Monash Health EDs has been changed to flag abnormal vital signs in the ViCTOR Chart format. Finally, in 2015 Monash Health embarked on a 'Sepsis Initiative' to increase clinical awareness of the importance of early recognition and treatment of sepsis.
7. In relation to the delay in the administration of the verbally ordered antibiotics, Dr Cheek gave evidence that apart from his change in practice to either observe or himself administer antibiotics that he has previously verbally ordered *'it is difficult to pinpoint an exact process that could be written that could prevent that from ever occurring'*.<sup>93</sup> Monash Health advised that it has endeavoured to improve communication within the ED by introducing a 'Team Steps Program' providing for structured communication within its EDs. In my view it would be prudent to also introduce a more targeted policy in relation to verbal orders. Whilst the panel accepted that the circumstances justified Dr Cheek making a verbal order, it is difficult to imagine that he would not have had the opportunity to reduce that order to writing within a fairly short time frame. If he had done so, the problem may not have arisen.
8. At the conclusion of the Inquest Mrs Black addressed the Court as to suggested systemic improvements following the death of her son. At my request Counsel for Monash Health responded to Mrs Black's comments in her written submissions.
9. The first issue addressed by Mrs Black was the problem of cognitive bias. She suggested that a second or subsequent presentation of a child to a hospital emergency department within seven days for a suspected infectious illness should require review by a senior

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<sup>93</sup> T 280.



paediatric consultant *'without being privy to the diagnosis of any clinicians who have previously treated the child'*.<sup>94</sup>

10. It is understandable that Mrs Black should make this submission as the evidence revealed the ease with which cognitive bias can be transmitted between practitioners, especially respected colleagues. Dr Chong independently formed her own cognitive bias towards viral infection. Dr Craig was the consultant in charge of the paediatric ED during the day. He explained that he was supervising 7 doctors in the ED that day and that as *'Dr Chong was a senior and very capable doctor ...[he] did not need to supervise her as much as I would a junior doctor.'*<sup>95</sup> When he handed over his responsibilities to Dr Cheek at about 5pm, he told him that Lachlan had a presumed viral illness, although he had not personally examined him and was unaware of his vital signs. Dr Chong repeated that Lachlan had a presumptive viral illness when she handed over to Dr Cheek at about 6.30pm. Despite being faced with a very sick child, Dr Cheek conceded that he had to be dissuaded from *'the initial cognitive bias'* before he would consider antibiotics. The evidence suggests that not only did Dr Cheek have to contend with his own cognitive bias, but he was likely influenced by the cognitive bias of others.
  
11. It is clearly desirable that clinicians reviewing a patient should do their utmost to exercise independent judgment, I accept however, that it would be impractical and undesirable to prohibit them from knowing of any prior diagnosis at all. Monash Health submitted that whilst it is impossible to eliminate cognitive bias altogether, the use of objective measures, including the alert criteria in the ViCTOR Chart and their policies of escalation to senior clinicians, ameliorate its effects. One such policy (in the form of a memorandum to all ED Medical Staff), which has been in existence since 2010 requires that patients presenting to the ED following a previous attendance within 7 days *'are to be personally reviewed by a senior registrar or ED consultant'*.<sup>96</sup> Although there was some contention during the inquest, it is clear that there was compliance with this policy as Dr Chong was in fact a senior registrar at the time. That said, because Lachlan's care was not escalated pursuant to the Mandatory Alert Criteria, Dr Craig never saw him. Appreciating that ED consultants have many demands on their time and are not necessarily present overnight, in my view, a

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<sup>94</sup> T 102. Mrs Black later referred to review by a senior registrar. It is not clear whether this was intentional.

<sup>95</sup> Statement of Dr Simon Stuart Craig dated 3 July 2017.

<sup>96</sup> Memorandum to all ED Medical Staff dated 26 March 2010, Coronial Brief page 329.

policy requiring review by an ED consultant for repeat presentations has a greater chance of countering the problem of cognitive bias than the existing policy allowing for review by a senior registrar alone. This is because ED consultants by virtue of their greater experience should be better equipped to deal with cognitive bias and further, such a policy will likely result in two doctors considering all possible diagnoses, rather than one.

12. Mrs Black also recounted feelings of being ignored, when she was the person in the best position to know just how sick her son was. Whether based on truth or perception, unfortunately such a complaint is common in this jurisdiction. It is understandable that clinicians look for objective factors to diagnose and treat patients, rather than subjective assessments. That said, family members are obviously a vital source of information as to the patient's health.
13. Monash Health acknowledged the importance of clinicians listening to family members and, importantly, advised that it had recently introduced a policy in the ED to allow for escalation of care by concerned family members.<sup>97</sup> Posters advising of this right are now placed in the ED waiting room and brochures are given to family members of patients admitted to wards. I note that similar initiatives exist in other hospitals, such as the Northern Hospital REACH program which allows a concerned family member to dial a number to trigger an emergency response.
14. Monash Health's criteria for family initiated escalation of care include a patient becoming more unwell, a belief that a patient is not receiving necessary medical attention and a concern with what is happening. If this policy had existed at the time of Lachlan's admission to MMC, instead of feeling helpless and ignored Mrs Black may have been empowered to trigger a greater response to her son's deteriorating condition.
15. Doctors and nurses are not exempt from human error, particularly when operating in the high pressure environment of a busy hospital ED. Thus the need for procedures and policies to counteract human error so far as possible. It is to be hoped that the various measures instituted by Monash Health since Lachlan's death, together with any measures introduced in response to my recommendations, will significantly lessen the chances of a death occurring in similar circumstances.

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<sup>97</sup> This policy was in existence at the time of Lachlan's death, but did not apply to the ED.

## **RECOMMENDATIONS**

**Pursuant to section 72(2) of the *Coroners Act 2008*, I make the following recommendation/s connected with the death:**

1. That each of the Royal Australian College of General Practitioners, the Royal College of Physicians (Paediatric and Child Health Division) and the Australian College for Emergency Medicine consider the educational opportunities posed by the circumstances of this case in particular in relation to the recognition of the possibility of sepsis despite absence of fever and despite the apparent existence of a viral illness.
2. That Monash Health introduce a policy governing the circumstances in which it is acceptable for clinicians to make verbal orders for antibiotics and providing for mechanisms to ensure the prompt administration of any verbally ordered antibiotics, including charting the order at the first available opportunity.
3. That Monash Health introduce a formal policy governing the care of patients who present to the Emergency Department within 72 hours of a previous presentation requiring that such patients be personally reviewed by an Emergency Department consultant as soon as possible and that there be a concerted re-evaluation of the working diagnosis. In the event that an Emergency Department consultant is not available, the patient should be managed by a senior registrar and reviewed by a second senior registrar.

I convey my sincere condolences to the Black family on the loss of their beloved little boy.

I direct that this finding be distributed as follows:

Mr Tim and Mrs Angela Black  
C/- Daniel Opare  
Maurice Blackburn

DX 466  
MELBOURNE VIC 3000  
Monash Health  
C/- Rani Kulkarni  
K&L Gates  
PO Box 4388  
Melbourne VIC 3000

Susan Van Dyke  
Medico Legal Officer  
Monash Medical Centre  
Locked Bag 29  
Clayton South, VIC 3169

Professor Damon Eisen  
C/- Kathryn Booth  
Maurice Blackburn  
DX 466  
MELBOURNE VIC 3000

Dr John Cheek  
C/- David Maddocks  
Perry Maddocks Trollope  
Suite 802, 9 Yarra St  
South Yarra VIC 3141

Associate Professor John Raftos  
C/- St Vincent's Hospital Sydney  
390 Victoria St  
Darlinghurst NSW 2010

Dr Adam West  
C/- Monash Health  
Locked Bag 29  
Clayton South, VIC 3169

Dr Nigel Crawford  
RCH Level 3, 50 Flemington Road  
Parkville VIC 3052

The Chairman  
Consultative Council on Obstetric and Paediatric Mortality and Morbidity (CCOPMM)  
Clinical Councils Unit  
Quality and Safety and Patient Experience  
Victorian Department of Health  
50 Lonsdale Street  
Melbourne, VIC 3000

Royal Australasian College of Physicians (RACP)  
145 Macquarie Street

Sydney, NSW 2000

Royal Australian College of General Practitioners (RACGP)  
1 Palmerston Crescent  
South Melbourne, VIC 3205

Australasian College for Emergency Medicine (ACEM)  
34 Jeffcott Street  
West Melbourne, VIC 3003

Signature:



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**ROSEMARY CARLIN**  
CORONER

Date: 13 December 2017

Amended on 9 January 2018