Coroners Act 1996
(Section 26(1))

RECORD OF INVESTIGATION INTO DEATH

I, Barry Paul King, Deputy State Coroner, having investigated the death of ***Malakai Matiu Ward Paraone*** *with an inquest held at Perth Coroners Court from 5 November 2019 to 7 November 2019, find that the identity of the deceased person was* ***Malakai Matiu Ward Paraone*** *and that death occurred on 26 August 2016 at Princess Margaret Hospital from complications in association with fulminant sepsis in an infant (Streptococcus pyogenes) in the following circumstances:*

Counsel Appearing:

Mr B D Nelson assisted the Coroner.

Mr D E Leigh and Ms L M Bultitude-Paull (State Solicitor's Office) appeared for the South Metropolitan Health Service and the Child and Adolescent Health Service

Mr M L Williams (Minter Ellison) appeared for Dr B Itotoh

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Introduction

1. Malakai Matiu Ward Paraone died on 26 August 2016 at Princess Margaret Hospital from complications in association with fulminant sepsis (*Streptococcus pyrogenes*). He was seven months old.

2. In the three days prior to his death, Malakai was examined by doctors at three different hospitals and by a general practitioner at a private clinic. By the time he was eventually transferred to Princess Margaret Hospital (PMH) on the morning of 25 August 2016, his condition was dire. He was admitted into the intensive care unit but could not be saved.

3. On 17 October 2016, Malakai's mother, Nicole Thompson,[1] requested that an inquest be held into his death.[2] She was particularly concerned that he would not have died if he had not been discharged from the hospitals without having been correctly diagnosed with sepsis.

4. Following an investigation which included obtaining reports from doctors and medical experts, on 14 May 2019 the State Coroner approved Ms Thompson's request for an inquest.

5. I held an inquest at the Perth Coroners Court from 5 October 2019 to 7 October 2019. The primary purpose of the inquest was to investigate the nature and the quality of the care Malakai received in the month leading up to his death.

6. The documentary evidence adduced at the inquest included a brief of evidence[3] that contained statements from Malakai's parents, reports from the medical practitioners who had been involved in his care, and opinions from senior consultant paediatrician Dr S P Nair,[4] infectious diseases

[1] In June 2019, Ms Thompson informed the Court that she had changed her name.
[2] Exhibit 1.1.9
[3] Exhibits 1.1, 1.2 and 1.3
[4] Exhibit 1.1.17A, C

physician and clinical microbiologist Dr D J Speers[5] and general practitioner Dr J Kosterich.[6]

7. Also included in the documentary evidence were medical records from St John of God Midland Hospital (SJOG Midland),[7] Rockingham General Hospital (RGH)[8] and PMH,[9] and a comprehensive statement by Dr G Shymko, acting general director of clinical services for Rockingham Peel Group, together with 25 attachments to the statement.[10]

8. Included in the attachments to Dr Shymko's statement were:

   a. a SAC 1 Clinical Incident Investigation Report (SAC 1 Report) following a review at RGH of Malakai's death;[11]
   b. a review by Professor G Geelhoed, Chief Medical Officer, of Malakai's clinical care at the relevant hospitals;[12] and
   c. a report from Dr G Knight of the PMH Mortality and Morbidity Review Committee (PMH Committee) regarding Malakai's death.[13]

9. Oral evidence was provided by (in order of appearance):

   a. Dr W D Holloway, paediatric emergency medicine consultant;[14]
   b. Dr D M Thomas, general practicioner registrar;[15]
   c. Dr A R Morris, emergency medicine registrar;[16]
   d. Dr B O Itotoh, consultant general paediatrician;[17]
   e. Dr Shymko;[18]

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[5] Exhibit 1.1.18A,C
[6] Exhibit 1.1.23
[7] Exhibit 1.2.1
[8] Exhibit 1.2.2
[9] Exhibit 1.2.3
[10] Exhibit 1.3
[11] Exhibit 1.3.GS1
[12] Exhibit 1.3.GS3
[13] Exhibit 1.3.GS4
[14] ts 11 - 34
[15] ts 35 - 84
[16] ts 84 - 101
[17] ts 104 - 129
[18] ts 129 - 145

f. Dr D Alexander, paediatric intensive care consultant;[19]
g. Dr Nair;[20] and
h. Dr Speers;[21]

10. Following the oral evidence, counsel made helpful oral submissions.[22]

11. I have found that, while there were aspects of the care provided to Malakai that could have been improved, overall the care was understandable in the unusual and diagnostically difficult circumstances of his presentation. In particular, I have found that all of the medical practitioners involved in his care acted reasonably.

12. Given improvements to medical care that have been made since Malakai's death, I have not made recommendations directed towards the need for those or other improvements.

Malakai Matiu Ward Paraone

13. Malakai was born at Rockingham Maternity Hospital by elective caesarean section on 29 December 2015. He lived in Bullsbrook with Ms Thompson and his father, Te Keepa Aperehana Rimutai Brown and his four year old half-brother, Bryce Mark Hemopo[23].

14. Malakai was a healthy and happy baby, though his medical history included asthma and whooping cough in May 2016. He rarely cried and he slept well. His mother had smoked but had not used drugs or alcohol through pregnancy.[24]

[19] ts 145 – 157
[20] ts 158 - 213
[21] ts 216 - 259
[22] ts 260 - 284
[23] Exhibit 1.1.8
[24] Exhibit 1.1.8

St John of God Midland Hospital

15. On 7 May 2016, Malakai attended the emergency department (ED) at SJOG Midland and was diagnosed and treated for whooping cough.[25] On 1 June 2016 he presented with an ongoing cough and itchy red skin. He was diagnosed with a viral throat infection and provided cortisol cream for the skin.[26]

16. On 27 July 2016, Malakai was referred by a GP in Ellenbrook to SJOG Midland following three days of diarrhoea and vomiting. He was not moving his right arm. The GP had diagnosed gastroenteritis and possible pulled elbow.[27]

17. That evening, Ms Thompson told a doctor at the SJOG Midland ED that Malakai was very irritable but had been feeding well. On examination, he was crying on passive movements of his right arm. He did not vomit or have any further diarrhoea at the hospital. The doctor repositioned Malakai's arm and arranged for an X-ray, which showed no fracture. Malakai was discharged home that evening with a diagnosis of pulled elbow.[28]

18. At about 1.20 am on 23 August 2016, Malakai attended the SJOG Midland ED with his parents. Ms Thompson told the triage nurse that Malakai had been fussy and off all day and that he had not been using his right arm that evening. She had given Malakai some ibuprofen at 11.00 pm. The nurse noted that Malakai would bend his right elbow and wrist but would not move his shoulder.[29]

19. Dr A Mackay, a senior registrar in the SJOG Midland ED, examined Malakai and noted that he was holding his arm in extension and was reluctant to move. Malakai would flex his elbow but not reach at the shoulder. He was crying inconsolably and Dr Mackay's attempt to reduce the pulled elbow made no change. Ms Thompson told Dr Mackay that

[25] Exhibit 1.2.1
[26] Exhibit 1.2.1
[27] Exhibit 1.2.1
[28] Exhibit 1.2.1
[29] Exhibit 1.2.1

Malakai had not been moving his right elbow for four hours and that, uncharacteristically, he had been crying with pain. She said that he previously had pulled elbow and that he had been playing with his brother.[30]

20. Dr Mackay's notes do not suggest that she considered a possible infection of the shoulder joint. However, she provided a statement dated 28 October 2019 in which she said that she had observed that Malakai had a low-grade fever and that she had prescribed paracetamol and had ordered an X-ray of his right elbow and shoulder.[31]

21. The X-ray again showed no fracture, but Mr Brown noticed that Malakai stopped crying when his arm was moved for the X-ray. After that, Malakai was drinking from a bottle with both hands and he was bright and alert.[32]

22. Dr Mackay stated that she had a differential diagnosis of a pulled elbow, a fracture or other trauma, and a septic or infected elbow or shoulder joint. When Malakai returned from the X-ray in such an improved condition, she considered that it was unlikely that he would have improved so rapidly if he had an infected joint. On that basis, she excluded infection from her differential diagnosis, and she was satisfied that Malakai could be discharged. She told Ms Thompson and Mr Brown that they should bring him back to the ED if he developed a fever, became unwell or stopped moving his arm again.[33]

Expert discussion of the care at SJOG Midland

23. Professor Geelhoed noted that the story of a pulled elbow spontaneously reducing when manipulated for an X-ray is quite common, but the earlier finding that he could flex his elbow prior to manipulation was not typical of a pulled elbow. He considered that a temperature of 37.9 degrees in a child who was feeding and was otherwise generally well would not require further

[30] Exhibit 1.2.1
[31] Exhibit 1.1.25
[32] Exhibit 1.2.1
[33] Exhibit 1.1.25

action, especially as Malakai's family had reported having 'colds'. It was therefore reasonable to send Malakai home.[34]

24. The PMH committee was unable to comment on this episode of care because it had no documentation from SJOG Midland.[35]

25. Dr Nair stated in his report that the possibility of an evolving septic arthritis or osteomyelitis should have been actively considered. He stated that blood tests should have been undertaken as well as the X-rays since X-rays are often normal in the early stages of such infections. He said that he considered that an admission for further observation would have been reasonable in order to attempt to elucidate any other more sinister cause.[36]

26. In oral evidence, Dr Nair was taken to Dr Mackay's statement, which had not been available to him when he had prepared his report. He said that Dr Mackay's statement clearly shows that she had done a thorough examination of Malakai and that his was a particularly complex presentation. He noted that Dr Mackay was considering differential diagnoses, and he agreed that she had been reassured by the fact that Malakai started to appear well.[37]

27. However, Dr Nair said that some conditions have a variable course which can best be determined by a period of observation. He explained that, in paediatric medicine, a clinician's assessment is considered to be more reliable than tests such as blood tests, which can be unreliable early on. If children are observed, it is possible to see a serious infection evolve. In addition, if a child is admitted into a ward instead of the ED, the clinician can spend more time with the parents, and little clues or nuances can be teased out.[38]

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[34] Exhibit 1.3.GS3 3
[35] Exhibit 1.3.GS4 1
[36] Exhibit 1.1.17
[37] ts 162 -163
[38] ts 162 - 163

28. Dr Speers said in his report that he believed that the low-grade fever, irritability and right shoulder pain on 23 August 2016 were likely to be the first signs of a deep *Streptococcus pyrogenes* (*S. pyrogenes*) infection, but it was not possible to conclude that a deep-seated infection of the upper right arm was the source of the infection because no specimens were collected from the right arm and an internal post mortem examination was not performed. Dr Speers also noted that X-rays would not have revealed any soft tissue changes apart from significant swelling or bone changes in osteomyelitis or septic arthritis. [39]

29. Dr Speers said that young infants with *S. pyrogenes* infection may not present with classic signs and symptoms of infection, and relatively few localising or constitutional symptoms may be present, such that the illness may be unrecognised.[40] In oral evidence, Dr Speers said that this makes it difficult for practitioners to identify an infection.[41]

Conclusion about the care at SJOG Midland

30. While it seems evident in hindsight that, by early 23 August 2016, Malakai was presenting with signs caused by *S. pyrogenes* infection, it is not surprising that Dr Mackay did not identify the infection given that the signs effectively disappeared when Malakai's arm was moved for the X-ray and his overall condition appeared to have improved.

PMH on 23 August 2016

31. Between 2.30 am and 6.00 am on 23 August 2016, Malakai remained unsettled and hot to the touch.[42] At 10.40 am, Ms Thompson called for an ambulance, which arrived at 11.00 am.[43] Malakai slept during the trip to

[39] Exhibit 1.1.18 8
[40] Exhibit 1.1.18 6
[41] ts 234
[42] Exhibit 1.1.8
[43] Exhibit 1.1.19A

PMH while Mr Brown accompanied him.[44] At 12.15 pm, Malakai saw a triage nurse, who noted:

> Regional problems -swelling/distension - right upper limb from yesterday and not wanting to use. S/B Midland yesterday and nil found. Nil preceding injury. Ongoing pain, not using arm and oedema. Febrile last night. [45]

32. Malakai was assessed by a nurse in the PMH ED at 1.20 pm. He was pink in colour, and had a temperature of 36.4 degrees, a heart rate of 148 beats per minute, a respiratory rate of 48 breaths per minute and a capillary refill of less than or equal to 3 seconds. Ms Thompson told the nurse that Malakai was going through cycles of increased pain with an unwillingness to move his arm. At 2.40 pm, Malakai was given paracetamol.[46]

33. At 3.30 pm Malakai was seen by Dr Y M Ong, a resident medical officer. Dr Ong took Malakai and his family to chairs opposite the X-ray area since there were no available cubicles. Dr Ong assessed Malaki using the ED injury assessment form, a document used for every child under two who presented with an injury.[47]

34. Dr Ong took a history from Malakai's parents. When asked if anyone else in the family had been unwell, Mr Brown said that everyone in the family was sick. Malakai presented with other features of a virus, including a snotty nose, but Dr Ong was unsure if he suspected a virus at the time.[48]

35. Malakai was settled and interactive during Dr Ong's examination. His right shoulder and clavicle appeared normal and there were no spasms, but he was unhappy to have the rest of his arm moved. He had two red, flat blanching spots on his upper thigh/groin area. Dr Ong advised Malakai's parents about the difference between blanching and non-blanching rashes to

[44] Exhibit 1.1.10
[45] Exhibit 1.2.3
[46] Exhibit 1.2.3
[47] Exhibit 1.1.20
[48] Exhibit 1.1.20

ensure that they knew what to look out for, and so that they could bring him back if the rash spread or became non-blanching.[49]

36. Dr Ong thought that Malakai could have had a fracture, a pulled elbow, or perhaps some kind of infection. Given that Malakai did not have a fever and had tenderness over his elbow, Dr Ong thought it more likely that he had a fracture or a pulled elbow than an infection.[50]

37. Dr Ong obtained Malakai's X-ray images and a verbal account of the radiologist's report from SJOG Midland. He then consulted his senior colleague, Dr Holloway, in compliance with the ED policy for a junior doctor to confer with the most senior doctor in the ED before making management decisions in relation to a patient who has re-presented within a short period of time.[51]

38. Dr Ong and Dr Holloway reviewed the X-ray images together and agreed that there was no obvious fracture or abnormality and that it was unlikely that there was a gross infection.[52]

39. Dr Ong attempted to manipulate Malakai's joint to enlocate the possible pulled elbow. He did not feel a click on the first attempt, and was not convinced upon further examination that it had been successful. On the second attempt, Dr Ong thought that he had felt a very subtle click, but Malakai continued to cry and there was no immediate movement of his upper limb, so he was not convinced he had been successful. Malakai vomited up his milk after this second attempt, and a nurse took Malakai and his father to a bathroom to clean up.[53]

40. Dr Holloway and Dr Ong returned to assess Malakai while he was still in the bathroom with his parents and his brother. A bed became available, so Malakai was moved to the bed. Dr Holloway examined him and found no

[49] Exhibit 1.1.20
[50] Exhibit 1.1.20
[51] Exhibit 1.1.20
[52] Exhibit 1.1.20
[53] Exhibit 1.1.20A

restriction in Malakai's arm movements, and he did not seem to be in any pain. Malakai's parents were pleased with his improved movement.[54]

41. However, Dr Holloway said that Malakai 'did not look so good', and a tympanic reading indicated that he had a temperature of 39 degrees at 3.30 pm. Dr Holloway decided to keep Malakai in the ED to observe him for a while.[55] Dr Holloway did not form an opinion whether Malakai had a viral illness. He asked Dr Ong to make sure that Malakai had a full set of observations and examination for the source of his fever, and not to discharge him with abnormal observations.[56]

42. Dr Ong informed the nurse in charge of the section that another full set of observations was needed within an hour's time.[57] He continued work on his patient notes, and he was later informed by a nurse that Malakai's vital signs had improved and that his fever had gone down. At 3.40 pm, Dr Ong was informed that Malakai had a temperature of 37 degrees, a heart rate of about 185 beats per minute, and a respiratory rate just under 40 breaths per minute.[58]

43. Dr Ong went to Malakai's bed and told his parents that his fever had gone down and that he could remain in the ED until he had completely settled, but they were keen to head home because it had been a long previous night at SJOG Midland and they had spent the afternoon waiting at PMH. They left the ED with Malakai between 4.00 pm and 4.30 pm.[59]

44. Before Malakai was discharged, Dr Ong explained by way of a 'safety net' that, if there was any change in Malakai's condition, they should bring him back to the ED. Dr Ong emphasised that they should return if Malakai developed persistent fevers, further vomiting, intolerance of feeds, change in colour, progression of a rash, or reduced movement in his limbs.[60]

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[54] Exhibit 1.1.20A
[55] Exhibit 1.1.20A
[56] Exhibit 1.1.26
[57] Exhibit 1.1.20A
[58] Exhibit 1.1.20A
[59] Exhibit 1.1.20A
[60] Exhibit 1.1.20A

45. Dr Ong did not consider doing a blood test to check for infection while Malakai was in the ED because ED staff at PMH did not routinely take blood from a child with a fever to test for cultures unless the child was being admitted or ED staff were concerned that the child was unwell.[61]

46. In oral evidence, Dr Holloway said that, when Malakai's temperature was recorded at 39 degrees, he began thinking that he had an infection. He said that the drop in temperature from 39 degrees to 37 degrees in 10 minutes was probably a mismeasurement since he had never seen temperature drop that quickly.[62] It is possible that 39 degrees was wrong since the other four temperatures in the ED were below 38 degrees.[63]

47. Dr Holloway said that the vast majority of children in the PMH ED have viral illnesses, but a small subset had bacterial illnesses. He said that time is often a great investigation to see which way the clinical status of the child is heading.[64] He said that patients are usually only admitted to the paediatric wards if they will likely be required to stay more than 24 hours.[65]

48. Dr Holloway said that he was slightly troubled by Malakai's observations and their fluctuations, and he would have welcomed a longer period in the ED. He did not consider that there was a need for a holding order to require that Malakai stay, and he felt that Dr Ong's safety net instruction to Malakai's parents was a reasonable plan, but he still felt that he did not know where the temperature was coming from.[66]

49. Dr Holloway said that blood cultures are useful to determine the cause of an infection, but they take up to 48 hours to get a result. Instead, it is necessary to use observation and clinical acumen to figure out if a child is getting better or getting worse. When Malakai's temperature decreased rapidly, it was still not possible to know that it was not a viral issue. Children who are truly sick still have lethargy and, maybe, tachycardia, decreased feeding and decreased urine output. Most of those signs were not present in Malakai's

[61] Exhibit 1.1.20
[62] ts 20
[63] ts 29
[64] ts 16
[65] ts 23
[66] ts 22 - 24

case. Even if he had been kept in for observation for a couple more hours, he may not have demonstrated that he had underlying sepsis. The increased observation would have allowed Dr Holloway to make a better assessment of how sick or unwell Malakai was.[67]

50. Dr Holloway agreed that Malakai's management seemed to have gone reasonably well, but that Malakai slipped through. Dr Holloway thought that part of the difficulty was that he had presented to different health services, so they were not able to maintain a continuity of care. He said that doctors at PMH ED almost always admit any child who presents for a third time because the doctors may have missed something and need to work it out further.[68]

51. Dr Holloway said that it might be better for the protocol for the follow-up of children who have a fever without a focus to be done at the ED of the same hospital at which they were originally seen rather than to a GP.[69]

Expert discussion of the care at PMH on 23 August 2016

52. Professor Geelhoed noted the discrepancy between the triage nurse's record of swelling of Malakai's arm and the records of the nurse and the doctors of no swelling. The history of pulled elbow was supported by the examination of possible click when manipulated. As Malakai's temperature had settled and his parents were happy to take him home, it was reasonable to agree to him leaving with the detailed explanation and instruction provided by Dr Ong.[70]

53. Professor Geelhoed noted Ms Thompson had said that Malakai went through cycles of increased pain and unwillingness to move his arm. He said that the history of Malakai's arm being normal after manipulation and then some time later being painful would be compatible with a pulled elbow, but if his symptoms fluctuated but did not improve overall, it might also be

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[67] ts 30 - 31
[68] ts 32
[69] ts 33
[70] Exhibit 1.2.GS3 4

compatible with infection of fluctuating intensity in the arm. An infection in the bone would not show in the short period in which he had symptoms.[71]

54. The PMH Committee considered that this episode was undertaken by appropriately experienced staff and that the assessment was thorough. An infective cause for pain and decreased movement was apparently not considered specifically. With the benefit of hindsight, the symptoms may have been due to septic arthritis of the elbow or shoulder. The advice upon discharge was extensive and included symptoms that would not have been related to trauma.[72]

55. The PMH Committee noted that a blood pressure could not be recorded and that the inability to record one should have been resolved before Malakai was discharged, but none of the other signs suggested that hypotension was a likely issue.[73]

56. In his report, Dr Nair stated that Malakai's history of being okay and then being in pain and not wanting to move his arm should have prompted an active search for an alternative diagnosis other than pulled elbow.[74] He said that Malakai should have been admitted for further observation or had a longer period of observation in the ED at PMH given the two presentations to different hospitals within a 12 hour period, intermittent fevers, intermittent inability to move his right arm and pain without a clearly identified diagnosis and very concerned parents.[75]

57. In oral evidence, Dr Nair said that, after seeing Dr Ong's statement and hearing Dr Holloway's evidence, he was satisfied that they had definitely actively considered alternative diagnoses. There was a very good clinical assessment combined with a reasonable differential.[76]

58. When asked if he would have considered a holding order (to keep Malakai at PMH), Dr Nair said that Malakai's parents were really tired and had seen

[71] Exhibit 1.2.GS3 4
[72] Exhibit 1.2.GS4 1
[73] Exhibit 1.2.GS4 1
[74] Exhibit 1.1.17 13
[75] Exhibit 1.1.17 14
[76] ts 166

Malakai starting to look a little better, so they were relatively reassured and would not have wanted to stay in the ED for a few more hours. However, Malakai's case was atypical and the doctors needed more time to work out what was best, so it would have been a good idea to consider admitting him to the ward, where the family could have something to eat and spend time talking to the doctors in comfort. That might have convinced them to stay, although he could not say whether it would have changed the outcome.[77]

59. Dr Nair also said that he considered that Dr Ong's safety net advice to Malakai's parents was excellent; probably one of the best that he had seen.[78]

60. Dr Speers stated in his report that he believed that Malakai's fever, vomiting, increased heart rate, rash and swelling of the right arm were likely due to the progressing of the *S. pyogenes* infection.[79]

61. In oral evidence, Dr Speers said that, after he had read the notes from PMH in relation to Malakai's presentation on 23 August 2016, he did not think that there was a good explanation for the constellation of signs and symptoms. He said that the swelling of the arm, the high temperature, the persistent tachycardia, the rash and the vomiting were not explained. In addition there was the parental concern. He said that basic blood tests and other examinations of the swollen right arm could have been done. If there was no explanation for the signs and symptoms, Malakai could have been admitted for observation.[80]

62. Dr Speers was referred to Dr Ong's statement in which Dr Ong said that he saw no obvious redness, swelling or warmth on the overlying skin and soft tissue on the elbow, and the rest of the right shoulder joint and clavicle appeared normal, but Malakai was unhappy to have the rest of his arm moved. Dr Speers said that it would be unusual for swelling due to oedema to change within one hour (swelling was noted by the triage nurse at 12.15 pm), but he also noted that the original injury was to the elbow and

[77] ts 166 - 167
[78] ts 168
[79] Exhibit 1.1.18A 8
[80] ts 237 - 238

there was no good explanation for why the shoulder would now be involved. The symptoms in the arm are not explained by the previous injury.[81]

63. Dr Speers agreed that Malakai could have vomited if he had been sufficiently distressed from Dr Ong's attempt to manipulate his elbow back into place, and Dr Speers agreed that the rapid drop in Malakai's temperature from 39 degrees to 37 degrees over ten minutes indicated that one of those temperatures may have been incorrect. When Dr Speers was referred to the evidence that Malakai's observations had resolved and his arm was moving quite freely, and was asked if there was any reason to keep Malakai in for observations, Dr Speers said that the one thing that did not fit with the total resolution was the very high heart rate (of 185 beats per minute) at the time of the 37 degree temperature recording.[82]

64. However, Dr Speers agreed that there did not seem to be enough evidence to go against Malakai's parents' wishes to leave, assuming that they had been informed what to do if Malakai worsened.[83]

65. In important testimony about diagnosing sepsis, Dr Speers agreed absolutely that it was easier in hindsight because no one sign diagnoses sepsis. It is a pattern of progression and a constellation of signs that you look for, and for each individual sign or symptom there is always more than one explanation for it. In Malakai's case, there was no obvious evidence that he would be so drastically unwell within a day or so.[84] Dr Speers agreed that it was difficult to be critical of clinicians for not diagnosing sepsis at an early stage.[85]

Conclusion about the care at PMH on 23 August 2016

66. By the time Malakai attended PMH, his illness had progressed from when he was seen at SJOG Midland. The level of expertise of the clinicians available to examine him was arguably greater, but in the context of his apparent improvement and the difficulty of diagnosing a bacterial infection,

[81] ts 239
[82] ts 253 - 254
[83] ts 255
[84] ts 255
[85] ts 258

it is understandable how the seriousness of his condition could have been missed.

67. Despite the ultimately tragic conclusion, I am satisfied on the basis of the expert evidence that the management of Malakai at PMH on 23 August 2016 was reasonable in the circumstances.

Dr Mah on 24 August 2016

68. On the morning of 24 August 2016, Malakai still had symptoms. At about midday, his parents drove Malakai and Bryce to stay with Malakai's paternal grandmother, Julia Toha Brown, and her husband in Port Kennedy as had been previously planned.[86]

69. Ms Brown was concerned that Malakai was not his usual self. At about 2.00 pm, she and her husband took him to Rockingham Medical Centre, where he was seen by Dr M S L Mah.[87]

70. Ms Brown told Dr Mah that Malakai had been coughing, feeling hot, having diarrhoea (yellow soft stools) and had been crying a lot. Dr Mah examined Malakai and found that he had a mild fever, with a temperature of 37.9 degrees, but was alert and drinking from his bottle. He had a red throat, enlarged cervical lymph nodes and eczema, but no petechial or other non-blanching rash. In his progress notes, Dr Mah wrote 'NO PETECHIAL RASH' in bold. There was no tonsillar enlargement and no pus on the tonsils. Ms Brown informed Dr Mah that Malakai's right elbow had been dislocated. Dr Mah found no abnormality in the right elbow and at the time was unaware of any issue with the right shoulder.[88]

71. Based on his examination and the history provided by Ms Brown, Dr Mah formed the impression that Malakai had a viral upper respiratory tract infection and enteritis. Although his examination did not reveal any markers of serious or evolving illness, he considered that, with a child of Malakai's

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[86] Exhibit 1.1.11
[87] Exhibit 1.1.13
[88] Exhibit 1.1.13

age, the history of marked family concern was significant and that, with two hospital visits and a visit to him, it was appropriate to arrange further investigations.[89]

72. Dr Mah recommended blood tests and a nasopharyngeal swab. He took the swab and placed the specimen in a bag with the request form and gave it to Ms Brown and her husband. He instructed them to take Malakai to RGH pathology immediately for blood tests and at the same time to submit the throat swab for analysis.[90]

73. Dr Mah had ordered the blood tests and blood cultures to rule out viral influenza and other organisms. He told Ms Brown to go to the hospital immediately because his in-house pathology lab may not have been able to do the venesection in an 8-month old baby.[91]

74. Dr Mah advised Ms Brown and her husband that he would call them to come back for a review when he had the initial results, and advised them to give Malakai paracetamol, keep his fluid intake up, and cool him with a sponge.[92]

75. Ms Brown did not get the recommended blood tests and cultures done because she planned on taking Malakai to the hospital on the next morning.[93]

76. It appears that, given the time required to grow cultures, had Ms Brown taken Malakai to the RGH pathology laboratory for blood tests and cultures on the afternoon of 24 August 2016, it would have not led to a different outcome.

77. Ms Brown took Malakai home, and told his parents what Dr Mah had advised. They went to their home to get some rest while Ms Brown continued to care for Malakai overnight.[94]

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[89] Exhibit 1.1.13
[90] Exhibit 1.1.13
[91] Exhibit 1.1.13
[92] Exhibit 1.1.13
[93] Exhibit 1.1.11
[94] Exhibit 1.1.11

78. Malakai was unsettled that night despite Ms Brown's attempts to calm him and reduce his temperature. He started vomiting and having diarrhoea. At about 3.00 am on 25 August 2016, Ms Brown took him to the RGH ED.[95]

Expert discussion of the care provided by Dr Mah

79. Neither Professor Geelhoed nor the PMH Committee considered the care provided by Dr Mah.

80. Dr Nair said in his report that Dr Mah had obtained a detailed history and undertook a thorough examination and, despite clinical findings appearing to support a possible viral infection, considered that further investigation would be warranted. Dr Nair said that, given Dr Mah's concerns as were demonstrated by instructing Ms Brown to go to the pathology laboratory at RGH immediately, Dr Mah should have considered contacting the laboratory to check if the tests were done and if there were any results that he may have needed to address. He should also have considered discussing his concerns with RGH ED or PMH ED and then referring Malakai to them for further investigation and admission.[96]

81. Dr Nair was also concerned that Dr Mah had no discharge summary for Malakai from SJOG Midland or PMH ED. Dr Nair said that it would have been reasonable for him to have contacted PMH ED to obtain further information and possibly discuss Malakai's ongoing symptoms.[97]

82. Dr Joe Kosterich, a GP with 30 years of practice and a health industry consultant, was commissioned by Dr Mah's lawyers to provide an opinion on Dr Mah's management of Malakai.

83. Dr Kosterich provided a report in which he said that Dr Mah conducted a thorough examination of Malakai and documented his findings. The fact that he noted that Malakai had no petechial rash showed that he was alert to the possibility that Malakai had meningitis. Despite reassuring signs and the

[95] Exhibit 1.1.11
[96] Exhibit 1.1.17
[97] Exhibit 1.1.17 15 - 16

absence of alarm features such as a temperature above 39 degrees, rash, altered conscious state or lacking of taking fluids, Dr Mah took a swab and ordered further investigations for bacterial infection. In Dr Kosterich's view, Dr Mah went above and beyond what would generally be done in similar circumstances.[98]

84. Dr Kosterich said that Dr Mah conducted himself in a completely correct manner, and his standard of practice was totally consistent with that of a competent GP in Australia.[99]

85. In relation to Dr Nair's criticisms of Dr Mah, Dr Kosterich said that he rejected them as unfair and unrealistic. He said that it is standard practice to await for laboratory test results and that when laboratories obtain urgent results, they ring the doctor or fax the results.[100]

86. Dr Kosterich said that, if Dr Mah had called PMH ED, there was no suggestion that Malakai had deteriorated since his discharge and no expectation that he would have improved by 24 August 2016. It was clear that he was not ill enough to warrant admission at PMH, and parental anxiety is normal, especially for a first child.[101]

87. Dr Kosterich said that the length of time of symptoms consistent with a viral illness with no alarm signs was not abnormal. The diagnosis was as clear as could be in the situation. He said that, if Dr Mah had called an ED and outlined his findings, it is virtually certain that he would have been told to manage Malakai as he had been doing.[102]

88. When Dr Nair was provided with Dr Kosterich's report, he prepared a supplementary report in which he said that he had inferred from Dr Mah's

[98] Exhibit 1.1.23
[99] Exhibit 1.1.23
[100] Exhibit 1.1.23
[101] Exhibit 1.1.23
[102] Exhibit 1.1.23

use of the word 'immediately' that he had some urgency and concern about Malakai's presentation.[103]

89. Dr Nair said that, after reviewing Dr Kosterich's report and seeing Dr Mah's medical notes for the first time, he understood that Dr Mah had seen Malakai at 2.36 pm on 24 August 2016 and that Dr Mah had felt that Malakai had a possible viral illness and had ordered blood tests only to exclude other causes.[104]

90. On that basis, Dr Nair said that he considered it far more likely that Dr Mah did not have any serious concerns, so there would have been no specific reason for him to consult with either RGH ED or PMH ED or to have called the laboratory to follow up the tests later that evening.[105]

91. Dr Speers said in his report that the history and symptoms recorded by Dr Mah at Malakai's presentation were likely due to *S. pyogenes* infection.[106] Dr Speers did not comment on Dr Mah's examination and management of Malakai.

Conclusion about the care provided by Dr Mah

92. I am satisfied that Dr Mah provided an appropriate level of care to Malakai in the circumstances presented to him, especially considering the inherent difficulties in diagnosing sepsis in infants, but I do not want that view to be understood as suggesting that I accept all of Dr Kosterich's arguments in his defence of Dr Nair's initial criticisms or suggestions.

93. In particular, I do not accept that, had Dr Mah called the PMH ED, it is certain that he would have been told to continue with the same management. Dr Holloway's evidence established that the general practice at PMH was

[103] Exhibit 1.1.17C 2
[104] Exhibit 1.1.17C 2
[105] Exhibit 1.1.17C 2
[106] Exhibit 1.1.18A 9

that, if a child presented three times, the child was more than likely going to be admitted even if one of those times was at a GP.[107]

94. I also do not accept that it would be appropriate for a GP to discount parental concerns in the case of a possible viral infection. Dr Holloway said that, in his 10 or so years at PMH, parental concern or carer's concern is one of the markers for admission: 'you listen to the parents. If they're worried, you listen harder.'[108]

95. The importance of parental/carer concern is also emphasised in the Queensland Paediatric Guideline for 'Sepsis – Recognition and emergency management in children' (Queensland Guideline),[109] and the Perth Children's Hospital ED Guideline for 'Sepsis management'.[110] The latter guideline also contains the following statement in bold under the heading Clinical Recognition: '[It] is important to maintain a high index of suspicion for sepsis as prompt treatment is crucial'. The Paediatric Acute Recognition and Response Observation Tool forms, known as PARROT charts, that were being trialled at FSH, RGH and other hospitals at the time of the inquest also included directions to include families' views and concerns in assessing children as they know their children best.[111]

96. I note that Malakai was not Ms Thompson's first child, that Ms Brown had at least three of her own children, and that Dr Mah did take Ms Brown's concerns into account in any event.[112]

RGH on 25 August 2016

97. As noted above, Malakai was unsettled after Ms Brown took him to her home from Dr Mah's surgery. She bathed him that night, and one of her daughters got into the bath to try to settle him, but he was uncharacteristically unhappy.

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[107] ts 32
[108] ts 32 - 33
[109] Exhibit 3
[110] Exhibit 4
[111] Exhibit 1.3.GS9, GS10,GS11
[112] Exhibit 1.1.11

He cried that night and started vomiting and having diarrhoea, so she took him to RGH ED early on 25 August 2016.[113]

98. At 4.50 am, Ms Brown advised the triage nurse at the ED that Malakai was unsettled and that he had a swollen shoulder, diarrhea and vomiting. He looked unwell. He was alert with a temperature of 36 degrees. There is no record of Malakai's colour, whether his peripheries were warm or cool, or what his capillary refill time was at the time of triage.[114] The nurse gave him a triage category of '3', which meant that he could wait about 30 minutes.[115]

99. At about 5.30 am Malakai was assessed by Dr Thomas, who at that time was a resident medical officer in the ED. She was about to take a break, but heard Malakai cry and decided to check on him before her break. A nurse told her that he did not look well, so she accompanied the nurse to review him. By that time Malakai had dusky lips, severe rib recession, dry mucous membranes, a sunken fontanelle, sunken eyes, loose black stools, and a non-blanching rash on his shoulder that had spread to his face. He had a respiratory rate of 65 breaths per minute and a capillary refill rate of 6 seconds. His heart rate was 188 beats per minute.[116]

100. From that time in the morning, the hospital notes are very scant. The following account is based on retrospective notes made by the relevant doctors. Where there is inconsistency in the notes, I have relied on notes which were corroborated to some degree.

101. Dr Thomas realised that Malakai was very unwell, so she went to see her supervisor, Dr Morris, who was an emergency medicine registrar and was the most senior doctor in the ED at the time. Dr Morris assessed Malakai and immediately noticed that he had a widespread non-blanching rash, with rash on his legs and abdomen, and a rash with elements of purpura on his upper arms. He was very irritable and distressed, and he was crying loudly.[117]

[113] Exhibit 1.1.11
[114] Exhibit 1.2.2 Paediatric Triage Nursing Assessment
[115] Exhibit 1.1.21
[116] Exhibit 1.2.2 Paediatric Triage Nursing Assessment
[117] Exhibit 1.1.21 10; Exhibit 1.1.24 8

102. Dr Morris commenced treatment for ‘septicaemia – presumed meningicoccal’, and attempted to obtain intravenous access in order to administer the antibiotic ceftriaxone. After two failed attempts to obtain intravenous access, she requested intra-muscular ceftriaxone and instructed a more junior ED registrar, Dr J Hayward, to call on-call consultant paediatrician Dr Itotoh, for assistance.[118]

103. At the time, Dr Itotoh was in doctors’ accommodation provided by RGH nearby. From about 1.00 am to about 4.00 am that morning, she had been involved in a forceps delivery/emergency caesarean section of a baby who needed CPR from the delivery until stabilisation in the neonatal unit. Dr Itotoh had then slept in the accommodation until about 5.30 am, at which time she had a shower in preparation for returning to the neonatal unit. As she was getting ready to leave, Dr Hayward called her. She walked directly to the ED and arrived five minutes later.[119]

104. In the meantime, Malakai had been moved to the resuscitation area and was connected to monitoring. Unsuccessful attempts were made to obtain finger prick blood sugars, and at about 6.20 am two unsuccessful attempts to obtain intraosseous (IO) access were made by a nurse who had recent training in the procedure. [120]

105. At about this time, Dr Itotoh arrived and twice attempted, unsuccessfully, to gain intravenous access, and a nurse administered the intramuscular ceftriaxone in Malakai’s buttock.[121]

106. Dr Itotoh then successfully obtained IO access into Malakai’s left tibia and aspirated bone marrow which was sent for blood cultures.[122] She had included sepsis and viral illness in differential diagnosis, and she considered that Malakai was to be treated for presumed sepsis. She did not think that he

[118] Exhibit 1.1.24A
[119] Exhibit 1.1.27
[120] Exhibit 1.1.24A
[121] Exhibit 1.1.27
[122] Exhibit 1.1.24A

had septic shock, so she did not order another dosage of ceftriaxone to be administered through the IO line. [123]

107. Dr Itotoh ordered a 20 ml/kg saline bolus to be administered through the IO line. A 10 ml/kg bolus was administered with some difficulty.[124]

108. Dr Itotoh considered that, once Malakai's intravascular volume had increased with the fluid boluses, he would need to be nursed in isolation and placed on intravenous antibiotics. She called the paediatric ward at RGH and learned that an isolation bed was not available, so she advised the ED team to transfer him to PMH. As he appeared to be stabilised with the saline bolus and as the antibiotic had been administered, Dr Itotoh returned to the neonatal unit.[125]

109. Dr Morris directed Dr Thomas to arrange for Malakai's transfer to PMH and asked nurses to do a blood sugar test for Malakai. Dr Morris and Dr Hayward then left the resuscitation area to review other patients.[126]

110. Dr Thomas called PMH and spoke to the ED registrar, who accepted the transfer. A nurse in the RGH ED told Dr Thomas that the IO cannula was loose. Dr Thomas then called St John Ambulance (SJA) for an urgent transfer and nominated priority 2, meaning that they should be there within 10 to 15 minutes. Dr Thomas nominated this level of priority to allow time to secure Malakai's IO line and to prepare for the transfer.[127]

111. Dr Morris returned to the resuscitation area and found that the nurses were having difficulty obtaining Malakai's blood sugar level. Dr Morris arranged for him to be administered dextrose through the IO access to boost his blood sugar level, but when the nurse attempted to administer the dextrose, the IO line appeared to be leaking under the dressing. The nurses adjusted Malakai's

[123] Exhibit 1.1.24A; Exhibit 1.1.27
[124] Exhibit 1.1.21; Exhibit 1.1.27
[125] Exhibit 1.1.27
[126] Exhibit 1.1.24A
[127] Exhibit 1.1.21

dressings and were able to fix the leak. Dr Morris ordered further fluids at this point to comply with Dr Itotoh's earlier order for a 20 ml/kg bolus.[128]

112. PMH called the RGH ED to ask for an update as to when Malakai would be arriving. Dr Thomas, on Dr Morris's instruction, called SJA to change the priority level to priority 1 so that the ambulance paramedics would attend immediately. Dr Hayward was to accompany Malakai in the ambulance.[129]

113. As the ambulance paramedic arrived, an ED consultant at RGH, Dr H Clarke, arrived for his day shift and secured the IO line.[130] Dr Morris handed over Malakai's care to the ambulance paramedics.[131]

114. After Malakai's departure, Dr Thomas entered the primary diagnosis of Malakai's illness in the ED's Information System (EDIS) as: Generalised Infections – Septic Shock.[132]

115. On the way to PMH, Malakai had several small vomits of brown fluid, which Dr Hayward removed with suction to prevent aspiration. As the ambulance was approaching Fiona Stanley Hospital (FSH), the paramedics asked him if he wanted to divert to the ED there instead of continuing to PMH, but he declined the offer because he understood that Malakai required paediatric intensive care, which was not available at FSH.[133]

Expert discussion about management of Malakai at RGH

116. Professor Geelhoed noted that the seriousness of Malakai's illness was not fully appreciated at triage, but when Dr Thomas became involved, she immediately consulted the senior doctor in the department. Malakai was then transferred to the resuscitation bay, the on-call paediatrician was called, the appropriate treatment of fluids and antibiotics was initiated and arrangements were made to transfer him to PMH. Vascular access was not

[128] Exhibit 1.1.24A
[129] Exhibit 1.1.24A
[130] Exhibit 1.1.21
[131] Exhibit 1.1.24A
[132] Exhibit 1.1.21
[133] Exhibit 1.1.22

obtained, but this was not unusual in the circumstances and no anaesthetists were available at RGH at the time.[134]

117. Professor Geelhoed said that the volume of fluid and the dose of antibiotics were less than ideal, but in his opinion that had little, if any, influence on the outcome.[135]

118. The PMH Committee considered that Malakai had been recognised as profoundly unwell at RGH, but the initial management did not follow current guidelines for the management of septic shock, most significantly in the failure to deliver significant fluid resuscitation. The management of hypoglycaemia was also suboptimal, with no confirmation of restoration of euglycaemia.[136]

119. The PMH Committee noted that it was difficult to be certain of the management at RGH because the nursing and medical notes appeared to be incomplete. It also noted that the initial contact with PMH was to the ED registrar when, for a case of that severity, it should have been to the ED consultant or the PICU consultant on call. The call to the registrar should have been used as an opportunity to provide advice rather than just as a notification of a transfer. The registrar should have immediately notified a consultant.[137]

120. The PMH Committee also considered that mechanical ventilation should have been considered prior to transfer given that Malakai was likely to deteriorate. In addition, the most experienced medical staff available should have undertaken the transfer, and a response plan to divert to FSH if Malakai deteriorated should have been included.[138]

121. In his report, Dr Nair was critical of the management of Malakai at RGH, particularly the general delay in treating him and the failure to keep adequate records of his observations and treatment in the ED. He also noted that

[134] Exhibit 1.3.GS3 6
[135] Exhibit 1.3.GS3 6
[136] Exhibit 1.3.GS4 2
[137] Exhibit 1.3.GS4 2
[138] Exhibit 1.3.GS4 2 - 3

Dr Itotoh made no contemporaneous notes and instead made retrospective notes on 1 September 2016.[139]

122. The failure to keep records commenced at triage at 4.51 am, when no note was made of Malakai's colour or relative temperature of his peripheries or his capillary refill time despite the triage form providing places for these signs, which suggests that the observations were not done. Dr Nair notes this was extremely concerning as identification of the delayed capillary refill time would have implied that Malakai was very sick and needed immediate attention. Malakai was not examined by Dr Thomas until 5.30 am, at which time he was presenting with symptoms consistent with septic shock from meningococcal septicaemia.[140]

123. Dr Nair noted that there was a one hour delay until Malakai received antibiotics and intravenous fluids. He said that, once the IO line was in place, he should have been given another dose of ceftriaxone. In addition, Malakai's capillary refill time remained six seconds for the two hours in the ED, so he should also have been given further boluses of fluid to correct the shock.[141]

124. Dr Nair noted that there was no record of an ED consultant being contacted, and it was not until 6.00 am that Dr Itotoh was called. He said that early involvement of senior clinicians is essential in managing children with septic shock.[142]

125. Dr Nair noted that there were serious discrepancies in the medical records between the descriptions of the ED staff and Dr Itotoh's notes. However, Dr Nair also noted that the records suggested that Dr Itotoh had no junior paediatric medical staff to assist her after hours, so that would have explained why she delegated several functions which she might otherwise have done herself.[143]

[139] Exhibit 1.1.17 23
[140] Exhibit 1.1.17 20
[141] Exhibit 1.1.17 21
[142] Exhibit 1.1.17 20
[143] Exhibit 1.1.17 26

126. In oral evidence, Dr Nair reiterated the comments he made in his report. In relation to the difficulties in recognising and treating sepsis in a child, he said that sepsis and septic shock are part of a continuum. In hindsight it is simple and easy, but it can be quite difficult clinically to identify changes or evolution of septic shock.[144]

127. Dr Nair agreed that the recognition and treatment of sepsis is an area that is still evolving. He said that for 25 years he has 'seen it grow and change, and we still don't have a core understanding of things and processes. It is a work in progress.'[145]

128. Dr Nair said that different paediatricians had different views about it, and a lot of traditional views are still prominent. The entire area of sepsis/septic shock, even the recognition and the definition, has been problematic in paediatrics.[146] However, he agreed that the way to treat it once it has been identified as a possibility was with antibiotics and boluses of fluids. He said that was exactly what happened with Malakai and that, once there was recognition that he was sick, everything was done appropriately.[147]

129. Dr Speers said in his report that, when Malakai presented at RGH, his constellation of signs, symptoms and investigation results were all consistent with septic shock with septicaemia and multi-organ failure. He said that this was recognised by the ED staff who commenced fluid resuscitation, dextrose and a parenteral antibiotic, ceftriaxone.[148]

130. Dr Speers considered that, by the time Malakai presented at RGH, an irreversible sepsis cascade had commenced, so even if he had been administered antibiotics and other adjunct therapy the result would not have changed.[149] The advanced sepsis was irretrievable.[150] The difficulty in his case was recognising that his illness was caused by a bacterial infection. Had

[144] ts 193, 201
[145] ts 210
[146] ts 211
[147] ts 212
[148] Exhibit 1.1.18 9
[149] ts 243
[150] Exhibit 1.1.18C 5

he been administered antibiotics one or two days earlier, the outcome may well have changed.[151]

131. When asked how common sepsis was in small children, Dr Speers said that bacterial infections were common but viral infections are more common. He said that severe invasive infections are a lot less common. He said that a scenario like Malakai's is a recurring problem because there is a more common explanation for basically everything that happens when a child presents with symptoms, and it is very difficult 'to pick which is the one that is going to go on and have a bad outcome'.[152]

132. Dr Speers said that Malakai's example of a deep-seated streptococcal infection does not manifest the usual signs of a bad infection. It manifests as pain without all the usual signs and symptoms normally expected for an infection. He absolutely agreed that it is difficult to be critical of clinicians who do not diagnose it at an early stage.[153]

<u>Changes at RGH following Malakai's death</u>

133. Dr Schymko was a member of the RGH executive who signed off on the SAC 1 Report. He explained in his statement that the following issues were identified by RGH following Malakai's death:[154]

    a. lack of proper documentation recorded in Malakai's medical record;
    b. lack of compliance with the guideline for treating sepsis;
    c. problems with communications; and
    d. a low level of paediatric resourcing at RGH

134. As to the documentation issue, Dr Shymko said in oral evidence that it is not an uncommon issue within health services and that it has arisen in other SAC 1 investigations. He said that RGH has been trying to address it across the hospital through education and increased audits. He said that the standard

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[151] ts 244 - 245
[152] ts 258
[153] ts 258
[154] Exhibit 1.3 5 - 6

of documentation seemed to be improving and that RGH continued to work on it. [155]

135. In his statement, Dr Shymko stated that, since 2017, RGH has provided education sessions about documentation to graduate nurses twice a year, and there is specific training of triage nurses and yearly review through audit and assessment.[156]

136. At the time of the inquest there was also an 'Escalation Project' underway, which aimed to develop the age-appropriate PARROT charts mentioned earlier. These charts are said to be 'the first early warning tool to combine clinical assessment, clinician and family concern, and escalation process and a clinical communication model focusing on timely action'. The paediatricians at RGH support a state-wide implementation of the charts.[157]

137. In relation to documentation from other medical providers, Dr Shymko stated that most Western Australian hospitals use EDIS for ED records, but the records are not available between hospitals.[158]

138. In oral evidence, Dr Shymko said the unavailability of records between hospital EDs is a state-wide problem that is complicated by the fact that some major hospitals are private and some are public, which increases the complexity of communications between them. He was not aware of a solution, and he noted that they were still yet to make sure that their own systems communicated with each other.[159] He said that it was a significant gap in the system and that he would have thought that, in this day and age, with the initiative and the will, we could set up something that would be better than it is now.[160]

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[155] ts 136
[156] Exhibit 1.3 6 - 7
[157] Exhibit 1.3 8
[158] Exhibit 1.3 9
[159] ts 136 - 137
[160] ts 144

139. That evidence is particularly frustrating given that, in 2015, I made the following recommendation:

> If it is not already doing so, the Western Australian Department of Health, take steps to attempt to identify and have in place a means of giving clinicians in emergency departments timely access to patients' health information from all sources.[161]

140. As to identifying and treating sepsis, Dr Shymko said that training of nursing staff in relation to recognising the seriously ill child is provided, and sepsis specific training is provided to nursing staff and medical staff on a regular basis.[162] He said that each year there are a variety of educational activities, including those related to paediatric sepsis, provided to staff. A Sepsis Staff Development Learning Package, which included information about managing a paediatric patient, was developed in 2016 and is still available. ED registrars receive training to become emergency physicians, and 25% of that training is specific to paediatrics. Registrars are required to see 400 paediatric cases as part of their training.[163]

141. Since Malakai's presentation, an annual sepsis awareness campaign is conducted to coincide with World Sepsis Day. [164]

142. Dr Shymko said that the PMH guidelines were available on desktop computers in the RGH ED at the time of Malakai's presentation. Since then, a large computer screen was installed next to the bed in the resuscitation area to give more visible access to the guidelines and to a drug dosage calculator.[165]

143. As to the communications issues identified in the SAC 1 Report, Dr Shymko stated that, though it was not solely a response to Malakai's presentation, the South Metropolitan Health Service had implemented a training program

[161] ***Inquest into the death of David Yehuda Weiser***, CORC 29/2015, 18/09/2015
[162] Exhibit 1.3 11
[163] Exhibit 1.3 12
[164] Exhibit 1.3 12 - 13
[165] Exhibit 1.3 10

called Speak Up for Safety, which encourages clinical staff at every level to raise an issue if they are concerned. The need for that encouragement was perceived because of the hierarchical nature of medical services and the resultant reticence of staff to question the opinion of a more senior clinician.[166] The training is compulsory.[167]

144. Of more relevance in Malakai's presentation was the failure by ED staff to contact the on-call ED consultant immediately upon realising the seriousness of Malakai's condition.[168] Dr Shymko said that RGH takes great pains to try to ensure that nursing and medical staff have a low threshold for escalation to a senior clinician. He said that Malakai's incident was taken very seriously by the hospital and that a lot of time was spent, and continues to be spent, to educate staff about decreasing the thresholds. He believed that has occurred.[169]

145. In relation to the issue of level of paediatric resourcing at RGH, Dr Shymko noted that, after Malakai's presentation, RGH recruited and implemented paediatric registrars to provide extra cover, including overnight cover.[170] At the time of the inquest, three registrars had been recruited and another one was expected to commence in February 2020. There was approval and funding to recruit a fifth registrar, but RGH had not been able to find a suitable candidate at that time.[171]

Conclusions about management of Malakai at RGH

146. The evidence establishes that there were shortcomings in the care provided to Malakai at RGH. In particular, the delays in recognising the need for prompt attention for presumed sepsis or meningococcal infection, the failure to follow the relevant guideline in treating sepsis, and the failure to call for the ED consultant meant that Malakai did not receive the level of care that was warranted.

[166] Exhibit 1.3 11
[167] ts 135
[168] Exhibit 1.3 23
[169] ts 134
[170] Exhibit 1.3
[171] ts 131 - 132

147. However, it is also clear that, despite the setbacks in managing him, Dr Itotoh and the ED staff provided generally appropriate care and that the care they provided would not have led to a different conclusion even if they had commenced it as soon as Malakai presented and had complied more rigorously with the guideline.

148. I am satisfied that the improvements made at RGH should increase the likelihood that a child presenting at the ED will receive a higher standard of treatment and care than that provided to Malakai.

PMH 25 August 2016

149. On the way to PMH in the ambulance, Malakai's conscious state deteriorated, and he required bag mask ventilation. He arrived at the PMH ED at 8.49 am and was taken directly to the resuscitation bay for cardiorespiratory resuscitation. He was unresponsive and had ineffective respiratory effort and an extensive purpuric rash. There was clear evidence of cardiovascular failure.[172]

150. A second IO line was inserted and further fluids were administered, including saline, albumin, dextrose and ceftriaxone. The intensive care team attended and continued the resuscitation with the ED staff. Malakai was given inotropes to support his blood pressure and he was intubated and ventilated. He had a brief loss of cardiac output requiring external massage. He was then transferred to the paediatric intensive care unit (PICU) with a presumed diagnosis of meningococcemia with purpura fulminans.[173]

151. At 7.44 pm, PMH was notified that the blood culture taken from the IO line in RGH at 6.25 am on 25 August 2016 was positive for gram positive coccus consistent with a streptococcus.[174]

152. In the PICU, Malakai received large volume fluid resuscitation and ongoing inotropic support. He had another loss of cardiac output requiring external

[172] Exhibit 1.1.15
[173] Exhibit 1.1.15
[174] Exhibit 1.1.18A 9

compression, and a decision was made to place him on veno-arterial extracorporeal membranous oxygenation (ECMO). From about 11.30 am on 25 August 2016, he was supported on ECMO.[175]

153. Overnight, it became clear that Malakai could not be resuscitated. At 10.46 am, medical staff were informed that the gram positive coccus in the blood culture was identified as *S. pyogenes.*[176]

154. After discussions between his family and the PICU, Malakai was separated from the ECMO at 1.30 pm on 26 August 2016. He showed no signs of life, so that time was certified as the time of his death.[177]

<u>Expert discussion about management of Malakai at PMH ED and PICU</u>

155. Professor Geelhoed considered that Malakai's management at PMH was appropriate and well-documented but, despite heroic measures, he succumbed on 26 August 2016. [178]

156. The PMH Committee considered that the management at PMH was thorough and appropriate.[179]

157. In Dr Nair's opinion, the management at PMH for this admission was of the highest quality. The teams did everything in their power to try to save him, but he had catastrophic damage from septic shock secondary to overwhelming and fulminant streptococcal sepsis.[180]

158. Dr Speers believed that Malakai presented to PMH with irreversible multi-organ failure.[181]

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[175] Exhibit 1.1.15
[176] Exhibit 1.1.18A 9
[177] Exhibit 1.1.15
[178] Exhibit 1.3.GS3 6
[179]Exhibit 1.3.GS4 3
[180] Exhibit 1.1.15
[181] Exhibit 1.1.18

Conclusions about management of Malakai at PMH ED and PICU

159. It is clear that the care that Malakai received at PMH on 25 and 26 August 2016 was appropriate.

Cause of death and how death occurred

160. On 26 August 2016, Ms Thompson submitted an objection to an internal post mortem examination of Malakai's body. On my authority, on 29 August 2016, forensic pathologist Dr J White performed an external examination and found gross generalised oedema and diffuse grossly haemorrhagic petechial rash with areas of tissue necrosis.[182]

161. Dr White formed the opinion that the cause of death was: '[C]omplications in association with fulminant sepsis in an infant (*Streptococcus pyogenes*)', which I adopt as my finding as to the cause of death. Despite undertaking a review of Malakai's hospital records, Dr White was unable to determine the source of the infection without undertaking an internal post mortem examination.[183]

162. Dr Speers stated that he was unable to prove his conclusion, but he believed, and on balance I accept, that Malakai had suffered a minor traumatic event of a dislocated elbow, which was the inciting event for a *S. pyogenes* infection that progressed on 23 August 2016 and 24 August 2016. He then developed sudden onset of streptococcal toxic shock syndrome (SSTS) whereby toxins released from the bacteria caused a sudden and overwhelming inflammatory response that presents as sudden shock and multi-organ failure, which led to his death.[184] The most common site of *S. pyogenes* leading to SSTS is deep tissue infection.[185]

163. I find that death occurred by way of natural causes.

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[182] Exhibit 1.1.6
[183] Exhibit 1.1.6
[184] Exhibit 1.1.18A 12
[185] Exhibit 1.1.18A 7

Conclusion

164. Ms Thompson's concern that Malakai would not have died had he been diagnosed with sepsis was understandable. In the clear vision of hindsight, Malakai's tragic death was preventable had the underlying cause of his symptoms been identified sooner.

165. Unfortunately, the nature of streptococcal sepsis in general, and sepsis arising from a deep-seated infection of the arm of an infant in particular, is such that it was extremely challenging to diagnose, so it is not surprising that even competent, experienced clinicians failed to do so in Malakai's case.

166. It is cold comfort to Malakai's family that deaths from sepsis are also relatively rare, but it may be some consolation to know that, as a result of his death, improvements have been implemented to reduce the likelihood that another baby will die in similar circumstances.

B P King
Deputy State Coroner
4 September 2020