

Delays in recognition and treatment of sepsis in a young child

Executive summary

1. On 1 October 2022, the Health and Disability Commissioner (HDC) received a complaint from Mr and Mrs B about the care provided to their son, Master A, aged 4, at Health New Zealand | Te Whatu Ora Capital Coast and Hutt Valley (Health NZ). Sadly, Master A died in the Emergency Department (ED) at Wellington Hospital in September 2022.
2. At the outset, I acknowledge the devastating outcome of these events and the impact on Mr and Mrs B and their family, and I offer my sincere condolences for the loss of their son, Master A. This investigation is focused on assessing the standard of care provided to Master A at the time of the events, and it is not the role of HDC to determine whether the action or inactions of Health NZ contributed to Master A's death.
3. This investigation found a number of deficiencies in the care provided across multiple departments at Health NZ, and I find that the cumulative effect of these amounts to a breach of Right 4(1) of the Code of Health and Disability Services Consumers' Rights (the Code), for not providing services to Master A with reasonable care and skill. I acknowledge that Master A's presentation was challenging and his condition deteriorated rapidly. I also acknowledge that it is not possible to know whether earlier intervention could have altered the tragic outcome, but I consider there were missed opportunities to identify this deterioration sooner and initiate the paediatric sepsis pathway (PSP).

Recommendations

4. Health NZ advised that since the events, it has facilitated two meetings with Master A's family, at their request, to discuss their concerns, answer their questions, and offer their condolences. Health NZ also advised of the following changes that have been implemented.

The local accident and medical centre

- The local accident and medical centre (the medical centre) continues to focus on training and system improvements regarding the recognition and treatment of unwell patients, including children.
- In May 2024, the orientation document for all new doctors was updated to include recommending two additional training webinars to view prior to commencement of work – Sepsis and Critical Thinking. Completion of these webinars is compulsory for nurse practitioners and registrars.
- Three-monthly audits of Early Warning Score (EWS) monitoring are ongoing.
- Paediatric-focused training is prioritised, including an interprofessional simulation-based paediatric workshop in July 2025.

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- A 'Written Advice' template has been implemented to provide written advice for patients and family in lieu of a printed discharge summary. This sits within the medical centre's electronic patient management system and enables clinical staff to provide a summary of information for patients and family at the time of the consultation where they feel it is indicated, eg, care plan, safety-netting advice and recommendations for medications or follow-up.

Wellington Hospital ED

- The number of nurse educators with dedicated paediatric training and experience has been increased. This team has developed a strong paediatric education profile, and Health NZ can now provide further training in relation to recognising deteriorating patients and the ways to escalate care when concerned.
- The Paediatric Early Warning System (PEWS) score¹ is now used for every child from the time of their arrival in the ED and throughout their presentation.
- The PEWS chart now has a checkbox for 'parental concern', and Health NZ constantly reiterates to staff that parental concern must be taken seriously.
- The Health Quality & Safety Commission Te Tāhū Hauora PSP has been adopted with a complementary education programme that focuses on red flag recognition. This includes both a screening tool to ensure staff stop to consider 'could this be sepsis' and a rapid escalation and treatment plan if the patient meets the criteria. It is a requirement that this pathway be kept in all paediatric patients' file notes and is designed for constant reassessment throughout their presentation. The Hutt ED also has a PSP in place that was based on the Starship Sepsis Guidelines.
- Paediatric registrars are now provided training on the recognition of unwell children and access techniques for difficult intravenous (IV) insertions.
- The ED visitor policy was reviewed and updated to allow more than one parent to support a child in the department.
- The day after discharge, an ED registered nurse makes a follow-up phone call to all caregivers of children with the aim of checking that the child is not deteriorating and that treatments are effective.
- The PSP has been emphasised in resident medical officer teaching, particularly to draw attention to both a low temperature and a fever as potential signs of sepsis.

5. Acknowledging the substantial changes already implemented by Health NZ following these events, I further recommend Health NZ:

¹ A clinical tool used to detect early signs of clinical deterioration, identify children at risk of rapid deterioration, and guide timely intervention and escalation of care.

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- a. Provide a formal written apology to Master A's family for the breach of Right 4(1) of the Code identified in this report. The apology is to be sent to HDC, for forwarding to Master A's family, within three weeks of the date of this report;
 - b. Conduct an audit of 20 randomly selected records of paediatric patients seen in the ED in the past 6 months and report on whether the PSP has been consistently kept in the notes and used for constant reassessment throughout their presentation. The results of this audit are to be provided to HDC within three months of the date of this report.
 - c. Review the policies and procedures in place for patient handover between the ED and the Paediatric Department to ensure sufficient clarity for clinicians on roles and responsibilities during the handover period. Evidence of the review and any changes made as a result are to be sent to HDC within three months of the date of this report.
6. Health NZ has confirmed that it accepts these recommendations.

Background

Presentation at the medical centre – 22 September 2022

7. On 22 September 2022, Master A presented to the medical centre and was seen by the triage nurse, Registered Nurse (RN), at 5.05pm. The clinical notes document that Master A presented with fevers and cold or flu-like symptoms. It records that, on 20 September, he had a fall from his bike and the following day became reluctant to move his neck. Master A is recorded as having developed fevers the night prior. His temperature was recorded as 38.8°C (the normal temperature range for a four-year-old child is 36.5–38.0°C).
8. At 6.26pm on 22 September, Master A was reviewed by a general practitioner (GP), Dr C. Dr C documented Master A's fall from his bike two days prior and that he began complaining of pain in the left side of his neck on 21 September and later that night developed a fever with a high temperature (38.8°C). Clinical notes state that Master A had had a cough for a week and that his brother also had a cough with no fever. Dr C documented her physical examination of Master A, that his heart and lungs sounded normal, that he was breathing normally, and that his tonsils also appeared normal. Dr C documented an assessment of Master A's abdomen, recording it as soft, with normal sounds and no rash. Dr C assessed Master A's neck to be 'slightly rotated towards the right' (torticollis) but not tender when pressed. Master A had a high temperature (38.9°C), and his eardrums and throat were pink.
9. Health NZ told HDC that, although it is not documented in the clinical notes, Dr C recalls 'that there were no signs of trismus (restricted ability to open the mouth), no pus on the tonsils, and there was no excessive drooling' and there were 'no palpable cervical lymphadenopathy (swollen lymph nodes in the neck) and certainly no enlarged lymph nodes.'
10. Dr C recorded her clinical impression of a febrile viral illness and torticollis caused by Master A's fall from his bike two days prior. Master A was discharged with advice that his parents should manage his symptoms with regular paracetamol and ibuprofen, ensure he remained

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hydrated and that his torticollis should gradually improve but that if it became any worse or his parents had any concerns, they should seek a GP review.

Presentation at Wellington Hospital – day1 September 2022

Initial presentation

11. At 10.59am on day1 September 2022, Master A presented with his parents at Wellington Hospital ED. Health NZ's 'COVID-19 Hospital & Clinical Patient Visitors Policy' in place at the time allowed only one visitor per patient in the ED, and any exception to this policy was to be managed on a case-by-case basis. Mrs B accompanied Master A in the ED as Mr B was not granted access, in accordance with the Health NZ policy.
12. The triage nurse, RN D, documented that Mrs B advised that Master A had tested positive for COVID-19 on 24 September and had since developed body and joint aches. Master A's temperature was documented to be low (35.8°C) and his heart rate elevated (149 beats per minute (bpm)).² Master A was triaged as a Code 3 – indicating an urgent case where the patient should be reviewed by a doctor within 30 minutes.
13. Health NZ said that Master A was brought through to the department quickly and taken into the clinical treatment area (CTA) because he was COVID-19 positive.
14. At 11.15am, Master A was assessed by RN E who documented Master A's positive COVID-19 test and that he had been having joint, body and neck pain and aches ever since. The clinical notes record that Mrs B had noticed Master A's limbs were swollen that morning. RN E documented Master A as 'lethargic looking', 'very sore, in distress, unable to settle for long, groaning in pain' but not feverish. RN E recorded Master A's heartrate as high (156bpm) and his weight as 15 kilograms.
15. At 12.16pm, the Day Stay National Medication Chart records that Master A was given paracetamol.

ED review

16. Master A was reviewed by an Emergency Medicine Senior Registrar, Dr F, at around 12pm. Dr F documented Master A's history, including his intermittent fevers, that he had 'not been eating well' but was taking some fluids and passing small amounts of very dark urine. The clinic notes state that Mrs B noticed Master A's joints (feet, hands, elbow and knees) were very swollen and that Master A seemed to be in pain, unable to weight-bear and had a raised temperature (39°C). Dr F documented that there was no rash present but that Master A had been complaining of abdominal pain with no history of vomiting or diarrhoea.
17. Dr F observed Master A to be alert and oriented but that he 'look[ed] miserable and unwell: pale, lethargic [and] in pain' and that he was sore with movement. Master A's temperature was low (35.8°C), heart rate was elevated (149bpm), and blood pressure was within the normal range (93/58mmHg).³

² The normal heart rate range for a four-year-old is 80–120 bpm.

³ The normal blood pressure range for a four-year-old is 78/48–112/74.

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18. Dr F examined Master A, documenting that his chest was clear, his abdomen was soft, and he did not have a rash over his torso, limbs, palms, or soles of his feet. Master A's heart, lungs, and ears appeared normal, and although Dr F was unable to examine inside Master A's mouth, no lesions were present around the mouth. Master A's feet and hands were recorded to be pale, with the presence of oedema (fluid retention) and warm to the touch. No capillary refill time was documented. Oedema was present on Master A's arms and legs, particularly his right foot, left elbow, and left knee. Dr F attempted to stand Master A, but he was too sore to weight bear, so his mobility could not be tested.
19. The clinical notes record several possible diagnoses that Dr F considered based on Master A's presentation, including complications of COVID-19, Henoch Schönlein Purpura (HSP),⁴ or another autoimmune disorder. Dr F planned to try managing Master A's pain with simple pain relief initially, and – if unsuccessful – to administer intranasal fentanyl.⁵ She requested a urine sample, the application of Ametop to allow a blood sample to be taken, fluids to be given, and that paediatric review was required. Dr F told HDC that she had not included sepsis as a differential diagnosis because Master A was afebrile. Because of this, she did not prescribe antibiotics.
20. At 12.26pm, Ametop was applied in anticipation of IV-line placement and blood tests. Master A's heart rate was elevated (155bpm), respiratory rate⁶ was within the normal range (26 breaths per minute) and his blood pressure within the normal range (93/58). Health NZ said that, as Master A's vital signs were relatively normal at the conclusion of Dr F's review, it was thought to be appropriate to leave the Ametop for at least 30 minutes to ensure skin anaesthesia before inserting the IV.
21. Health NZ said that Dr F discussed Master A's case with the ED senior medical officer (SMO), and a possible diagnosis of nephrotic syndrome⁷ was discussed. Health NZ said that the SMO agreed with Dr F's treatment plan, given Master A's symptoms. The SMO did not physically review Master A at the time, which Health NZ said was usual practice.
22. At 12.28pm, Master A was referred to the paediatric service for further review. Health NZ said that, generally, seriously unwell children presenting to the ED would have IV access and blood tests performed by ED staff. In children who are less unwell and are stable but likely to need paediatric assessment and admission, IV lines, blood tests, and overall decisions about care management are handed over to the paediatric team. Therefore, Health NZ said that ED staff thought the paediatric team would insert the IV and obtain bloods when they came to assess Master A.

⁴ An autoimmune disease (when the body's immune system attacks its own tissue) involving inflammation of small blood vessels that mostly commonly occurs in children.

⁵ A synthetic opioid administered through the nose for rapid pain relief.

⁶ The number of breaths taken per minute for a four-year-old child, the normal range is 22–34.

⁷ A kidney disorder in which the glomeruli (filtering units in the kidneys) are damaged and allow excessive protein to leak into the urine, leading to swelling, low blood protein, and other complications.

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23. At 12.29pm, the urine specimen and dipstick samples were taken. Health NZ said the tests were received in the laboratory at 12.56pm and the results were reported at 1.55pm, which is within the expected timeframe of 60 minutes for an urgent sample.

Paediatric review

24. At 1.38pm on day1 September, Dr G, a paediatric senior registrar, reviewed Master A and noted that he was in too much pain to be fully examined or for bloods to be taken. He requested that oral morphine be trialled to facilitate this. Dr G requested that repeat urine specimen and dipstick samples be taken in the ED.
25. Master A's observations were repeated at 2.04pm. His temperature was documented at 35.8°C (slightly low), whereas his pulse (98bpm) and respiratory rate (30 breaths per minute) were within the normal ranges.
26. The Day Stay National Medication Chart records that an RN administered morphine 3.2mg at 2.15pm. Mrs B told HDC that she was not informed of the medication being administered to Master A at this time.
27. Health NZ said that a nursing staff shift change occurred at approximately 3.00pm. RN H documented receiving a patient handover and at 3.08pm that a dipstick urine sample was completed. RN H observed Master A to be alert with swollen limbs and a blister on his right wrist that he had peeled. RN H documented Master A's joint pain, questioning whether this was related to COVID-19, but that Dr G had reported the morphine to be having a 'good effect.' Health NZ said that Master A was being monitored on the electronic vital signs monitor, but his vital signs were not formally recorded at this time. In contrast, Mrs B recalls comforting and carrying Master A around the room and is clear that he was not continuously attached to an electronic monitor.
28. At 3.13pm, the urine biochemistry was reported and showed an abnormal protein/creatinine ratio.⁸ At 3.19pm, the albumin/creatinine ratio in Master A's urine was reported as above normal.
29. At 3.30pm, Dr G reviewed Master A and recorded his history over the previous days. Dr G completed an examination of Master A, documenting him to be 'distressed, in pain, rigid, crying' and that he was unable to move his body and reluctant to move his limbs with no oedema. Master A is documented as being slightly cool in his peripheries but warm centrally and afebrile.
30. Dr G attempted to insert an IV line to take a blood sample; after two unsuccessful attempts because of the swelling, he requested that the ED SMO assist with the insertion of an ultrasound-guided IV line.
31. Dr I, ED Consultant, told HDC that he was called to assist with inserting an ultrasound-guided IV at around 4pm. Dr I said this was challenging but ultimately successful, and blood samples

⁸ Abnormal protein in urine usually indicates that the kidneys are allowing protein to leak from the blood into the urine, which can signal kidney damage or other health issues.

were successfully taken. He recalls Master A being 'restless and very oedematous but that his observations on the monitor were not unduly abnormal.'

32. Health NZ said that handover of Master A's care occurred between 4.20pm and 5pm and that Master A's care was discussed with the paediatric SMO. Health NZ said the need for antibiotics was considered and Staphylococcal Scalded Skin Syndrome (a toxin-mediated reaction to a bacterial illness) was also discussed as a possible diagnosis.
33. At 4.57pm, Master A's observations were documented on the Paediatric Vital Signs Chart.⁹ Master A was documented as having a low temperature (36.3°C), a high pulse rate (166/min), an elevated respiratory rate (69/min), and increased work of breathing.
34. At 5.12pm, RN H reviewed Master A and noted that he was now very unwell. It is documented that Master A was cold in his extremities, indicating that blood flow to these areas had reduced and that she was unable to get a clear reading of his heart rate and oxygen saturation on the vital signs monitor. The readings were taken manually by an RN, and his pulse rate (193), heart rate (166), and respiratory rate (69) were considerably higher than the normal range. Master A was documented as having increased work of breathing and as drowsy and lethargic; Mrs B reported increased swelling. RN H documented that she requested that the paediatric registrar review Master A and that 'they are with the patient now.' Master A's family are concerned at the time taken to manually check Master A's vital signs at this point.
35. Dr L was the paediatric registrar who reviewed Master A, and she documented her review retrospectively at 10.01pm. Dr L documented that she was called to review Master A at around 5.30pm. On arrival, Master A was alert, but he looked oedematous and was tachycardic (abnormally fast heart rate; 190) and tachypnoeic (rapid shallow breathing; 60 breaths per minute). Master A's extremities were documented as cool, and his capillary refill time¹⁰ was documented as 3 seconds, slower than normal. Master A's chest was reportedly clear despite being short of breath, and he had developed a new area of peeling skin (a desquamating lesion) on his right arm. Dr L documented that Master A 'looked unwell' so was transferred to a resuscitation room. Health NZ said this is an area where seriously ill patients are treated because it contains the equipment and staff required for dealing with immediately life-threatening illnesses and injuries. At 5.28pm, Master A was moved to resuscitation room 3.
36. Dr L documented that she organised for the antibiotics flucloxacillin and clindamycin to be administered and for a chest X-ray and ECG.¹¹ The Day Stay Medication Chart records the antibiotics being administered at 6.07pm and 6.33pm, respectively. The chest X-ray was

⁹ The Paediatric Vital Signs Chart outlines the normal ranges for heart rate, respiratory rate, blood pressure and temperature across different age groups. It is part of the Paediatric Early Warning System, which is a national tool designed to help healthcare professionals identify children at risk of deterioration.

¹⁰ Capillary refill time is a clinical test used to assess the flow of oxygenated blood through the body's extremities by measuring how quickly blood returns to the capillaries after pressure is applied to the skin. A normal refill time is usually less than two seconds.

¹¹ An ECG (electrocardiogram) is a non-invasive test that records the electrical activity of the heart.

performed at 6.04pm. Dr L documented retrospectively that IV fluids were administered and ceftriaxone (a broad-spectrum antibiotic) was charted, but there is no documentation of this being administered.

37. Dr L also escalated Master A's condition to a paediatric SMO, Dr J, called the Intensive Care Unit (ICU) registrar to refer Master A's care, and requested that Master A be reviewed by the ED consultant, Dr I.
38. Dr J documented his involvement in Master A's care retrospectively at 9.24pm. He attended Master A at around 6.10pm and reviewed Master A's history and presentation. When Dr J arrived, Master A was severely tachycardic (190bpm), had elevated blood pressure (130/93), had difficulty breathing when lying flat, and had poor blood flow to his extremities (peripheral perfusion). Master A was placed on high-flow oxygen to assist with his breathing and increase the level of oxygen in his blood.
39. Health NZ said that, at this time, Master A's blood test results became available. They showed abnormal results and indicated an infection, damage to his liver, and low albumin.¹²
40. Dr J documented that Master A was maintaining saturations well with high-flow oxygen but that he had developed clinical evidence of pulmonary oedema (fluid in the lungs). A chest X-ray did not show any evidence of pulmonary oedema.
41. Dr J said that Master A's clinical presentation was complex and that he was clearly very unwell. At this stage, Dr J said a number of differential diagnoses were still being considered, including a systemic inflammatory response syndrome related to COVID-19, nephrotic syndrome with an infection of his abnormal fluid, or toxic shock syndrome associated with some other cause of sepsis.
42. Health NZ said that, at this time, Master A was being treated for all these conditions.
43. Dr K was the duty ED SMO covering the resuscitation area from 1pm. Dr K told HDC that he recalls Dr I alerting him to Master A. Dr K documented his review retrospectively at 9.04pm. He documented that he understood Master A had been referred to the paediatric service with the impression of nephrotic syndrome, possible sepsis, increasing work of breathing, and questioning pulmonary oedema (fluid in the lungs). Dr K documented that Master A was 'looking very unwell,' vacant looking, and had poor effort of breathing requiring high-flow oxygen support because of his rapid, shallow breathing.
44. Despite Master A being given high levels of oxygen support, his oxygen levels continued to drop, and a tube was inserted in his throat to assist him with breathing (intubated). A line was placed in the bone in Master A's leg to enable resuscitation medication to be given.
45. At around 6.49pm, Master A's heart rate fell to 60bpm, and there was no detectable cardiac output, indicating that the heart was not contracting effectively to pump blood.

¹² Albumin is a protein in blood plasma that is produced in the liver. Low albumin affects fluid balance and nutrient transport in the body.

Cardiopulmonary resuscitation (CPR) was commenced. The ECG showed that Master A's heart was in asystole (not beating). Sadly, after CPR continuing for over 40 minutes, Master A died at 7.24pm.

Further information

46. Health NZ said that sepsis was not initially considered as a diagnosis, and so Master A was not initiated on the sepsis pathway and antibiotics were not commenced early on in his admission.
47. Health NZ said it is deeply sorry that it did not diagnose Master A's condition sooner and acknowledged how extremely devastating this has been and continues to be for Master A's family.

Health NZ System Analysis Review

48. Health NZ conducted a System Analysis Review into the care provided to Master A. As part of this review, Health NZ sought independent reviews on the care provided by the ED and Paediatric teams.

Emergency medicine

49. Health NZ obtained an independent review from a consultant emergency physician, who made the following remarks:
 - There was a delay in effective investigation, specifically a delay in blood tests being obtained, which would have provided results that could have allowed review of the differential diagnosis and consideration of physiological derangement.
 - Sepsis should have been considered because of Master A's history of a febrile illness with poor fluid intake and urine output.

Paediatric Service

50. Health NZ obtained an independent review from a consultant paediatrician, who made the following remarks:
 - There was a significant delay in obtaining IV access and blood samples. Earlier blood tests may have triggered earlier antibiotic treatment.
 - In hindsight, although Master A's presentation was not typical for sepsis, he should have been placed on the sepsis pathway.
 - There was no history or examination from the paediatric registrar after the review at 2.13pm, and no further medical review was documented until Master A's deterioration at 5.12pm.

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Independent advice

Independent clinical advice – Emergency Medicine

51. Independent clinical advice was obtained from Dr Vanessa Thornton, emergency medicine physician (see **Appendix A**), who identified the following departures from accepted standards in the care provided Health NZ.

- Delay in placing an IV line and taking blood test, and failure to place a numbing agent prior to doing so – moderate departure.
- Early diagnostic anchoring, where infection was not considered in the differential diagnosis as a cause for Master A's symptoms – mild departure.
- Failure to place Master A on an infection protocol considering he had a fever – mild departure

Independent clinical advice – paediatric

52. The following independent clinical advice was obtained from Dr Philip Moore, consultant general paediatrician (see **Appendix B**), who identified the following departures from accepted standards in the care provided by Health NZ.

- Handover between ED and Paediatric teams and the resulting unclear responsibility for Master A's care – mild departure
- Delay in placing an IV line and obtaining blood tests – mild departure
- Failure to place Master A on an infection protocol – moderate departure
- Delayed recognition and response to Master A's deteriorating condition – mild to moderate departure
- Incomplete observation records – mild departure
- Concerns of inadequate pain management.

Analysis: Health NZ – breach

53. As a healthcare provider, Health NZ is responsible for providing services in accordance with the Code. In reaching this opinion, I have considered the independent advice provided by Dr Thornton and Dr Moore. I have also considered the advice provided to Health NZ by Dr Pearson and Dr Edwards as part of the independent review it commissioned. In considering the care provided, I note that I have not focused on whether there is a causal link between these failures and the outcome in this case. The focus is on whether the actions of the providers and the care provided at the time was in line with the appropriate standards of care.
54. In assessing the standard of care provided to Master A, it is important not to apply hindsight bias, knowing the eventual diagnosis and tragic outcome for Master A and his family. The

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role of this Office is to assess whether the standard of care was within accepted standards based on the information the clinicians had at the time, without the benefit of hindsight and without focusing on the tragic outcome. I also acknowledge that, at the time clinicians were also managing a number of other unwell patients in a high-pressure environment during a pandemic.

Delay in placing an IV and obtaining blood tests

55. When Master A presented to Wellington Hospital, he was assessed in the ED and the assessing RN placed Ametop on his arm in preparation for the placement of an IV and for blood tests to be taken. The ED Senior registrar then assessed him at around 12pm, and more Ametop was applied in anticipation of the IV placement and blood tests. The need for involvement from the paediatric service was identified, and Master A's care was transferred to this service at 12.28pm. The paediatric senior registrar then reviewed Master A at 1.38pm and documented him as in too much pain to be fully examined or for bloods to be taken. IV placement was attempted at around 3.30pm, but by this time the swelling in Master A's arm meant the line could not be placed. It was not until 4.15pm, five hours after Master A's presentation at the ED, that an ED consultant placed an ultrasound-guided IV.
56. All the independent reviewers of Master A's case agree that there was a delay in placing an IV and obtaining blood tests. Dr Thornton advised that, although blood tests and IV placement can be complicated in children because of the distress they can cause, Master A was recognised as being 'miserable' and 'unwell' with an unclear diagnosis, so proceeding to IV placement and blood tests at the first medical review at around 12pm would have been appropriate. Dr Thornton advised that, in an ED setting with an unwell child, blood tests could have assisted in the early consideration of infection, and this delay was a moderate departure from accepted standards.
57. Dr Moore also advised that there were delays in obtaining IV access and blood tests, which could have contributed to delays in diagnosis and management. He advised that there were further delays in arranging a more senior doctor to take over after the unsuccessful attempts to insert the IV at around 3.30pm. He advised that this was a mild departure from accepted standards.
58. I accept the advice of both Dr Thornton and Dr Moore and consider that there were delays in this respect. I acknowledge the challenges for clinicians in placing an IV in children and that this can often be very distressing. It is evident that there was some confusion regarding whether this responsibility sat with the ED or paediatric clinicians, and this is discussed further below. However, I am critical that no earlier attempts were made to place an IV and obtain blood tests as this was an important diagnostic tool that should have been utilised sooner in Master A's admission.

Inadequate observation records

59. Regular and accurate vital sign assessments are important for the early recognition of a patient's deteriorating condition. The Health NZ 'Vital Signs Standard in the Emergency Department' guideline states that it is essential that patients have baseline vital signs taken

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on arrival at ED. It further states that ‘the minimum requirement for vital signs assessment in young unwell children within CTA is hourly.’

60. Throughout his admission, there were periods of time where Master A went longer than the expected one-hour timeframe between having his vital signs assessed. Most significantly, there was a 70-minute period without recorded observations during the transfer of Master A’s care from the ED to paediatric services at 12.28pm until his review by paediatric clinicians at 1.38pm and a further prolonged, nearly three-hour, period without observations between 2.04pm and 4.57pm.
61. In accordance with the Health NZ ‘Vital Signs Standard in the Emergency Department’ guidelines, these timeframes fall outside what is expected for paediatric patients within the CTA. Dr Moore advised that a failure to undertake these observations in a patient with Master A’s history would constitute a moderate departure from accepted standards and that if these observations were recorded but not documented then this would be a mild departure. Dr Moore further commented that, throughout Master A’s presentation, on a number of occasions the observations were incomplete with not all vital signs assessed. This did not enable a full clinical picture and is therefore a mild departure from accepted standards. In Dr Moore’s opinion, this led to a delayed recognition and response to Master A’s deteriorating condition.
62. I accept this advice and consider that there were inadequacies in the standard of vital sign assessments and documentation throughout Master A’s presentation at Wellington Hospital. Although I acknowledge that Master A was obviously very unwell and in pain, which may have made completing these observations more challenging, they were fundamental in monitoring for signs of deterioration in his condition, and I am therefore critical that this did not always occur in the timely manner that was expected under the ED guideline.

Consideration of infection and initiation of PSP

63. When Master A presented at Wellington Hospital, he had a documented history of fevers, joint swelling, and limb pain; had tested positive for COVID-19; and was observed by clinicians to be very unwell and in pain. When Master A’s observations were taken during the triage assessment, his temperature was recorded as low and his heart rate high.
64. The Health NZ PSP (**Appendix C**) in use at the time starts with assessment in triage and states that, if a child has a suspected or proven infection and two or more of a number of clinical features, they should be reviewed by a doctor within 30 minutes. If sepsis is considered, immediate paediatric consultation is required, and prompt IV accesses and blood tests must be obtained.
65. Dr Thornton advised that Master A’s history of fevers and raised heart rate meant that he could have been placed on the PSP as part of the triage process and, retrospectively, not initiating the pathway at this time was a mild departure. Although Dr Moore is not a peer of the ED clinicians, he agreed that Master A’s clinical features at this point of his admission

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meant that he met the PSP criteria to be identified as a child at risk of sepsis. I accept this advice and consider that this was a missed opportunity to commence Master A on the PSP.

66. Dr Moore advised that there were further missed opportunities throughout Master A's admission to consider sepsis as a differential diagnosis and to commence Master A on the PSP. Dr Moore noted that the observations recorded at 4.57pm included a low temperature, tachycardia, and a raised respiratory rate. In his opinion, there is evidence of anchoring bias because sepsis was not considered in the early stages of Master A's presentation, and this influenced decisions made at the later stages of Master A's presentation. Dr Moore advised that this was a moderate departure from accepted standards.
67. I accept this advice and agree that Master A's clinical features met the PSP criteria and that this pathway should have been commenced from as early as the initial triage assessment. I acknowledge that a wide differential diagnosis was being considered; however, it is evident that important clinical cues were missed and that these became more apparent throughout Master A's presentation as his condition deteriorated. I am therefore concerned that sepsis was not considered in Master A's differential diagnosis and he was not commenced on the PSP.

Handover between ED and Paediatric Services

68. When Master A presented to Wellington Hospital at 10.59am, he was initially under the care of the ED clinicians, where he was triaged and assessed. ED staff recognised the need for paediatric review of Master A, and his care was appropriately transferred to the paediatric services at 12.28pm for further review and treatment. Master A was subsequently reviewed by paediatric clinicians at 1.38pm. During this 70-minute period, there is no evidence that Master A was given pain relief, no evidence of nursing observations of Master A's vitals, and no attempts to insert an IV or obtain blood tests. Health NZ said that, in seriously unwell children, ED staff insert IV lines and take blood tests but that this becomes the responsibility of the paediatric team in children that are less unwell and are clinically stable.
69. Dr Moore advised that there is evidence of unclear responsibility over the period between the transfer to and arrival of paediatrics. He advised that this would be considered a mild departure as it contributed in minor ways to delays in Master A's treatment.
70. I accept this advice and consider that the lack of clarity of responsibilities between the ED and paediatric clinicians impacted on the overall standard of care provided to Master A, particularly in relation to the delays in placing an IV and obtaining blood tests, and in the completion of Master A's observations. I am critical of this confusion and consider that this represents systemic issues in the handover process between the ED and paediatric department.

Conclusion

71. As outlined above, aspects of the care provided to Master A by multiple clinicians from different disciplines at Health NZ fell below an accepted standard, and I consider that this reflects system-level issues at Health NZ rather than any individual failings. Although I acknowledge that Master A's presentation was clearly very complex and his condition sadly

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deteriorated very quickly, it was the responsibility of Health NZ to ensure that staff had the guidance required to provide services to Master A with reasonable care and skill. I consider the cumulative effect of the deficiencies discussed above constitute a breach of Right 4(1) of the Code, for failing to provide services to Master A with reasonable care and skill.

Distribution

72. A copy of this report with details identifying the parties removed, except Health New Zealand | Te Whatu Ora Capital Coast and Hutt Valley and Wellington Hospital, will be placed on the Health and Disability Commissioner website, www.hdc.org.nz, for educational purposes.

Dr Vanessa Caldwell

Deputy Health and Disability Commissioner

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Appendix A: Independent clinical advice to the Commissioner

The following independent advice was obtained from Dr Vanessa Thornton, emergency medicine physician.

'I have been asked to provide an opinion to the commissioner on case number C22HDC02444, and I have read and agree to follow the commissioner's guidelines for independent advisors.

I am the Acting Interim District Director at Counties Te Whatu Ora. My qualifications are FACEM (Fellow of the Australasian College of Emergency Medicine), FRACMA (Fellow Royal Australasian College of Medical Administrators) and MBChB at Auckland University. I have been a fellow of the Australasian College for Emergency Medicine for 22 years and graduated as a doctor in 1992. I am drawing on my experience as an emergency physician and the literature available.

I have reviewed the following documentation:

- Letter of complaint dated 1 October 2022
- Te Whatu Ora response dated 24 March 2023
- Statements from clinicians: [...]; [...] [...]; [RN D]
- Clinical records from Te Whatu Ora covering the period [of the days prior to and including day1] September 2022
- Te Whatu Ora Policies: Paediatric Sepsis Pathway; Death of a neonate, infant or child on a CCDHB site; Death of an infant or child in hospital; Triage in the Emergency Department.

I have been advised to provide advice and will comment on the ED aspect of this presentation, particularly on the following:

1. The investigations completed during [Master A]'s initial presentation at [the local medical centre];
2. The decision to discharge [Master A] into his parents' care. In particular, please comment on any safety-netting advice provided to Mr and Mrs [B];
3. The triaging process at [Master A]'s presentation to the ED at Wellington Regional Hospital;
4. The care provided to [Master A] by clinicians at the ED. In particular, the appropriateness and timeliness of seeking investigations, receiving results, and providing treatment;
5. The adequacy of the policies and procedures in place at Te Whatu Ora. As part of this, please comment on whether the care provided to [Master A] aligned with these documents;
6. Any other matters in this case that you consider warrant comment.

Summary of events

[Master A] was a 4-year-old boy presented to [his local] Accident and Medical centre at 5.05pm on 22 September 2022. RN [...] states the patient presented with fever and

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chills. No associated cough or sputum. No history of COVID and had a temperature of 38.8°C and refusing to move his neck. Mum had been treating him with Panadol (last dose 4pm) and brufen (last dose 11am) at home. Doctor [C] then reviewed [Master A]. The history was of [Master A] falling off his bike at daycare 2 days prior to presentation. Once home, [Master A] was fine. Then the family noted neck pain and fever of 38.8°C one day later. [Master A] was usually active and interactive. On examination, [Master A] was quiet and flushed, throat pink with clear chest and dual heart sounds. Ears were mildly pink. Neck was not tender to palpation but rotated slightly to the right. No rash was noted.

The impression from [Dr C] was of a viral illness and torticollis and to treat with fluid, Panadol and brufen. A repeat temperature was performed at 6.26pm and dose of brufen was given. Advice was given to see GP if no improvement or any concerns. It is not clear when the final discharge was completed or given to the patient as the “time performed” was 27 September 2022, 9.52am.

On day1 September 2022 at 10.59am [Master A] was taken to Wellington ED. The triage nurse was RN [D], and the presenting complaint was noted as “unwell Paed” with a history of RAT positive and developing aches and pains in joints. [Master A] was looking lethargic, very quiet and not interacting at triage and given a triage score of 3. His temperature was 35.8°C, HR [heart rate] 149, saturations were 100%.

At 11.15am, he was seen by [...], an RN. The history was body and joint aching. [Master A]’s mother stated [Master A] had tested RAT positive for COVID and noted to have aches and pains ever since. The mother noted bilateral joint swelling of the upper and lower limbs and brought him to ED. On examination, [the RN] noted a lethargic-looking patient, very sore, groaning, and unable to settle due to the pain. Ametop, a local anaesthetic for skin was placed for an IV line.

At 12.31pm, the ED registrar [Dr F] reviewed [Master A]. Dr [F] confirmed the history of falling off his bike 6/7 ago and had been reviewed at [his local medical centre]. Since Wednesday, unwell with poor appetite. Noted was that [Master A] is taking some fluid but has very dark urine. There was no rash, but abdominal pain not associated, with no history of vomiting or diarrhoea.

On examination, the registrar noted that he looked miserable and unwell, pale and lethargic. Propped up on his bed and too sore to move. HR 149, RR [respiratory rate] 26, Sats 99% and BP [blood pressure] 93/58. [Master A]’s HS [heart sounds] were dual, chest clear, ears were normal, and unable to view the mouth. Feet and hands were reported to be pale and oedematous but warm, and all of [Master A]’s arms and legs were swollen. No rash was noted over the limbs.

The differential by Dr [F] included COVID, autoimmune disorder, and HSP. Plan was analgesia MSU [mid-stream urine collection], bloods, oral fluids, a BSL [blood sugar level], and a referral to Paediatric Medicine. Ametop was placed on the child.

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At 2.15pm, [Dr G] reviewed [Master A]. The note says the child was much too sore to take bloods and would require sedation. The registrar asked for repeat urine specs and pain relief orally.

At 2.21pm, morphine was given orally and dipstick urine was completed by RN [...].

At 3pm, [Dr I], ED SMO, was called to assist with the line for [Master A]. Due to the oedema, an IV guided line was required.

At 3.08, [RN H] reported dipstick in the notes and vitals completed. [RN H] noted at 5.12pm that [Master A] was in a dark room and was cold and she had been unable to get a pulse and sats initially. By manual palpation, HR 166 and RR 69. The patient was drowsy and lethargic, and the swelling had increased.

The documented comprehensive assessment was completed by Dr [G], initially finalised at 4.59pm and modified at 5.01pm and 5.09pm. A thorough history taken was of a 4-year-old boy presenting with fever, polyarthritis, and polyarthropathy. This included a history of falling off a bike at kindy 6/7. Unwell for the last 4/7, with fevers, sore throat, and abdo pain. Mum reported a positive RAT test 2/7 prior to presentation and unable to weight bear the day before presentation with ongoing abdo pain combined with reduced urine output for last 2 days. On the day of presentation, bilateral swelling of joints and pain. The relevant negatives in the history were no rashes, no dysuria or frequency, no jaundice. There was no recent history of travel. Also noted was no medications or allergies or previous medical history. The social history was one sibling 22 months, and a heat pump was installed in the house, which had previously been cold and mouldy.

The examination noted a distressed and pained child who couldn't move or weight bear post Panadol and brufen. It was noted that he had oedematous wrists, elbows, and shoulders, and with hand and knee and tenderness of all joints. He had no signs of a rash, and throat was apparently normal and ears NAD [no abnormality detected]. [Dr G] noted cool peripheries with dual HS. Breath sounds NAD.

[Dr G] noted the urine was positive for protein and blood only.

The impression by [Dr G] was of a mixed nephrotic and nephritic picture, evolving HSP, or IgA [immunoglobulin A] nephropathy. He also had a question in the differential of Staph scalded syndrome. The investigations, bloods, and the management included monitoring for further desquamation, daily weighs, and discussion with the SMO. [Dr G] reported discussing with the SMO (which SMO is not documented), and the SMO said to hold off antibiotics.

At 5pm, [Dr I] recalls a resus call by the paediatric registers. [Dr I] added broad-spectrum antibiotics and IV fluid 10ml/kg. High-flow oxygen was added, and a referral to ICU ensued. Dr [K] was advised to attend resus as it was his area of responsibility.

At 5.30pm, a note was written by reg Dr [L], retrospectively. The note reports that she had been called to the room at 5.30pm by the nurses. On arrival, Master A was alert but oedematous. His HR 190 and RR 60. He was cool, with a capillary refill of 3 seconds. He looked unwell and was transferred to resus. Dr [L] arranged for IV flucloxacillin and IV clindamycin, and a CXR [chest X-ray] and ECG was completed. Dr [J] was called as the on-call paediatrician and [Dr I] ED SMO assisted in the room. IV fluid bolus was given and ceftriaxone.

[Dr K]'s ED SMO notes report subsequent asystole cardiac arrest and then full ACS [acute coronary syndrome] protocol ensued following cardiac arrest, with intubation, ventilation, CPR, fluids, and adrenalin.

Unfortunately, [Master A] did not survive despite full protocol.

Responses to Questions

The investigations completed during [Master A]’s initial presentation at [the local medical centre]. [Dr C] had the history of a fall off a bike and then a history of fever one day later associated with neck pain as a result of a minor fall. Investigations are usually completed to assist with diagnosis. [Dr C] did not get a history of a sore throat at the time of presentation, thus a swab was not indicated based on the history obtained. Other considerations at the time would be an X-ray of the neck if you were concerned about an injury, but this was low risk in the setting of a low-speed accident. A soft tissue X-ray could be considered of the neck if you were concerned about a retropharyngeal abscess.

On review of the presentation to [the local medical centre], [Dr C] had the initial diagnosis of a viral illness with torticollis after the fall from [Master A]’s bike.

The investigations completed at the time were at the standard of a viral illness.

The decision to discharge [Master A] into his parents’ care. In particular, please comment on any safety-netting advice provided to Mr and Mrs [B].

At the time of the presentation to [the local medical centre], [Master A] had a fever and neck pain. A full examination was completed, and [Dr C] noted in the discharge summary the appropriate treatment and advice for a viral illness, which included Panadol, brufen, and hydration. Furthermore, he recommended follow-up with the GP if there was no improvement in the torticollis.

This is at the standard expected of an accident and emergency centre.

What could have assisted the family may have been written advice around what symptoms to watch out for and when to seek review. It is not clear whether the discharge summary given to the patient as the document reports finalisation on 27 October 2022. Clear written advice on return, particularly in the setting of torticollis with a fever, which could be a more serious condition in a child, such as an abscess or infection, may have assisted in terms of earlier follow-up.

The triaging process at [Master A]’s presentation to the ED at Wellington Regional Hospital.

Triage is an essential function in EDs, where many patients may present simultaneously. It aims to ensure that patients are treated in the order of their clinical urgency, which refers to the need for time-critical intervention. Several events need to occur at triage, including documentation of:

- Date and time of assessment
- Name of triage officer
- Chief presenting problem(s)
- Limited, relevant history
- Relevant assessment findings
- Initial triage category allocated (Guidelines on the Implementation of the ATS [Australasian Triage Scale] in Emergency Departments) (G24) Jul-16, 4 of 8

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- Re-triage category with time and reason
- Assessment and treatment area allocated
- Any diagnostic, first aid or treatment measures initiated¹

At the initial triage, the triage score 3 was assigned. This is score that necessitates being seen within 30 minutes. Within this group is a range of conditions, including potentially life-threatening conditions. The patient's condition may progress to life or limb threatening or may lead to significant morbidity if assessment and treatment are not commenced within 30 minutes of arrival. As per the triage score, re-triage can occur at the time of nursing assessment and can either be upgraded or downgraded.

[Master A]'s triage included a short history, time stamps, and triage nurse's documentation. The physiology documented a high HR at 150 for age, with his respiratory rate and temperature 38.8°C low at the time of presentation.

Based on the above assessment, the triage was at the expected standard for an ED.

The care provided to [Master A] by clinicians at the ED. In particular, the appropriateness and timeliness of seeking investigations, receiving results, and providing treatment.

[Master A] was seen by a Senior ED registrar, Dr [F], at 12.30pm. Dr [F] thought that [Master A] was unwell and clearly miserable, with pain and a history of fever significant features of his presentation. Dr [F] recognised early that an admission was necessary for [Master A]. On review of Dr [F]'s report, she noted a complicated constellation of symptoms; however, unfortunately, infection was not part of the initial differential diagnosis. Low temperature in the setting of Panadol and brufen can make the diagnosis of infection challenging.

Dr [F] also requested several appropriate investigations, including a BP, urine, blood tests, and PCR [polymerase chain reaction] test was completed to confirm the COVID.

Dr [F] didn't progress immediately to blood tests. Blood tests can be complicated in children due to distress that can be caused. However, in [Master A]'s case, the assessment RN [...] had placed Ametop on the child at the time of assessment 11.15am. Therefore, at the time of assessment by Dr [F] the Ametop was ready for blood tests. Considering Dr [F] felt that [Master A] was "miserable, unwell" and she wasn't sure of diagnosis, but this included nephrotic syndrome, which may be caused by infection, then proceeding to IV line and blood test would be appropriate. Retrospectively, early blood tests may have assisted in the diagnosis.

The timing of the initial IV line and blood test is a moderate deviation than that expected in an ED if a child is seen as "unwell". Early blood tests may not have changed the outcome but would have assisted in an early consideration of infection.

Follow-up of these tests is important in the ED and would have assisted in ruling in or out some of the diagnosis, including COVID complications. The COVID test result was

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available at 2.27pm and was negative, and this early in the condition you would have a positive lab PCR. In nephrotic syndrome, the diagnosis requires a high BP, and with [Master A] the BP was 93/58 or within normal range for a child. Nephrotic syndrome requires hypertension for the diagnosis, then this normal range BP may have produced further consideration as to why the BP was lower than expected either as a result of infection or the initial diagnosis was incorrect. The documented handover on the ISBAR reports that patient has COVID when the test was returned at 2.27pm as negative.

Early follow-up of requested investigations may have enabled further consideration to an expanded differential diagnosis and causes for the presentations. The follow-up of tests is important in a presentation and is a mild deviation from that expected in the presentation.

The management by Dr [F] included discussion with an SMO in ED. The assessment by Dr [F] and the investigations considered early were appropriate, but the differential didn't consider causation despite the history of fever. Early engagement by paediatrics was important. Management with antibiotics could have been part of early treatment had the differential included infection. Early diagnostic anchoring without wider differential diagnosis of cause was a mild deviation from expected in an unusual presentation.

The adequacy of the policies and procedures in place at Te Whatu Ora. As part of this, please comment on whether the care provided to [Master A] aligned with these documents. There were a number of policies presented by Te Whatu Ora. These protocols included a triage protocol, sepsis protocol, and death of a child protocol. I will comment on the triage and sepsis protocol as they are within my scope of practice.

As noted above, the Triage protocol for Te Whatu Ora Capital and Coast is a standard protocol consistent with the ATS and appropriate for children. It was appropriately followed in terms of [Master A]'s presentation.

The sepsis protocol for <16 years is appropriate for children. You are placed on this protocol if there is recognition of infection or at risk for infection.

Both the triage and sepsis protocols are at the expected standard for an ED.

[Master A]'s triage process was at the expected level.

[Master A] had a history of fevers and thus could have been placed on the infection protocol as part of the triage protocol or subsequently in his early assessment or any time during the presentation. [Master A] had a history of fever and a temperature less than 36°C at 35.8°C and a HR of 149, greater than expected for a child of 4 years. [Master A] initially was thought to be COVID positive as the source for infection. If the protocol had been used, [Master A] would have kept infection as part of the differential early in the differential diagnosis. A low temperature is far less common in sepsis but is

part of sepsis. Retrospectively, not using the protocol was a mild deviation from the expected level of care.

Any other matters in this case that you consider warrant comment.

This is a very challenging and sad case for clinicians, and many things seem more relevant in retrospect. Diagnostic anchoring bias with the positive COVID RAT test at home and the low temperature excluded other infection in the initial differential diagnosis. The nature of group A streptococcal sepsis poses impressive challenges from diagnostic and therapeutic perspectives. It is rarely invasive and when it is invasive mortality is reported at 8–23%.²

Furthermore, [Master A] had a low temperature rather than a fever at presentation, thus the red flag for infection was not obvious to staff. Most patients are seen early in the course of Strep A infection by primary care providers or ED physicians and sent home, only to return in 12–24 hours with fully developed group A streptococcal sepsis. Early diagnosis in sepsis is imperative as mortality increases every hour without antibiotics,³ but the clinician must have a high index of suspicion in order to diagnose the condition. In this case, staff recognised that [Master A] was unwell, but sepsis did not become part of the differential. The constellation of symptoms were challenging on presentation, but the child looked unwell with a very unusual presentation; even with a high index of suspicion, the outcome may have been unfortunately the same.

1. [Acem.org.au/getmedia/51dc74f7-9ff0-42ce-872a-0437f3db640a/G24_04_Guidelines_on_Implementation_of_ATS_Jul-16.aspx](https://www.acem.org.au/getmedia/51dc74f7-9ff0-42ce-872a-0437f3db640a/G24_04_Guidelines_on_Implementation_of_ATS_Jul-16.aspx)
2. [news-medical.net/news/20221218/Recent-surge-in-group-A-streptococcal-infections-among-children-in-UK.aspx](https://www.news-medical.net/news/20221218/Recent-surge-in-group-A-streptococcal-infections-among-children-in-UK.aspx).
3. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5649973/> '

Further advice was sought from Dr Vanessa Thornton on 29 September 2023:

'I have been asked to provide a subsequent opinion to the commissioner on case number C22HDC02444, and I have read and agree to follow the commissioner's guidelines for independent advisors.

I am the Acting Interim District Director at Counties Te Whatu Ora. My qualifications are FACEM (Fellow of the Australasian College of Emergency Medicine), FRACMA (Fellow Royal Australasian College of Medical Administrators) and MBChB at Auckland University. I have been a fellow of the Australasian College for Emergency Medicine for 22 years and graduated as a Doctor in 1992. I am drawing on my experience as an emergency physician and the literature available.

I have again reviewed the following documentation:

- Letter of complaint dated 1 October 2022
- Te Whatu Ora's response dated 24 March 2023

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- Statements from clinicians: [...]; [...]; [...]; [RN D]
- Clinical records from Te Whatu Ora covering the period [four days prior to and including day1] September 2022
- Te Whatu Ora Policies: Paediatric Sepsis Pathway; Death of a neonate, infant or child on a CCDHB site; Death of an infant or child in hospital; Triage in the Emergency Department

I have also reviewed the letter dated 12.09.2023.

Response to letter

As an opening statement, it would be important to reiterate that HDC asked me for a review and opinion of the case with specific questions around Emergency Medicine practice. As I am not a paediatrician, then a paediatrician should review the practice of any work completed by paediatrician as this is not my area of expertise. I would also like to comment on the use of the word “blame.” The questions posed by HDC and my response to those questions were around management or standards of care and not in any way to “blame” Dr [F] as she appropriately identified a difficult case and discussed this with her senior Doctor. I would like to reiterate that this was a challenging case, and things often look different in retrospect, which is how we can make changes and learn. I would like to restate it is likely that even with immediate treatment that “outcome may have been unfortunately the same” as this patient was likely in septic shock on arrival in the ED, as indicated by the short time between arrival and cardiac arrest.

Response to comments

The timing of the initial IV line and blood tests is a moderate departure from accepted standards of care in the Emergency Department if a child is seen as “unwell”.

a. Whilst we agree that there was a long delay in obtaining blood tests, there was a shared responsibility between the ED and Paediatric team as noted below. We think it is unfair to lay the blame solely at Dr [F]. She did the initial assessment and Ametop was only applied after that assessment. She referred to the Paediatric team in a timely manner. [...]

b. Dr Thornton implies in her response that Ametop was applied at triage around 11:15, when in fact, Ametop was only applied after Dr [F] had assessed [Master A]. There is a nursing entry in the EDIS notes at 12:26: “Ametop applied over patient's left dorsum, right dorsum and ACF @ 1225hrs”.

c. Dr [F] referred [Master A] to the Paediatric team at 12:28. At the conclusion of her assessment (at 12:26) [Master A] had relatively normal vital signs with only a mild tachycardia (which scored 1 on the PEWS) and it was thought to be appropriate to leave the Ametop for at least 30 minutes to ensure skin anaesthesia prior to inserting an IV cannula.

d. As is common practice in Wellington ED, it was thought that the Paediatric team would obtain blood tests and insert an IV cannula when they came to assess [Master A].

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e. The Paediatric team arrived at 13:38 to assess [Master A] and at this stage responsibility of care, including further investigations and treatment, were transferred to the Paediatric team. The Paediatric team allude in their note at 14:13 to [Master A] being in too much pain to fully examine or take bloods.

f. It was not until 15:30, after multiple failed attempts, that the Paediatric team requested the expertise of an ED SMO to insert the IV cannula and take bloods.

Response to comments

Just to reiterate, I have not commented on the paediatric management of the case as I have reviewed the case from the response of the emergency physicians, thus cannot directly respond to comment a) and then comment e).

In response to b) I apologise and correctly note that I referred to the writing of the note at 1226 rather than 1255.

In the ED, in the situation of an unwell child who has signs of sepsis with hypothermia (35.8°C), tachycardia (156/min) and “groaning, in distress, unwell” as stated by RN [...] on initial assessment, then early blood tests with IV line analgesia and blood would be appropriate. The question asked by HDC was on the timing of the IV line in this case. It is my opinion an early line would be best practice to obtain bloods and commence treatment. As stated in the first review, bloods can be difficult and Ametop is of great assistance to help with bloods, but on further consideration Ametop is not essential in an unwell child. In EDs with sick children, cold spray or distraction can be deployed and a line placed without Ametop. Furthermore, the use of USS [ultrasound] is appropriate for difficult lines, and early deployment as you have commented in point f) would also be appropriate. This could have assisted in the early placement of the line.

Who places the line is as noted in comment d) where it is stated “that Paediatrics would place the line.” If it is common practice and expectation for Paediatrics in Wellington Hospital to place the line in sick children and commence treatment, then review of this practice would be appropriate. The review would be to ensure when a child is sick and requiring a line as in the case of [Master A], the handover is clear around urgency. In the previous review, I did not have access to this policy so apologise if this created confusion. In most EDs, it would be standard practice for the ED doctors to be involved in placing the line and initiating treatment. It is also current practice in some EDs across New Zealand that nurses are also involved in gaining IV access for children

Further to statement c), [Master A] had relatively normal vital signs and reference to the Paediatric Early Warning Score (PEWS) score being 1 and thus did not require emergent line. PEWS is a tool that is used to help identify mokopuna (infants, children and young people) at risk of deterioration as versus acute presentation. It should not, however, replace skilled nursing assessment and decision-making in an acute setting as it has not been validated in acute settings such as EDs. Due to the limitations of PEWS, a high PEWS should be taken seriously but a low score is poor at ruling out the requirement for admission or serious underlying illness as was demonstrated in [Master A]’s case. PEWS

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≥3 is highly specific (96%) but poorly sensitive (44%) and very useful in medical illness and in particular respiratory illness. To note a further reason that PEWS has limited use in EDs is that it has limited use in surgical illness.^{1,2} For this reason, most assessments for children include an important overriding statement around clinical acumen and judgement remaining essential for the detection of deterioration or serious illness in a child with mild or no abnormal haemodynamic vital signs. In most of [Master A]’s assessments, all staff have made excellent assessments and commented that [Master A] looked unwell, lethargic and had severe pain and was tachycardic. This included Dr [F]’s assessment.

Furthermore, on subsequent review of the PEWS and in fact on the paediatric initial assessment in Wellington, which was in [Master A]’s notes, there is no Cap refill time, which is considered a core vital sign in PEWS and in the assessment of a sick child as per protocol in advanced paediatric life support (APLS).^{3,4} Capillary refill time is a useful and rapid metric in determining the intravascular volume status of ill patients, particularly those with conditions that arise or result from hypovolemia. As a recommendation, there would be recommendation for the ED assessment of children to consider inclusion of cap refill time as an early sign of hypovolemia.

2. Comments on testing.

Dr Thornton comments that the early follow up of the requested investigations may have enabled further consideration to an expanded differential diagnosis and causes for [Master A]’s presentation.

a. Whilst we agree that early follow up of results is important, we do not think that there was a delay in obtaining and/or acting on results.

b. The SARS-CoV-2 RNA nasopharyngeal swab referred to appears to have been taken postmortem on 27 September, taken at 13:12, was reported at 14:27. The reference to being COVID positive refers to the positive RAT done at home 2 days earlier. As was practice at the time, not all positive RATs were followed up by a PCR test.

c. The blood tests were done whilst under the care of the Paediatric team and reached the laboratory at 16:27. It appears that the blood results became available around 17:17, by which stage [Master A] had already deteriorated significantly.

d. The urine biochemistry was received in the laboratory around 12:57 and we note that the Paediatric team signed it off at 15:43; the significantly increased albumin/creatinine ratio in isolation did not suggest infection as a cause.

I would like to apologise and correct the timeline as I had not registered the date on the Nasal swab test as the nurse had commented on the nasal pharyngeal swab. I had assumed this was routine as was in ED at the time of COVID for admission to wards. The timing fitted [Master A]’s presentation and seemed sensible and appropriate. This was a protocol in most hospitals in COVID for sick admissions and returned result at 2 hours

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later was common at the time of COVID. I note that at Wellington hospital you did not follow up admissions with a nasal pharyngeal swab PCR test as commented in b).

As stated above, early blood tests would have assisted in the diagnostic dilemma that was presented with [Master A].

Summary

This is a very difficult case and sad case. I would like to apologise on the error of timing in Ametop and the swab result. Early assessments from triage and by staff noted that [Master A] looked “unwell, lethargic and miserable,” thus making excellent clinical judgement. It would be standard practice for most ED physicians to start investigations in the form of an IV line; however, as indicated by the response letter from Wellington there is a different practice in this department. Review of the handover protocol to paediatrics around urgency of bloods may assist for future cases. Review of the use of cap refill in the ED observations for children may assist with early warning of severe illness. Again, I would like to say early intervention would likely not have changed the outcome for [Master A].

1. Lillitos PJ, Hadley G, Maconochie I. Can paediatric early warning scores (PEWS) be used to guide the need for hospital admission and predict significant illness in children presenting to the emergency department? An assessment of PEWS diagnostic accuracy using sensitivity and specificity. *Emerg Med J.* 2016;33(5):329-37.
2. National Institute for Health and Care Excellence. Fever in under 5s: assessment and initial management Clinical guideline GC160. London: NICE; 2013.
<https://www.nice.org.uk/guidance/cg160> (accessed 4 Oct 2016).
3. <https://starship.org.nz/guidelines/observation-and-monitoring-of-an-infant-child-or-young-person/>
4. Royal Children's Hospital (2012). *Observation and Continuous Monitoring Clinical Practice Guideline*, RCH: Melbourne'

Clarification was sought from Dr Thornton on 17 May 2024 (Dr Thornton's comments in red):

'Kia ora Dr Thornton,

Thank you again for providing us with your further advice of 1 October 2023 in relation to [Master A]. I am emailing to request clarification on some of the issues you discussed.

Specifically, I would be grateful if you could answer the following questions. These are intended to clarify the advice you have already provided us so we can be clear precisely what departures remain.

First, in regards to the issue of delays in placing IV lines and blood tests: Can you please confirm whether you still consider there to be a departure from the standard of care around this process (including whether the handover was sufficient?)

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Yes, this is still a departure from standard of care.

Second, my understanding is that your discussion in your initial advice around the numbing agent was part of the concern around IV line placement. Please confirm whether there is a separate criticism around the use of the numbing agent or whether this criticism is included in the issue referred to in the first point above.

It's to the first point. The numbing was put on but if urgent you can place using other methods without numbing cream.

Third, in regards to the issue around early diagnostic anchoring (i.e. whether infection should have been considered earlier): in your initial advice you identified a mild departure on this point. Could you please confirm whether Te Whatu Ora's response changed your view on this at all?

Yes, still comment on review it was not considered as a cause of the oedema when it should be part of a differential.

Fourth, in regard to the issue around early follow up of investigations (namely the COVID-19 test): can you please confirm that there is no longer a departure identified around this issue?

As noted in my second statement, the COVID test was not taken on admission but rather on death, so this was a mistake on my part as I had misread the date and assumed it had been completed on admission.

Finally, I note in your initial advice you identified a departure concerning the failure to place [Master A] on the infection protocol but that this was a criticism made in hindsight. Can you please confirm, based on what information the clinicians would have had at the time, whether you consider that there was a departure from the standard of care?

Hindsight bias comes into play. The PEWS were not completed to the international expected standard by not including cap refill and can be overruled by review of "unwell-looking patient."

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Appendix B: Independent clinical advice to the Commissioner

The following independent advice was obtained from Consultant General Paediatrician, Dr Philip Moore:

Complaint:	[Master A] (dec) / Te Whatu Ora – Capital, Coast and Hutt Valley
Our ref:	C22HDC02444
Independent advisor:	Dr Philip Moore

I have been asked to provide clinical advice to HDC on case number C22HDC02444. I have read and agree to follow HDC's Guidelines for Independent Advisors.

I am not aware of any personal or professional conflicts of interest with any of the parties involved in this complaint.

I am aware that my report should use simple and clear language and explain complex or technical medical terms.

Qualifications, training and experience relevant to the area of expertise involved	I am a Consultant General Paediatrician and have worked for more than 30 years in a busy regional hospital, including caring for children with sepsis, septic shock or toxic shock. My qualifications include Bachelor of Medicine, Bachelor of Surgery (MBChB) 1986 and Fellowship of the Royal Australasian College of Physicians (FRACP) 1993.
Documents provided by HDC	1. Letter of complaint dated 1 October 2022 and additional email of 13 October 2022 2. Te Whatu Ora response dated 24 March 2023 3. Statements from clinicians. 4. Clinical records from Te Whatu Ora covering the period of day1 September 2022
Referral instructions from HDC	1. The care provided to [Master A] by clinicians at Wellington Hospital. In particular, the appropriateness and timeliness of seeking investigations, receiving results, and providing treatment; 2. The handover between the ED and Paediatric teams; and 3. Any other matters in this case that you consider warrant comment.

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Factual summary of clinical care provided complaint

Brief summary of clinical events:

[Master A], date of birth [...], was a previously well 4-year-old boy. He died tragically as a result of Group A Streptococcal (GAS) sepsis and Toxic Shock Syndrome [in] September 2022.

His parents, [Mr and Mrs B], have concerns and complaints about the management of his illness and the circumstances of his death in the Emergency Department (ED) at Wellington Hospital.

I have been asked to provide independent clinical advice to the Health and Disability Commissioner (HDC) about his care, the communication between teams looking after his care and any other matters I see as relevant.

To provide this advice, I have reviewed the patient notes and other clinical records, the original complaint, the response from the Capital Coast DHB (CCDHB) (now Te Whatu Ora – Capital, Coast and Hutt Valley) and statements from a number of individual clinicians involved. I have also reviewed care guidelines and medical literature relating to GAS infection in children; including the CCDHB “Paediatric Sepsis Pathway”.

An exact timeline of care in ED, and associated observations and actions, is hard to extract from the notes provided. There are some inconsistencies between the notes, the vital signs chart and the DHB response in places. I am unclear about the timing of some clinical assessments. The timeline below is accurate to the best of my knowledge.

Clinical Timeline

[Master A] was born at term after a vaginal delivery complicated by shoulder dystocia. He was in good condition at birth but was observed for a few hours in a Neonatal Intensive Care Unit with no interventions. He grew and developed normally. Immunisations were complete and up to date, he was on no regular medications and had no known allergies. There was no significant past history of illness.

On about 20 June 2022, [Master A] had a bicycle accident and complained of a sore neck. He was reviewed by a doctor at [the local medical centre] and reassured that this was a minor soft tissue injury.

He then arrived in Wellington ED at 10.57am on day1 September 2022. He was assessed promptly by an ED triage nurse. He was noted to have been positive on RAT testing for COVID on 24 September 2022. He had complained of body and neck pain and on the day of admission had developed swelling of upper and lower limbs.

Initial observations at 11.01am included a low temperature of 35.8°C (normal 36.5–37.4°C), pulse rate 149/min (upper limit of yellow zone of PEWS matrix) and SaO₂ 100% in air.

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Respiratory rate is not recorded, and blood pressure is not recorded. He was given a triage code of 3 (indicating an urgent case who should see a doctor within 30 minutes).

At 11.15am he was seen by a primary ED nurse. Her notes include “lethargic looking, patient very sore, in distress, groaning in pain. Afebrile.” A pulse rate was now 156/min (orange zone of PEWS matrix).

At 11.57am he was reviewed by an ED Registrar (doctor). He elicited the history of a fall from a bicycle 6 days before, leading to some neck pain, but review at another hospital was reassuring. (I have not been asked to review that episode of care.)

The next day, 5 days before his admission, he had started to feel unwell with intermittent subjective fevers and reduced appetite. Then 2 days before admission, he RAT tested positive for COVID (see above) and again was weakly positive the morning of admission.

A fever of 39.0°C was measured at home the morning of admission and joint swelling and limb pain became prominent. He could not weight bear. It was noted that he was “passing small amounts of very dark looking urine.”

On examination he is described as “alert and orientated” but also “looks miserable and unwell, pale, lethargic, in pain.” The low temperature of 35.8°C was noted. Feet and hands were pale and oedematous, but warm. There is no documented assessment of capillary refill time (CRT). No rash or cellulitis or skin loss was seen. Because of pain, his oral cavity could not be examined and only the tip of his tongue was seen. There was swelling of the left knee, right foot and left elbow. An attempt was made to stand him up to remove clothing, but he was “too sore to WB.”

The diagnoses considered at that stage for “an unwell child with swollen limbs, pain, intermittent fever and COVID positive” included a COVID-related inflammatory syndrome, an autoimmune disorder, or Henoch-Schönlein Purpura (HSP).

The ED Registrar’s plan was to give pain relief, oral fluids, to perform blood and urine tests and to place an IV line. It was recognised that [Master A] would need further investigation and admission, and his care was referred to the on-call paediatric team.

At 12.18pm he was given 240mg of paracetamol (15mg/kg). At 12.26pm Ametop (local anaesthetic cream) was applied in multiple places in anticipation of IV line placement and blood tests.

At 12.26pm, his observations included a pulse rate 155/min, respiratory rate 26/min, blood pressure of 93/58 and SaO₂ 99% in air.

At 1.38pm, [Master A] was seen by a Paediatric Registrar but he was “in too much pain to fully examine or to take bloods.”

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At 2.04pm, the observations included a temperature of 35.8°C, a pulse rate of 98/min (off an oximeter, not manual), and a respiratory rate of 30/min, SaO₂ 95% in air.

It was decided to trial oral morphine before other options for sedation would be considered. Morphine was given at 2.15pm.

At 3.30pm, the Paediatric Registrar reviewed [Master A]. It seemed that the oral morphine was “having a good effect” so IV access was attempted. Two attempts were unsuccessful. There is a statement from a nurse present for those attempts that “I recall [Mrs B] (mother) interrupted the procedure and informed Dr X of **another blister that had formed** and been peeled by [Master A].”

At about 4.15pm, an IV line was placed under ultrasound guidance into the right antecubital fossa by an ED senior doctor and blood samples taken. This doctor remembers that [Master A] was “restless and very oedematous but that his observations on the monitor were not unduly abnormal.”

At some unclear time between 4.15pm and 17pm, [Master A] was reviewed again by the Paediatric Registrar. He noted “distressed, in pain, rigid, crying...unable to weight bear.” Swelling and oedema of the shoulders, wrists, elbows and left knee is noted, with joint “tenderness and reduced range of movement.” He is said to have “slightly cool peripheries, warm centrally, CRT < 2 sec” and “not tachycardic when settled.”

The registrar notes that “post IVL attempts desquamation noted on the flexor surface of the right forearm.”

The urine dipstick result became available and showed Pro +++, Bld +++, Leuk neg, Nit neg” On formal analysis, this urine had a mildly raised albumin/creat ratio of 38.7 (normal < 2.5).

Clinical impression now included a “mixed nephrotic and nephritic picture,? evolving HSP ?IgA nephropathy ?evolving staphylococcal scalded skin.”

This clinical picture was “discussed with SMO” and the decision was to monitor for further desquamation but to “defer antibiotics for now.”

At 4.57pm, observations are entered on a Paediatric Vital Signs Chart (also known as a Paediatric Early Warning Sign (PEWS) chart). Temperature was still a little low at 36.3°C, pulse rate was 166/min (orange zone), SaO₂ 100% in air, respiratory rate was elevated at 69/min (above red zone, trigger emergency response) and there was mild increase in work of breathing (WOB). He was said to be alert. A total PEWS score was not calculated but in retrospect was 7+ (as no BP was taken), but with a markedly raised respiratory rate.

By 5.12pm, [Master A] was noted to be “peripherally cold” and “drowsy and lethargic.” The nurse was unable to get a clear reading for pulse rate and SaO₂ using an oximeter. At 5.29pm, manual pulse of 193/min, normal BP, moderate increased WOB and resp rate 70/min. Urgent medical review was requested by the senior nurse (ACNM) on the floor.

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A second Paediatric Registrar reviewed [Master A] at about 5.30pm. She found him tachycardic at 190/min, cool peripherally with CRT > 2 sec, short of breath when lying flat, tachypnoeic with rate 60/min, oedematous and with further skin desquamation. The Registrar immediately contacted the Consultant Paediatrician on call and the ED consultant in the department and asked them to attend.

Intraosseus needles were inserted in both tibiae to increase options for access. A bolus of IV 0.9% saline 10ml/kg was given, followed by IV albumin at 10ml/kg. A chest X-ray and ECG were performed. He was placed on high-flow oxygen as tolerated.

Antibiotics were charted. He received flucloxacillin at 6.07pm and clindamycin at 6.33pm. Ceftriaxone was also charted, but I cannot be sure it was given.

At some point, the results of blood tests taken at 4.15pm became available. The CRP was markedly raised at 170 (normal < 6), there was a mild neutrophilia of 10.1 (normal 1.5–8.0), a low platelet count of 66 (normal 150–450), a low serum sodium of 126 (normal 135–145), mild renal impairment with serum creatinine of 61 (normal 25–56), and abnormal liver function tests (total bilirubin 41 (normal 2–20), ALT 138 (normal 5–40) and albumin 19 (normal 34–48)). No blood gas or serum lactate had been requested.

At 6.15pm, the consultant paediatrician attended. By this time, other senior medical staff present included two ED consultants. Paediatric anaesthetist and intensive care consultant assistance was requested, and they attended in good time. [Master A]’s mother was in attendance throughout, but his father was only admitted during the resuscitation.

As his WOB increased and SaO₂ fell, he was trialled on a NRB (non-rebreather mask), then bag and mask ventilation. His heart rate then started to fall and it was clear that intubation and ventilation would be required. At this point, he vomited a large amount and his airway was suctioned and a brief trial of a laryngeal mask airway (LMA) was unsuccessful.

At about 6.49pm, as his heart rate fell to 60/min and there was no detectable cardiac output, cardiac compressions were started and the APLS algorithm for cardiac arrest commenced. A crash intubation (with no anaesthetic) was indicated and successful. After some adjustment of endotracheal tube (ETT) length good air entry was obtained and SaO₂ rose to 100%.

Resuscitation continued with no interruptions through multiple cycles of adrenaline, continuous CPR and ventilation. Other therapies were given, including intravenous glucose and calcium gluconate. An ultrasound was used to exclude cardiac tamponade and airleak.

A blood gas taken from the intraosseus needle at 7.03pm confirmed a severe metabolic acidosis with pH 6.9 and lactate 19.

After more than 30 minutes of CPR, he remained in asystole. The attending senior doctors agreed that resuscitation should cease, and [Master A] died at 7.24pm.

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At the time of his death, a wide differential diagnosis was being considered. Subsequently, his blood cultures were positive for *Streptococcus pyogenes* (Group A strep), and the death certificate lists toxic shock syndrome, Group A Strep infection, and a systemic inflammatory response syndrome as causes of death. The case was referred to the coroner and a post mortem performed, but the results are not available to me.

The other diagnoses being considered in his final hour included paediatric multisystem inflammatory disorder (PIMS-TS) related to COVID-19 infection, nephrotic syndrome with bacterial peritonitis, bacterial sepsis without TSS, and other renal diseases.

Question 1: The care provided to [Master A] by clinicians at Wellington Hospital. In particular, the appropriateness and timeliness of seeking investigations, receiving results, and providing treatment.

List any sources of information reviewed other than the documents provided by HDC	1. Invasive group A streptococcal infection in New Zealand 2017-2022 (esr.cri.nz) 2. Schlapbach LJ et al. Lancet Infect Disease J. 2015;(15):46-54 3. Paediatric <16years Sepsis Pathway, CCDHB. 4. Sepsis Guideline, Starship Hospital, Sept 2022 5. Paediatric early warning system Te Tāhū Hauora Health Quality & Safety Commission (hqsc.govt.nz) 6. Coulthard MG et al. J Paeds Child Health. 2022;(8):497–503 7. Invasive GAS infection and TSS: treatment and prevention. UpToDate 17/03/23
Advisor's opinion	In providing this opinion, I am conscious of the risk of retrospective bias, given my knowledge of the eventual diagnosis and tragic outcome of this case. In any complex episode of severe illness, it is possible to find small deviations from ideal care: that is the reality of working in high-pressure, resource-limited environments. As well, I am reviewing this case in isolation, whereas on the day in question, [Master A] was one patient in a very busy ED. Every clinician involved would have also been managing other unwell patients. I am also conscious of the fact that Group A Streptococcal sepsis is rare, particularly in the 1- to 4-year age group and particularly in [ethnic group] children. There were only 40 cases in the Wellington

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	area over the 5 years up to 2022 in <i>all</i> ages. The incidence in young children over that period was five cases/100,000 children per year (ie, fewer than one case a year on average).¹ Group A streptococcal infection and sepsis is of particular concern for a number of reasons. It can be subtle and non-specific to begin with, can progress rapidly, and has a high mortality rate. With widespread use of immunisation to prevent H flu, meningococcal and pneumococcal infections, invasive GAS has become a predominant pathogen around the world. Many countries have reported a largely unexplained increase in GAS infection.⁷ I also recognise the high mortality in Group A Streptococcal sepsis and toxic shock syndrome in children. Even with prompt recognition and expert management, the mortality of septic shock approaches 20% in Australasian children.² Different management in this case may not have changed the outcome. Published guidelines and paediatric sepsis pathways have been developed to improve outcomes.³ The key is early recognition of the possibility of invasive infection or sepsis.⁴ This has been the main driver in development of Early Warning Scores (eg, PEWS) to monitor illness severity, flag deterioration and trigger escalation in management.⁵ [Master A] presented to Wellington Hospital on day1 September 2022 at 10.57am. He was triaged promptly and appropriately and was then reviewed within 20 minutes by a primary ED nurse. He was reviewed by an ED registrar within 60 minutes of presentation. The ED registrar documented a thorough history and physical examination. From this information, they formed a differential diagnosis, which included a COVID-related inflammatory syndrome, an autoimmune disease, HSP or kidney disease. Sepsis was not considered at this point. In my opinion, it should have been.
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	The CCDHB Paediatric Sepsis Pathway,³ in use at the time, starts with assessment at triage. If a child has suspected or proven infection AND has two of a number of clinical features (see below), they are supposed to be reviewed by a doctor within 30 minutes. If sepsis is thought possible, immediate paediatric consultation is required and prompt IV access and blood tests obtained. In this case, [Master A] had a clear history of five days of subjective fever, a one-day history of joint swelling and limb pain, and had tested positive for COVID on RAT testing. His pain was severe, and he could not weight bear. He was clearly a child with a suspected infection. The clinical features that raise concern for sepsis on the pathway are: 1. Core temperature <36.0°C or >38.5°C 2. Inappropriate tachycardia = any HR in the orange or red zones of PEWS 3. Altered mental state (including sleepiness, irritability, lethargy, floppiness) 4. Prolonged central CRT The DHB response says “bacterial infection or sepsis was not suspected at that stage as [Master A] was still afebrile...”. In fact, the history clearly included fever with a measured temperature of 39.0°C that morning. Even more importantly, he was hypothermic on admission, with a core temperature of 35.8°C for his first three hours in the ED. A low core temperature is well recognised as possible in GAS sepsis. The DHB response says that he had a “slightly raised heart rate in the yellow zone” at presentation. They also wrote that “up until his sudden deterioration at around 1700 his vitals recorded were in the yellow zones at worst.” I note that no formal observations are recorded for three hours before that. In fact, [Master A] had an initial heart rate of 149/min, which is the upper limit of the yellow zone, and 15
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	minutes later his heart rate had risen to 156/min, which is in the orange zone. After 90 minutes in the department, his heart rate was still in the orange zone. By six hours in the department, his heart rate had risen to 166/min, high in the orange zone. In my opinion, this is an inappropriate tachycardia, particularly in a child with a low temperature. The DHB response says that “on examination, he was alert but looked unwell.” The first doctor who saw him also wrote “looks miserable and unwell, pale, lethargic, in pain.” The paediatric doctor who reviewed [Master A] after 195 minutes in the department found him in “too much pain to fully examine or take bloods.” At various other times, he is noted to be “alert” “irritable” “lethargic” “upset”. There is therefore some indication of altered mental state. As far as I can tell, his central CRT was not assessed by the first doctor who saw him. He did note “feet and hands pale, slightly oedematous, but warm to touch.” By 5.12pm, he was “peripherally cold” and manual observations had to be taken as the oximeter would not read. In my opinion, [Master A] met the criteria to be identified as a child at risk of sepsis according to the Wellington pathway.³ In the Starship Sepsis guideline,⁴ similar criteria for concern are listed. Acceptable upper limits for pulse and respiratory rate in 1- to 4-year-olds is 150/min and 45/min, respectively. Vascular access is considered a priority. There were therefore missed opportunities soon after triage, and then at other points of care, to include sepsis in the differential diagnosis and to move faster to gain IV access, blood tests and to give antibiotics. Ideally, these steps would have been taken within an hour of his presentation. The ED doctor’s initial plan included analgesia (given as oral paracetamol), oral fluids, an IV line insertion and
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	blood and urine tests. Ametop was applied in readiness for an IV line. It was recognised that [Master A] was unwell and that paediatric admission would be required, so at 12.28pm, approximately 90 minutes after presentation, he was referred to the paediatric registrar. However, he remained under ED care until the paediatric registrar arrived at 1.38pm, another 70 minutes later. During that 70 minutes, [Master A] was given no further pain relief, no IV or blood tests were attempted, and one set of nursing observations was done. The paediatric registrar noted that [Master A] was “in too much pain” to attempt IV access or to re-examine, so morphine was given. This seemed to settle [Master A], and an IV was attempted unsuccessfully at 3.30pm. It was during those attempts that blistering of the skin is noted. At 4.15pm, an IV was placed with ultrasound guidance by an ED senior doctor, blood tests were sent. This is over five hours after presentation to ED. Observations at 4.57pm included a low temperature, a tachycardia of 156/min, and a markedly raised respiratory rate of 69/min. These observations are the first observations recorded since 2.04pm, nearly three hours before. They are recorded on the PEWS chart, and the respiratory rate (in the red zone) should have triggered a Paediatric Emergency Team (PET) response. At some stage in this sequence of events, the blistering of the skin was considered, and the differential diagnosis expanded to include Staphylococcal scalded skin syndrome. The registrar discussed this with an “SMO”, and it was decided to defer antibiotics while “closely observing for any further desquamation.” It was soon after this, at 5.30pm that a second paediatric registrar reviewed him urgently after a request from senior nursing staff. The registrar took
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	immediate steps to escalate his care to appropriate senior doctors and started management for presumed sepsis. For instance, he received immediate IV fluid boluses and his first antibiotic at 6.07pm. Unfortunately, despite escalating care, [Master A] continued to deteriorate and passed away at 7.24pm. I agree with the DHB response that there is evidence of anchoring bias in this case. Sepsis was not considered early after presentation, and this then influenced decisions at later stages. The flow-on effect, compounded by the difficulties assessing [Master A] and getting IV access, was delay in treatment. The ED Registrar plan after 90 minutes in the department was to give pain relief, oral fluids, to perform blood and urine tests, to place an IV line and to refer his care to the on-call Paediatric team as admission was indicated. In the event, Paediatric review began after about 160 minutes in the department. IV access and blood tests were not completed until 315 minutes, and the test results were not available until about 375 minutes. These delays led to delays in diagnosis and management. If IV access and blood tests had been completed soon after EMLA was applied at 90 minutes, the test results would have been available about four hours sooner and [Master A] would probably have received earlier IV fluids and antibiotics. I also have concerns that there was delayed recognition and response to deterioration in this case. For instance, he was hypothermic and tachycardic at 11.15am and 12.26pm. There is then a 90-minute gap until further observations at 2.04pm, heart rate taken using an oximeter probe and possibly spurious, before a further long gap until observations at about 4.57pm. By that stage, [Master A] was very unwell, and his observations included a respiratory rate of 69/min
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	(above the red zone), and his care was escalated appropriately. In the end, [Master A] was in the ED for more than six hours before his recognised significant deterioration. Over that time, observations were recorded at T0 minutes, T15, T90, T150, and T300. Pulse and oxygen saturation were recorded all five times, temperature and resp rate three times and blood pressure once. Although he would have been on continuous oxygen saturation and pulse monitoring, it is not clear how this was being monitored. Certainly, the senior nurse who was asked to assist with his observations at 5pm (T300 above) recognised that he was extremely ill immediately (“I touched his foot and it was cold ... he was irritable and agitated ... I was really concerned about oedema”). I believe that, leading up to this point [Master A] was being cared for by a new graduate nurse orientating to the ED. Finally, by the time of his cardiac arrest, a large team of senior doctors and nurses were in attendance. The management of the arrest was exemplary and entirely in accordance with guidelines. There were a large number of nurses and doctors involved in this case. No one individual can be responsible for the outcome. Delays in diagnosis of paediatric sepsis are a common worldwide problem, but I am unsure whether that should be a mitigating factor.
What was the standard of care/accepted practice at the time of events? Please refer to relevant standards/material.	The most relevant standards of care in this case are the CCDHB Paediatric Sepsis Pathway,³ and the Starship Hospital Sepsis Guideline.⁴ I have also based my advice on my personal experience in acute emergency paediatrics.
Was there a departure from the standard of care or accepted practice? • No departure; • Mild departure;	In my opinion, [Master A] met the criteria to be identified as a child at risk of sepsis according to the Wellington pathway.³ Even without the benefit of hindsight, in my opinion important clinical clues were missed that would have

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• Moderate departure; or • Severe departure.	led to earlier treatment with fluids and antibiotics. Some of these clues were present at first presentation, and others became apparent over time. As there is no way of knowing whether the outcome would have been different, I find this to be a moderate departure from accepted practice. In my opinion, there were delays in first attempting IV access, and then after unsuccessful attempts further delays in arranging a more senior doctor to take over. These delays were compounded by difficulties with pain management and assessment, but the end result was delayed treatment for sepsis. I find this to be a mild departure from accepted practice. In my opinion, there was delayed recognition and response to deterioration in this case. For example, there are no recorded observations between 2.04pm and 4.57pm. A failure to undertake these observations in a patient with this history would be a moderate departure from accepted practice for the above reasons. If observations were undertaken but not documented, that would be a mild departure from the required standard of documentation. Also, many of these observations were incomplete (eg only one blood pressure recorded), which did not enable a full clinical assessment. This is a mild departure from accepted practice. In regards to management from 5.30pm onwards, and during the cardiac arrest at 6.49pm, I see no departure from accepted practice.
How would the care provided be viewed by your peers? Please reference the views of any peers who were consulted.	In my opinion, most paediatricians and ED doctors faced with a 4-year-old with clear recent history of fever, current hypothermia, tachycardia, painful and swollen limbs, and lethargy would include sepsis in their initial differential diagnosis and investigate accordingly. They would expect that IV access and

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	blood tests be performed as soon as possible and antibiotics commenced. If a child is obviously very unwell and in pain, whatever the differential diagnosis, they would expect frequent recorded observations. In most cases where a child is very unwell, and the diagnosis is not clear, they would expect early discussion with a senior paediatric doctor.
Please outline any factors that may limit your assessment of the events.	I cannot be sure about the exact timeline of some events. For example, the timing and detail of any discussion between junior and senior doctors.
Recommendations for improvement that may help to prevent a similar occurrence in future.	I am sure that this case will have resulted in a serious adverse event review at Wellington Hospital, probably a root cause analysis style of review. Wellington Hospital might also consider an external expert review of this case. All acute hospitals have regular Morbidity and Mortality meetings. This case would serve as a timely reminder to review sepsis pathways and guidelines with all staff.
Question 2: The handover between the ED and Paediatric teams.	
List any sources of information reviewed other than the documents provided by HDC	
Advisor's opinion	The timing of transfer between the ED and paediatric team for any case will vary depending on likely diagnosis, degree of sickness, ED staffing levels, ED department workload, paediatric availability and other factors. Patients in ED remain the responsibility of the ED staff until the paediatric team arrive to review the patient. If their arrival is delayed, it is important that normal care is not interrupted or delayed. [Master A] was triaged and reviewed promptly and a reasonable initial plan documented.

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	The failure to recognise the risk of sepsis has been discussed in depth. It was recognised immediately that he would require paediatric admission. He was referred to the Paediatric Registrar within about 90 minutes of arrival. He was given some pain relief and Ametop applied ready for an IV insertion and blood tests. He was then seen by paediatrics 70 minutes later. During that 70 minutes, [Master A] was given no further pain relief, no IV or blood tests were attempted, and one set of nursing observations was done. During that 70 minutes, [Master A] remained the responsibility of the ED doctor, but I am unable to comment on whether he reviewed [Master A] over that time or why he did not attempt the IV and bloods. The paediatric registrar then judged that [Master A] was in too much pain to examine and to tolerate IV access and blood tests, so these were delayed still further. It is impossible to comment on whether the ED doctor expected paediatrics to attend more promptly, or why the paediatric registrar did not either attempt an IV or request senior assistance much sooner. In the event, the end result was a delay in treatment, despite timely referral to paediatrics.
What was the standard of care/accepted practice at the time of events? Please refer to relevant standards/material.	There is no specific standard of care that I am aware of relating to transfer of care from the ED team to the hospital paediatric team.
Was there a departure from the standard of care or accepted practice? • No departure; • Mild departure; • Moderate departure; or • Severe departure.	In terms of handover between the ED and paediatric teams, there is some evidence of unclear responsibility over a period between referral to, and arrival of, paediatrics. This contributed in a minor way to delays in treatment.

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	In my opinion, there is a mild departure from accepted care relating to transfer of care.
How would the care provided be viewed by your peers? Please reference the views of any peers who were consulted.	My peers would sympathise with both the ED and paediatric teams in trying to provide high-quality care in a very busy and under-resourced clinical environment.
Please outline any factors that may limit your assessment of the events.	
Recommendations for improvement that may help to prevent a similar occurrence in future.	I have no specific recommendations.
Question 3: Any other matters in this case that you consider warrant comment.	
List any sources of information reviewed other than the documents provided by HDC	
Advisor's opinion	Other comments: Although the key issue in this case was the failure to consider sepsis in the differential diagnosis early in the care, leading to flow-on delays in IV access, blood tests and antibiotics, there are other aspects of care that are of concern. [Master A] was clearly a boy in considerable pain. He had swollen joints, painful limbs, and could not weight bear and was "reluctant to move". In retrospect, this was a further clue to a possible sepsis diagnosis: limb pain is common as a presenting feature of GAS sepsis and TSS.⁷ In terms of pain management, I can find no evidence of a standardised pain assessment such as the Faces Pain Scale or FLACC tool being applied. In his hours in the department, [Master A] was given analgesia on two occasions ... paracetamol at 12.18pm and morphine at 2.15pm. He was in clear and obvious pain after that, but no further analgesia was given.

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	This made aspects of management, assessment and investigation difficult and resulted in unnecessary suffering. It is worth commenting on the differential diagnosis that was considered early in this case. The diagnoses considered at that stage for “an unwell child with swollen limbs, pain, intermittent fever and COVID positive” included a COVID-related inflammatory syndrome, an autoimmune disorder, or Henoch-Schönlein Purpura (HSP). Paediatric multisystem inflammatory disorder (PIMS-TS) related to COVID-19 infection was an important diagnosis to consider. [Master A] was RAT positive two days before presentation and weakly positive that morning. Subsequent PCR was negative. This condition has a wide range of presenting symptoms and signs that overlap those of toxic shock syndrome and sepsis and also Kawasaki disease. Muscle pain and limb swelling are not common features. Laboratory evidence of inflammation and multisystem organ involvement is seen. One of the main risks to children with COVID-19 infection, at the time of the pandemic and through to the present day, is that other diagnoses are either not considered or are missed due to the presence of a positive COVID test. Both an autoimmune disorder and HSP would have been very unlikely given the acute onset of illness, the lack of rash, and the severity of his pain in the limbs. For similar reasons, a nephritis or nephrotic syndrome can be considered unlikely with such an acute onset and only mild proteinuria. Delays in recognition and management of children with sepsis are common throughout the western world. There are publications from many countries describing how these delays occur and considerable research into ways to improve practice. Indeed, this has been the major driver behind development of Early
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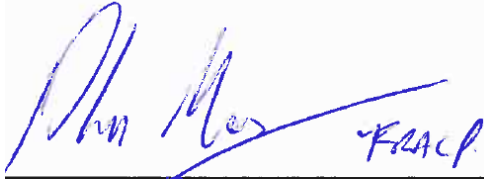
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	Warning Systems in paediatrics, maternity, adult medicine and general practice. For instance, a study from Queensland⁶ analysed the resulting serious adverse event reviews in 28 cases of severe paediatric sepsis. 23 of these children died, and many had Group A strep sepsis. Common contributing factors to bad outcomes included delayed response to a deteriorating patient in 27/28 cases, delayed treatment in 20/28 cases, delayed diagnosis in 18/28 cases and problems with escalation of care in 24/28 cases. This case reinforces the continued challenge faced by frontline medical and nursing teams in recognising and managing paediatric sepsis. Similar cases are reported in all departments in New Zealand and around the world. Finally, it is distressing to read that [Master A] was only able to have one parent with him during this admission, until he was receiving active resuscitation, when his father was allowed in. This may have been a COVID-related policy but, in most hospitals, there was some flexibility around these rules. I would hope an apology was made about this. My heart goes out to [Master A] and his family. I also reflect on the effect that this case will have had on all of the staff involved. Although we learn a lot from bad experiences, I suspect many of the staff involved will never forget [Master A].
What was the standard of care/accepted practice at the time of events? Please refer to relevant standards/material.	
Was there a departure from the standard of care or accepted practice? • No departure; • Mild departure; • Moderate departure; or	

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• Severe departure.	
How would the care provided be viewed by your peers? Please reference the views of any peers who were consulted.	
Please outline any factors that may limit your assessment of the events.	
Recommendations for improvement that may help to prevent a similar occurrence in future.	

By signing this report, I agree to HDC correcting any formatting, spelling, or grammar issues on the proviso that the substance of the report and any quoted material remains unchanged.

Signature:  FRACP

Name: Dr Philip Moore

Date of Advice: 4 July 2024

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Appendix C: Health NZ Paediatric Sepsis Pathway

Paediatric <16 years Sepsis Pathway CHILDREN'S HEALTH SERVICE		Capital & Coast District Health Board ŌPORO KI TE URU HAUOKA	
1 Assess at Triage Time assessment started:		Surname: NHI: First Names: Date of Birth:/...../..... Sex: PLACE PATIENT ID HERE	
This form should be placed in the child's progress notes. Some childhood illnesses will mimic sepsis. These must be identified by a senior clinician before opting out of this pathway.			
1 Assess at Triage Time assessment started:		RECOGNITION OF A CHILD AT RISK. If a child with suspected or proven infection AND has at least 2 of the following: ☐ Core temperature < 36°C or > 38.5°C (for infants less than 3 months of age, any temperature > 38°C qualifies) ☐ Inappropriate tachycardia = any HR in the orange or red zones of PEWS on age appropriate charts ☐ Altered mental state (including: sleepiness/irritability/lethargy/floppiness). Using AVPU on any other symptom see overleaf → ☐ Prolonged central capillary refill time (> 3 seconds) Calculating weight of child please see overleaf →	
THINK: could this child have SEPSIS? This section to be completed by a doctor. Please discuss with the on-call Paediatric RMO/SMO.		Date/time of escalation:	OR ☐ NOT SEPSIS Document reason why:
2 Investigate		Obtain vascular access and take blood tests. If unable to obtain vascular after two attempts, consider IO. Blood Tests ED: Venous/capillary blood gas (minimum of bedside glucose) Correct hypoglycaemia (BSL < 3.0mmol/L) with 2mL/kg 10% dextrose Lab: Green tube: ☐ electrolytes and creatinine ☐ urea ☐ liver functions ☐ CRP Purple tube: ☐ Full blood count Blue tube: ☐ Coagulation profile Blood cultures, please see overleaf → Urinalysis and culture (sterile collection) - do NOT delay antibiotic treatment If stable => CXR +/- LP - do NOT delay antibiotic treatment	
		NOT SEPSIS Document reasons why in EDIS or clinical notes Date: _____ Sign: _____	
		Unsure Date: _____ Sign: _____	
3 Treat		ACTION PLAN Name/dose of antibiotic given: Record this information on EDIS Date and time given:	NOT SEPSIS Document reasons why in EDIS or clinical notes Date: _____ Sign: _____
		Start antibiotics immediately once bloods and cultures have been obtained within 1 hour of presentation	
		Correct hypoglycaemia (BSL < 3.0) with 2mL/kg 10% Dextrose	
		Unsure Date: _____ Sign: _____	
4 Assess		Consider fluid resuscitation • Bolus 20mL/kg isotonic fluid over 5-10 minutes and repeat if necessary • Check for signs of fluid overload (e.g. wheeze, respiratory distress, hepatomegaly etc.) • Check for altered mental state from initial assessment using AVPU	
		NOT SEPSIS Document reasons why in EDIS or clinical notes Date: _____ Sign: _____	
		Unsure Date: _____ Sign: _____	
5 Reassess		• Reassess patient in 15 minutes • Record frequency of observations required and next medical assessment • All patients to be discussed with paediatric SMO and ICU	

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Additional notes

1 Assess	Patients with sepsis who may not manifest sepsis criteria - Lower threshold of suspicion for: age <3 months, chronic disease, recent surgery or immunocompromised - Presence of central line (e.g. PICC/PORT/Hickman) - Parents report excessively dry nappies, lack of response to social cues, significantly decreased activity or weak, high pitched or continuous cry. - Congenital heart disease may inappropriately trigger based on tachycardia - Altered mental state using AVPU is scoring VPU Some childhood illnesses will mimic sepsis, these must be identified by a senior clinician before opting out of this pathway. - Calculating weight: $\text{weight (kg)} = 3(\text{age}) + 7$				
2 Investigate	- One set of blood culture peripherally (1x pink cap bottle 0.5-3.0 ml) - Also another set one from central line if present - CXR, LP and Urine are important but ensure child has stabilised before attempting additional investigations and DO NOT DELAY ANTIBIOTICS.				
3 Treat	<table border="1"> <thead> <tr> <th data-bbox="311 878 874 918">< 3 months old</th><th data-bbox="874 878 1410 918">>3 months</th></tr> </thead> <tbody> <tr> <td data-bbox="311 918 874 1061"> Amoxicillin 50mg/kg (max 1g) AND Cefotaxime 50mg/kg (max 2g) </td><td data-bbox="874 918 1410 1061"> Cefotaxime 50mg/kg (max 2g) </td></tr> </tbody> </table> NOTES: see NZCF for dose frequency for age specific groups - Consider adding Acyclovir if clinical history of HSV exposure or evidence of systemic HSV infection. - Consider adding Vancomycin if central line present, VP shunt, suspected MRSA requiring inotropes or severe pneumococcal disease. - Consider adding Gentamicin if urosepsis is suspected. - Consider adding Clindamycin if skin or soft tissue infection is suspected. Always check for Multi-Drug Resistant Organism (MDRO) alerts on MAP/Concerto. Different empiric antibiotics may be indicated. Conditions that may require non-standard antibiotic treatment Contact infectious disease on call - Antibiotic allergies - Immunocompromised/unimmunised - Infection control alert for MDRO - Recent surgery - Recent travel or admission to overseas hospital - Recent antibiotics - A rash - Recent hospital admission	< 3 months old	>3 months	Amoxicillin 50mg/kg (max 1g) AND Cefotaxime 50mg/kg (max 2g)	Cefotaxime 50mg/kg (max 2g)
< 3 months old	>3 months				
Amoxicillin 50mg/kg (max 1g) AND Cefotaxime 50mg/kg (max 2g)	Cefotaxime 50mg/kg (max 2g)				
4 Assess	- If needing > 40mls/kg, ICU should be involved, (consider use of Plasma-lyte 148 as bolus fluids if needing >40mL/kg, and consider inotropes for on-going hypotension and/or poor perfusion) => Fluid resuscitation of > 60mL/kg maybe required in the first 60 minutes - Altered mental state using AVPU is scoring VPU				

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