HEALTH & DISABILITY COMMISSIONER
TE TOIHAU HAUORA, HAUĀTANGA

A Decision by the Deputy Health and Disability Commissioner

(Case 20HDC01585)

Introduction

1. This report discusses the care provided by Health New Zealand|Te Whatu Ora (Health NZ),[1] Registered Nurse (RN) A, Dr B, and Dr C to Master D.

2. On Day 1[2] Master D presented to a public hospital's Emergency Department (ED) with a fever and vomiting. Master D was admitted to the children's ward overnight for observation. Over the course of a few hours, Master D's condition deteriorated rapidly, and, sadly, he passed away.

3. Management of an aggressive infection in a young child is extremely difficult in any clinical setting. It stands to reason that responding to a rapidly progressing condition in a locality where staff are less experienced and access to specialist expertise, equipment and resources is limited is even more challenging. This type of situation necessitates all parts of the system to be operating effectively and, critically, there needs to be ready access to specialist expertise when warranted. This case serves to highlight the failures that can occur when the system is not equipped to respond to such a serious event. The Serious Event Review (SER) findings and remarks made by both Dr Sarah Clarke and RN Rebecca Conway have highlighted a scenario in which the staff present when Master D became critically unwell had insufficient paediatric experience to recognise and react to the significance of his condition.

4. I extend my sincere condolences to Master D's family for their devastating loss. I acknowledge that the circumstances surrounding Master D's presentation and rapid deterioration have left Master D's family with many questions on the quality of care he received.

5. Mrs D, Master D's mother, complained to HDC about the care Health NZ provided to her late son, Master D, in 2020. Mrs D's complaint concerns delays in the escalation of care, delays in treatment, and a delayed diagnosis of sepsis.

[1] On 1 July 2022 the Pae Ora (Healthy Futures) Act 2022 came into force, which disestablished all district health boards. Their functions and liabilities were merged into Health New Zealand|Te Whatu Ora.
[2] The relevant days are referred to as Day 1 and Day 2 to protect privacy.

6. The following issues were identified for investigation:

- *Whether [Health NZ] provided [Master D] with an appropriate standard of care on [Day 1 Month 1] 2020 and/or [Day 2 Month1] 2020.*
- *Whether [RN A] provided [Master D] with an appropriate standard of care from [Day 1 Month1] 2020–[Day 2 Month1] 2020.*
- *Whether [Dr B] provided [Master D] with an appropriate standard of care from [Day 1 Month1] 2020–[Day 2Month1] 2020.*
- *Whether [Dr C] provided [Master D] with an appropriate standard of care from [Day 1 Month1] 2020–[Day 2 Month1] 2020.*

7. Independent clinical advice on the care provided by Health NZ was obtained from Dr Sarah Clarke, an urgent care and rural hospital medicine specialist (Appendix A). Independent clinical advice regarding the care provided by RN A was obtained from RN Rebecca Conway (Appendix B). Appendix C attaches a copy of the Serious Event Review (SER) commissioned by Health NZ in July 2021. The SER was undertaken independently of the Health NZ and sets out the factual events that occurred and assists in identifying the care delivery problems. These same shortcomings in care are reflected in the advice from Dr Clarke and RN Conway.

8. This report is the opinion of Deputy Commissioner Rose Wall and is made in accordance with the power delegated to her by the Commissioner.

Information gathered during investigation

Background

9. Master D was 3 years old and generally had good health. When he presented to the public hospital ED on Day 1, he had no significant medical history and took no regular medication. Prior to presenting to ED, Master D had been experiencing upper respiratory tract symptoms consistent with a common cold. He had attended a soccer practice on Day 1 with no difficulty.

Public hospital

10. Public hospital routinely rostered a sole nurse to cover the children's ward for the afternoon and night shift, and one senior nurse[3] covered the whole hospital. If no paediatric consultant was based in the hospital, the children's ward would be covered by a rural health specialist consultant.

11. Staffing at the hospital on Day 2 Month1 2020 was routine — a sole nurse (RN A) covered the children's ward during the night shift, one senior nurse (RN E) covered the whole hospital, and one junior medical officer[4] (Dr B) and one senior medical officer(SMO)[5] (Dr C) were on call for

[3] A senior nurse with clinical and managerial experience at a senior level.
[4] A junior medical officer is a qualified doctor who is undergoing further training.
[5] A senior medical officer is a doctor employed or contracted as consultants/specialists.

the whole hospital. The workload in the hospital overnight was unremarkable with no significant time pressures from patients requiring high-level cares in the ED or the wards.

Admission Day1–Day 2

12. Mrs D told HDC that on the evening of Day 1 Month1 2020 Master D had vomited and had a fever peaking at 40.2°C. Master D's parents immediately drove him to the public hospital and arrived at the ED at approximately 9.41pm. Master D was assigned a triage score[6] of 2[7] with a Paediatric Early Warning Score[8] (PEWS) of 2.[9]

13. At approximately 9.50pm Master D was examined by Dr C. Dr C noted that Master D was 'alert but grizzly' with clear chest sounds and tenderness in the right iliac fossa.[10] A urinalysis[11] indicated no infection. A blood test (including blood cultures[12]) showed the presence of an infection and/or inflammation but was non-specific. Dr C's working diagnosis was mesenteric adenitis[13] or probable early appendicitis.[14] Dr C admitted Master D overnight for observation and for surgical review the next day if the abdominal pain localised in the right iliac fossa.

14. Master D was admitted to the children's ward at approximately 11.30pm. On admission, he was reviewed by RN A, the sole nurse rostered to work the evening shift on the children's ward. Master D was noted to be responsive with a PEWS of 0.[15] The admission care plan from Dr C included advice to continue to push fluids but that there was no need for an intravenous (IV) fluid bolus[16] at that stage.

15. From approximately 12.30am to 3am (Day 2 Month1 2020) Master D continued to vomit and remained febrile.[17] RN A administered paracetamol and ice blocks to help cool Master D's body temperature. At 2.45am Mrs D and her husband (Master D's father) noticed marked weakness in Master D's limbs when he went to the toilet, and they alerted RN A. Mrs D said that she

[6] A tool used to prioritise clinical urgency. Five triage categories specify the maximum clinically appropriate time within which medical assessment and treatment should commence.
[7] A triage score of 2 indicates that the patient's presentation is imminently life-threatening or time-critical, and the patient is to be seen within 10 minutes.
[8] A PEWS is a clinical assessment tool that utilises vital signs and symptoms to identify patients at risk of clinical deterioration.
[9] A PEWS score of 1–3 requires the nurse to consider informing the nurse in charge. Actions include optimising appropriate treatment as prescribed, managing anxiety/pain, taking observations at least every four hours or more frequently if required, and reviewing oxygen requirements.
[10] The right lower part of the abdomen (a common site of pain and tenderness in patients with appendicitis).
[11] Testing of a urine sample to check the appearance, concentration, and content to screen for infection or other disease.
[12] To check for bacteria or fungi in the blood.
[13] Inflammation of the lymph nodes in the mesentry (supporting tissues of the bowel), which causes stomach pain.
[14] Inflammation of the appendix, which often is characterised by pain in the lower right abdomen, vomiting, fever, and loss of appetite.
[15] A PEWS of 0 does not trigger a management plan.
[16] Administration of fluid directly into a vein to deliver a prescribed dose of fluid or medication immediately.
[17] Feverish.

alerted RN A again at 3.00am as Master D was 'hot, clammy and had started to vomit stringy mucus again'. RN A did not escalate Master D's care to more senior staff.

16. At approximately 3.20am Mrs D alerted RN E that Master D was still vomiting up mucus and was very hot (RN A was on a scheduled break at this time). When RN E turned on the room lights to assess Master D, she discovered a mottled,[18] non-blanching[19] rash covering Master D's trunk and face. RN E immediately alerted RN A and paged the on-call doctor, Dr B.

17. Dr B noted that Master D was 'grizzly' and was moving all four limbs with non-laboured breathing. Dr B reviewed the test results from ED, which showed that Master D had raised white blood cell (WBC) and neutrophil counts, and a positive blood culture result.[20] Dr B's impression was that Master D was possibly 'developing sepsis' and that the infection was likely 'non-meningococcal'. At approximately 3.51am Dr B paged the on-call laboratory scientist to request a gram stain.[21] Dr B's plan was to continue administering paracetamol, take a venous blood gas[22] (VBG), administer IV antibiotics once the results from the gram stain had been received, and administer IV fluids after the VBG had been obtained.

18. From approximately 3.50am until 4.15am, RN A administered a dose of ibuprofen and recorded a set of observations for Master D (documented retrospectively). Master D's heart and respiratory rate had increased, and his PEWS score was 6[23] (calculated retrospectively).

19. Sometime between 4.30am and 4.38am RN A obtained a VBG sample from Master D with the assistance of Mrs D and RN E. As RN A began to prepare the IV fluids at the bedside, she noticed that Master D's breathing was becoming increasingly abnormal. Master D became unresponsive, and RN A immediately administered oxygen at 10L/min via a face mask and paged RN E and Dr B. Dr B instructed RN A to page Dr C.

20. Shortly after RN E and Dr B's arrival, Master D's heart stopped beating. Chest compressions were commenced at approximately 5.10am, and RN A administered IV fluids. Dr C arrived soon afterwards and immediately led resuscitation efforts. A defibrillator[24] was used at 5.12am, but Master D's heart remained in asystole.[25] At 5.25am Master D was intubated[26] but he remained unresponsive. The first dose of empirical antibiotics was also administered. Subsequently, resuscitation efforts were stopped and, sadly, Master D was pronounced dead.

[18] A bluish-red, lace-like pattern under the skin.
[19] Not disappearing when pressure is applied to the skin.
[20] A positive blood culture result indicates bacterial growth in the blood.
[21] A test to determine the type of bacteria present in the blood.
[22] A sample of blood from a vein to measure oxygen and carbon dioxide levels in the body.
[23] A PEWS score of 6–7 requires notification of the nurse in charge and an RMO review within 15 minutes. A full PEWS score is to be calculated, and observations obtained every hour. A plan is to be documented, including timeframe and criteria for review. A PEWS must be recalculated after interventions, and a senior clinician covering paediatrics is to be consulted.
[24] A device that provides an electrical shock to the heart to attempt to restore a normal heartbeat.
[25] The heart's electrical system does not produce any heartbeats to pump blood to the body.
[26] A tube inserted into the airway to keep it open.

21. At 5.56am the results of the first gram stain reported gram-negative diplococcus with a suspicion of *Neisseria meningitidis*. [27] Subsequent testing confirmed *Streptococcus pneumoniae*.[28]

22. Health NZ commissioned a Serious Event Review (SER) of Master D's care. A copy of the SER report was provided to HDC (Appendix D).

Opinion: Health NZ — breach

Introduction

23. Health NZ is responsible for ensuring that it provides services in accordance with the Code of Health and Disability Services Consumers' Rights (the Code). Health NZ was responsible for ensuring that the hospital was resourced appropriately, and that Master D received services of an appropriate standard from suitably trained, experienced, and supported staff. 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. My 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.

24. While there is some individual accountability for the care provided to Master D, which I will discuss later in this report, I consider that the main criticism should be directed at Health NZ for allowing this situation to manifest. It failed to ensure that it had adequate systems and processes in place, and it failed to ensure that it had staff with sufficient paediatric experience, and, as a result, it failed to provide Master D services with reasonable care. In making my decision, I acknowledge the resource constraints experienced by rural centres such as Health NZ. It is not unique, and I will be commenting on this further in the recommendations section of this report. In short, all remote hospital settings must have provisions in place to anticipate scenarios where staff experience is limited and manage them with appropriate support and ready access to the experience when needed.

25. I have been guided by the independent clinical advice from rural medicine specialist Dr Sarah Clarke and from RN Rebecca Conway, and I find Health NZ in breach of Right 4(1) of the Code.

Staff orientation

26. In my view, Dr B did not receive an adequate orientation/induction. The SER identified that the locum junior medical officer orientation pack provided to Dr B lacked specific detail about the threshold for involving a consultant in clinical decision-making, and how this may differ from large tertiary hospitals. More specifically, there was also a lack of guidance on paediatric admissions, the rural environment and transalpine model of care, senior doctor notification, and the use of hospital HealthPathways (including the Paediatric Sepsis Screening and Action Tool). The SER found that the standard welcome letter emailed to Dr B (prior to commencing work at the public hospital) detailed the clinical functioning of the hospital but did not contain

[27] Bacteria that can cause meningococcal disease.
[28] Bacteria that can cause infections in the lungs, ears, lining of the brain and spinal cord, and in the blood.

any reference to the children's ward, or expectations for the management of paediatric patients.

27. The SER considered that Health NZ had not ensured that Dr B had access to the appropriate information regarding local hospital pathways and other clinical decision support tools before starting his locum. The SER recommended that specific guidance be put in place with a requirement for this to be reviewed by all locum junior medical officers before commencing work at Health NZ. It was noted that the guidance should detail where and how to access specific guidance, and the thresholds to call for senior assistance. I accept these SER recommendations.

28. In terms of orientation relating to sepsis information, the SER outlined that a presentation about sepsis was available in hard copy on the children's ward along with a copy of the Paediatric Sepsis Screening and Action Tool. However, there is no mention that a hard copy of the Paediatric Sepsis Screening and Action Tool was available in the ED. The SER noted that at the time of Master D's admission, the Paediatric Sepsis Screening and Action Tool was not accessible on the Health NZ servers but was accessible via the hospital HealthPathways site. In addition, documentation was available on the children's ward directed at identification and management of sepsis (including a hard copy of the Paediatric Sepsis Screening and Action Tool).

29. Dr Clarke noted that availability of a pathway does not imply familiarity with it. She advised that if staff were orientated to the Paediatric Sepsis Screening and Action Tool, and it was clearly expected that the tool be used for eligible presentations, then the organisation would meet an acceptable standard of care.

30. The SER outlined that RN A had been orientated to the Paediatric Sepsis Screening and Action Tool, albeit her review of this information had been self-directed. Further, the SER outlined that the locum junior medical officer orientation pack did not orientate locums to the Paediatric Sepsis Screening and Action Tool. While Dr B may have been aware of this tool from his previous role, it appears that he was not orientated to the tool sufficiently prior to commencing his locum cover of the children's ward. Dr Clarke noted that when Master D was in the ED, his vital signs were consistent with SIRS and warranted commencement of the Paediatric Sepsis Screening and Action Tool. However, Dr Clarke acknowledged that the tool was not available on the Health NZ intranet at the time of the event, and, as such, likely it would not have been standard care to commence a paediatric sepsis screening and action plan.

31. Dr Clarke advised that if the tool was available online, but staff were not sufficiently orientated to the tool to use it for eligible presentations, then this was a mild departure from the accepted standard of care by Health NZ. I accept Dr Clarke's criticism that Health NZ did not orientate staff to the Sepsis Screening and Action tool sufficiently.

32. I consider that the various examples of lack of orientation described above indicate that Health NZ failed to orientate staff sufficiently to key guidelines, clinical decision-making tools, and processes relevant to the paediatric unit and Master D's care.

Staff training

CPR training

33. The SER identified a lack of currency in CPR training among key staff involved in Master D's care. At the time of Master D's admission, RN A had not completed a CPR refresher[29] course within three months of her employment. Health NZ had not confirmed the currency of Dr B's CPR training prior to his appointment as a locum doctor. The SER highlighted that CPR training needs to be current for all staff and assured for locum staff who are employed at Health NZ.

34. Dr Clarke advised that it is imperative that the onsite team on any given day have the appropriate expertise to manage a paediatric emergency. Specifically, Dr Clarke considered that it would be usual to expect that nurses working in the paediatric inpatient unit, including a nurse in charge of a paediatric inpatient unit, would have completed a one- or two-day paediatric emergency course such as Paediatric Life Support (PLS) or Paediatric Advanced Life Support (PALS). She noted that Advanced Paediatric Life Support (APLS) training is also available.

35. On review of RN A's paediatric orientation booklet, Dr Clarke noted that she had been marked absent for the APLS training and, as such, had not completed this at the time of Master D's admission. RN Conway was also critical that there is no documented record of CPR training during the period of RN A's induction. PALS and PLS are not listed as potential courses in RN A's booklet.

36. Dr Clarke advised that if the nursing staff responsible for the paediatric unit had not undertaken any paediatric-specific emergency training, this would be considered a moderate departure from the accepted standard of care. It appears that Health NZ failed to ensure that RN A had completed an APLS, PLS or PALS prior to being rostered with sole responsibility of the children's ward. I accept Dr Clarke's advice that this was a moderate departure from the accepted standard of care.

37. Having considered Dr Clarke's and RN Conway's clinical advice, and the SER findings, I find that Health NZ failed to ensure that staff had adequate and current CPR and paediatric-specific emergency training.

Staff rostering and experience

38. The SER identified that RN A lacked sufficient paediatric experience and/or training to recognise the significance of Master D's condition. The SER noted that RN A obtained her nursing qualifications overseas and gained registration with the New Zealand Nursing Council prior to starting her role at Health NZ. Previously, RN A had worked in multiple neonatal intensive care units overseas.

39. The SER noted that RN A regularly worked night shifts. The night of Master D's admission was the first of her rostered set of nights. RN A told HDC that she completed the

[29] Health NZ requires permanent staff to attend a CPR refresher course within three months of employment, and then on an ongoing annual basis. The SER outlined that RN E was due to attend a CPR course in 2020 (prior to Master's D's admission). However, courses were placed on hold because of the COVID-19 pandemic.

orientation/induction programme specific to paediatrics and the children's ward. She said that on completion of her orientation, she was rostered on morning shifts only for the first three months, with a clinical nurse specialist and a paediatrics nurse to support her. After the three-month period, she was rostered on rotating shifts, which included afternoon and night shifts. She continued with rotating shifts for the remainder of her time at the public hospital.

40. Dr Clarke noted that Health NZ's rostering at the time allowed for a sole nurse working in the paediatric unit (which in this case was RN A). Dr Clarke advised that it is a known risk to work in such professional isolation, and this would not be considered safe rostering. Acknowledging the workforce constraints and that this is 'not altogether an unusual practice in rural hospitals', Dr Clarke advised that Health NZ's rostering of a sole nurse in the paediatric unit would be considered a mild departure from the accepted standard of care.

41. RN Conway noted that RN A was new to Health NZ, new to the paediatric speciality, and new to nursing in the New Zealand context. Considering this, RN Conway advised that RN A should not have been rostered in a sole charge nurse role. RN Conway advised that rostering RN A as a sole charge nurse was a moderate departure from the accepted standard. RN Conway stated:

> 'In my experience as a former paediatric Charge Nurse Manager, most [registered nurses] take 6 months to feel comfortable in a new role, particularly when they are new to the specialty or new to the New Zealand nursing context. Readiness to be in charge of a ward takes somewhat longer …
>
> [T]he organisation ought not to have put [RN A] in a position where she was sole charge of a ward. Other provisions such as a change of roster or transferring [Master D] to an area where [RN A] could care for him with support from other [nurses] should have been made.'

42. Dr Clarke advised that while it is fairly common in rural and provincial centres (such as the public hospital) for a junior doctor to be on site without senior medical support, their level of inexperience is often mitigated through the maintenance of senior nursing staff with relevant experience on each shift. If the nursing staff in a department lack the experience and seniority, then the combination of staffing becomes unsafe.

43. I agree with the above advice and consider that Health NZ failed to ensure that the combination of staff rostered had adequate paediatric experience and support, which meant that Master D's care was put at risk. Staff lacked sufficient paediatric training and/or dedicated paediatric experience to provide the expected standard of care for a rural paediatric inpatient service. I accept Dr Clarke's advice that Health NZ departed from the accepted standard of care. I also accept RN Conway's advice that rostering RN A as the sole charge nurse of the children's ward was a moderate departure from the accepted standard of care.

Incomplete PEWS

44. RN Conway advised that the PEWS recording and scoring of child observations is used to help clinicians recognise patient deterioration and is utilised as an adjunct to professional clinical judgement. The child observation chart outlines instructions for calculating PEWS, and a

management plan for escalating care if patient deterioration is detected. A full set of recordings is required to calculate a full PEWS score using each of the vital sign fields on the chart. A full set of recordings is required on admission, and on transfer between clinical areas. RN Conway noted that all recordings were partial rather than full PEWS, and that only four of the seven recordings included a calculated PEWS score.

45. The table below outlines the observations recorded for Master D.

TIME/PLACE	PEWS SCORE	OBSERVATIONS COMPLETED	RN RESPONSIBLE
Day1/Month1/2020 21:55: On arrival to ED	Score not recorded on chart but in ED records. PEWS = 2	Incomplete; BP [blood pressure] & CRT [capillary refill time] missing	ED nurse
22:30: In ED — review by Dr C	Score not recorded on chart but in ED records. PEWS = 1	Incomplete; RR [respiration rate], CRT & BP missing	ED nurse
23:30: On admission to children's ward	PEWS = 0	Incomplete; CRT & BP missing	RN A
Day 2/Month1/2020 00:30: children's ward	PEWS = 0	Incomplete; CRT & BP missing	RN A
01:30: children's ward	PEWS = 0	Incomplete; CRT & BP missing, parental concern not ticked	RN A
02:30: children's ward	PEWS not recorded/calculated	Incomplete; only temperature is recorded; parental concern not ticked	RN A
03:20: children's ward	PEWS = 1	Incomplete; CRT & BP missing	RN E
Approx. 04:10: children's ward	PEWS = 6 **Calculated retrospectively after Master D's passing.	Incomplete; CRT & BP missing; parental concern not ticked Not documented on PEWS chart but in nursing notes	RN A

46. RN Conway advised that Master D should have had a full PEWS recorded (including BP and CRT) on admission to ED and on transfer to the children's ward. She noted that CRT (which is calculated as part of the PEWS) helps to determine abnormal perfusion and is a red flag for sepsis.[30] However, despite eight assessments by three different staff members, no complete PEWS was calculated for Master D.

47. RN Conway advised: 'There appears to have been a poor systemic understanding of the minimum requirements for full and core PEWS recordings.'

48. RN Conway advised that the PEWS policy is clear about when to record a full set of observations. She said that her peers would consider the failure to record a full PEWS on admission and transfer to be a serious departure from a fundamental nursing task. I agree, and I consider that the failure of all relevant staff to complete any PEWS indicates a systemic problem for which Health NZ is responsible. RN Conway recommended that Health NZ undertake regular scheduling of audits and education to ensure compliance with the PEWS policy. She noted that this is important to arrest waning compliance and ensure continued awareness in locations where there is staff turnover.

49. I am critical of Health NZ that multiple staff failed to record a full PEWS for Master D, and in turn did not comply with the PEWS policy. I agree with RN Conway that there was poor systemic understanding of the PEWS policy and the requirement to ensure that a full PEWS was obtained.

Conclusion

50. As outlined above, Health NZ did not ensure that rostered staff had adequate or specific paediatric experience and/or training. The staff orientation process provided to nurses and locum doctors at the public hospital was also insufficient. I am also critical of Health NZ's failure to ensure that staff were following the PEWS policy and calculating full PEWS scores adequately. I consider that Health NZ also failed to ensure that staff were sufficiently orientated to the Paediatric Sepsis Screening and Action Tool (or other similar sepsis tool). Accordingly, I find Health NZ in breach of Right 4(1) of the Code.

Preparation of adrenaline during resuscitation — adverse comment

51. Mrs D told HDC that during the resuscitation of Master D, '[when RN A] was drawing this (adrenaline) up she kept drawing the wrong amounts up that were asked for also into the wrong sized syringes and had to repeat this on multiple occasions … '.

52. RN A's response to the SER states that at 5.14am (during the resuscitation of Master D), Dr C asked her to prepare '0.2mls Adrenaline 1:1,000 concentration'. RN A stated:

[30] The sepsis screening tool outlines that if one red flag for sepsis is detected, further urgent assessment and treatment is required immediately.

> 'I gave it together with normal saline flush to [RN E] to administer it who was very near to the IV luer site. At all times I followed [Dr C's] instructions as to what amounts I should draw up and in what size syringe …'

53. RN A said that at 5.20am Dr C asked her to prepare a second dose of 0.2ml of adrenaline with a 1:1000 concentration followed by a saline flush. The dose was administered by RN E. At 5.30am Dr C asked RN A to prepare a third dose of 5ml of adrenaline, which was administered by RN E. The Clinical Emergency Record/Drug Treatment form shows that 0.2ml of adrenaline was administered at 5.14am and 5.20am, but the concentration is not recorded. Subsequent doses of adrenaline were recorded at 5.30am, 5.40am, and 5.45am (5ml, concentration 1:10,000). It is noted that the strength and doses were also recorded in the nursing notes by the ED nurse, who also attended the resuscitation of Master D.

54. RN Conway advised that the standard adrenaline concentration and volume for CPR was not used for the initial two doses.[31] However, she noted that the confusion may not have rested with RN A alone, as other clinicians were present who could have identified the required 1:10,000 strength of adrenaline. RN Conway advised that this would have been double checked by another clinician. She said that selection of the correct concentration of adrenaline is usually taught in annual CPR updates, but it would be difficult to remember when not practised regularly. I consider that any criticism regarding the wrong concentration and volume of adrenaline cannot be attributed to RN A alone. Considering Dr Clarke's and RN Conway's clinical advice, and the SER findings, it is evident that staff did not have adequate CPR and paediatric-specific emergency training. I consider this to be a system failure by Health NZ.

Post-deceased care — other comment

55. Mrs D told HDC:

> ' … my beautiful boy [Master D] was pronounced dead all staff just walked out left him connected to machines and tubes and gear everywhere and in a indecent state … was left soiled and he had urinated himself also.'

56. RN A's response to the SER stated: 'Post mortem care and aftercare were done … Emotional support was given to the family and provided alone time to the deceased …'

57. RN Conway noted that there is no account of post-deceased care in RN A's nursing notes, nor are there notes from the oncoming nursing shift. RN Conway advised that following Master D's death, RN A would have been required to discuss aspects of care with other members of the resuscitation team, complete detailed nursing notes, and hand over to the morning team.

[31] The Health NZ CPR policy dated September 2020 outlined that the standard dosing in advanced life support for infants and children is 10 micrograms per kilogram with a single maximum dose of 1mg given every second loop or 3–5 minutes. This is guided by the Australian and New Zealand Committee on Resuscitation (ANZCOR) guidelines on Paediatric Advanced Life Support (PALS).

58. RN Conway said that bereaved family support and post-deceased care of the body are fundamental aspects of nursing. However, following a catastrophic event, she would expect other nursing and medical staff present to pitch in and help.

59. I have considered the somewhat conflicting evidence before me, and I am unable to make a finding as to precisely what care was provided after Master D had passed away, and when it was provided. I am concerned, however, that it did not make the family feel that Master D was being treated with dignity and respect.

Opinion: RN A — breach

Introduction

60. RN A was the sole nurse rostered on the children's ward during Master D's admission Day1–Day 2 Month1 2020. I have identified shortcomings in the performance of Health NZ, as in my opinion the hospital was not resourced to respond to the situation with which it was confronted. Staff were not trained and supported appropriately and, as a result, Master D did not receive services of an appropriate standard. While there were clearly systems failures, I now turn my attention to the actions of the individual health professionals involved in supporting Master D as he became increasingly unwell. As a registered nurse, RN A was responsible for ensuring that she worked within her scope of practice and was providing safe and competent care that complied with relevant guidelines and professional standards. RN A had the greatest amount of contact with Master D over the relatively brief period he was an inpatient. As such, she was principally responsible for the hands-on nursing care he received, and for monitoring his deteriorating health and reporting it to more senior colleagues.

61. I have undertaken a comprehensive assessment of the information gathered. I am also guided by RN Conway's independent clinical advice on the nursing care provided by RN A.

62. I consider that RN A showed a lack of critical thinking in her management of Master D, and in her decision not to escalate Master D's care when he displayed signs of deterioration. I am also critical of RN A's failure to follow relevant guidelines and policies adequately.

63. I acknowledge that Health NZ holds some responsibility, as it allowed RN A to be rostered with sole responsibility of the children's ward and did not ensure that RN A had adequate or specific paediatric training and/or experience. However, I remain critical of the nursing care RN A provided to Master D. I find RN A in breach of Right 4(1)[32] of the Code. The reasons for this are discussed below.

Inadequate fluid balance monitoring and management

64. Mrs D told HDC that by the time Master D was assessed in ED by Dr C, he 'was not drinking fluids at all'. Prior to Master D's arrival in the ED, he had vomited at home. Mrs D said that

[32] Right 4(1) states: 'Every consumer has the right to have services provided with reasonable care and skill.'

Master D continued to vomit 'stringy mucus' in the children's ward. She stated that she alerted RN A numerous times, but RN A was 'not concerned at all'.

65. A 24-hour fluid balance chart was used to monitor Master D's fluids in the children's ward. RN A documented six entries in the output column recording when Master D vomited or passed urine. The entries did not specify a measurement, but RN A documented descriptors such as 'large amount, small amount, approx. 6ml, vomit phlegm'. Between 2am and 2.30am, there are four entries of Master D vomiting phlegm.

66. In response to the SER, RN A said that when Mrs D informed her that Master D had vomited, she recorded this in the fluid balance chart. RN A stated:

> '[I]t was not overly concerning that he had vomited because medical staff were aware of his previous vomiting and so it was not a new symptom that required further escalation.'

67. The clinical notes indicate that Master D was given an ice block on his admission to the children's ward to help decrease his body temperature and encourage oral fluid intake. However, Master D vomited shortly after having the ice block. There is no record of any other oral fluid intake by Master D or any documentation to suggest that Master D's level of dehydration was reassessed by RN A after he continued vomiting in the children's ward. It appears that RN A did not discuss Master D's fluid balance chart and vomiting with the senior nurse (RN E), Dr B, or Dr C.

68. RN Conway estimated that Master D had vomited numerous times since 8pm the previous evening (Day 1 Month1 2020). RN Conway said that Master D also would have experienced increased fluid loss from his fever and sweating. RN Conway advised that by 3am RN A should have informed the doctor that Master D had continued to vomit and had had minimal oral fluid intake.

69. RN Conway advised that RN A's fluid balance monitoring fell short of the accepted standard in that there was a lack of critical thinking about fluid intake and output in the context of a young child who was vomiting frequently with a high fever. RN Conway considered that this demonstrated a moderate departure from the accepted standard of care.

70. I agree that RN A lacked critical thinking in her management of Master D's fluid balance and failed to recognise the need to escalate Master D's care to the senior nurse, on-call doctor (Dr B), or the senior doctor (Dr A) when Master D continued to experience multiple episodes of vomiting with minimal oral rehydration.

Incomplete PEWS and failure to escalate care

71. RN A took five sets of observations for Master D (out of the eight taken during his admission) but recorded only four sets of incomplete observations onto Master D's chart. The table below summarises the observations obtained and recorded by RN A:

TIME/PLACE	PEWS SCORE	OBSERVATIONS	RN RESPONSIBLE
Day1/Month1/2020 23:30: admission to children's ward	PEWS = 0	Incomplete; CRT[33] & BP[34] missing	RN A
Day2/Month1/2020 00:30: children's ward	PEWS = 0	Incomplete; CRT & BP missing	RN A
01:30: children's ward	PEWS = 0	Incomplete; CRT & BP missing, parental concern not ticked	RN A
02:30: children's ward	PEWS not recorded/ calculated	Incomplete; only temperature is recorded; parental concern not ticked	RN A
Approx. 04:30: children's ward	PEWS = 6 **Calculated retrospectively after Master D's passing	Incomplete; CRT & BP missing, parental concern not ticked Not documented on PEWS chart but in nursing notes	RN A

72. RN Conway advised that a full set of recordings is required to calculate a PEWS score using each of the vital sign fields on the chart. However, at no point was a full PEWS recorded by RN A. There was also no note on the PEWS chart to show that a BP had been attempted. In her response to the SER, RN A advised that she had been unable to obtain a BP reading because Master D was distressed and was moving too much for the machine to record. RN Conway advised that although obtaining a BP is often challenging with children 1–4 years of age, it is expected that an attempt to obtain a BP would be documented on the PEWS chart. RN Conway also noted that RN A did not record any CRT values for Master D, despite it often being possible when a child is distressed. RN Conway advised that the failure to complete a full PEWS (including BP and CRT) as per the PEWS policy[35] was a moderate departure from the accepted standard of care. RN Conway noted that complete and accurate data helps to detect deterioration (even where sepsis is not suspected), and at the very least provides a baseline on which to compare subsequent observations. I accept this advice.

[33] Capillary refill time — the time taken for colour to return to an external capillary bed after pressure is applied to cause blanching. CRT helps to assess the blood flow through peripheral tissues in the body. A normal CRT for a child is 2 seconds or less.
[34] Blood pressure.
[35] Te Tāhū Hauora|Health Quality and Safety Commission developed a national paediatric early warning system (PEWS) to help clinicians identify hospitalised tamariki with the potential to become more unwell, so that clinicians can respond quickly. The PEWS policy outlines that a fully accurate PEWS result can be obtained only by undertaking a complete set of observations, including blood pressure.

73. In my view, RN A also failed to escalate Master D's care at a critical point in his admission. At approximately 4.30am (Day 2 Month1 2020) RN A took the following set of observations: 'RR[36] 40, HR[37] 144, SpO_2[38] 92% on air, T[39] 38.5.' These observations (but not the PEWS score) were recorded on a piece of paper, which RN A intended to record on the PEWS chart after taking a VBG. However, although these results were concerning (with a PEWS of at least 6 had it been calculated), Master D's care was not escalated to more senior staff. RN A told HDC that the observations were recorded in the nursing notes retrospectively after the situation had been escalated and resuscitation efforts were taking place.

74. The SER considered RN A's explanation above and the subsequent events that transpired after the VBG was taken and found that this did not mitigate RN A's failure to act on the significant increase in Master D's respiratory and heart rate at 4.30am. The SER found that RN A lacked appreciation of the importance of accurate observations and the need to act on them. RN Conway advised that the failure to enter recordings directly onto the PEWS chart led to a missed opportunity to call for an urgent medical review. I agree and consider that despite the PEWS score not being calculated at 4.30am, nonetheless the observations should have prompted RN A to escalate Master D's care.

75. While I acknowledge that RN A was not the only nurse who did not complete a full PEWS for Master D, and that there were systemic failings by Health NZ in this regard, in my view RN A's five failures to record a complete PEWS, combined with the lack of documentation of attempts to obtain a blood pressure reading, and RN A's failure to act on and escalate significant changes in Master D's clinical presentation (eg, his increased respiratory and heart rate at 4.30am) to the Dr B or Dr A showed a lack of core critical thinking and constitutes a departure in care for which RN A is responsible. I am critical that RN A did not act on significant changes in Master D's vital signs and condition and missed opportunities to escalate Master D's care for urgent review.

Lack of response to parental concern

76. Mrs D told HDC that at approximately 3am (on Day 2 Month1 2020) she raised concerns with RN A that Master D was 'hot and clammy', and that he was vomiting 'stringy mucus'. RN A administered paracetamol, but Master D vomited it up shortly afterwards. Mrs D said that when she alerted RN A, RN A 'was not worried'.

77. The SER found that RN A should have responded to Master D's parents' concerns with more urgency. The only steps taken by RN A were hourly observations. The clinical notes contain no information to suggest that other actions were taken to identify the cause of Master D's deteriorating condition (such as performing a more detailed examination of Master D when his parents raised concerns or calling Dr B to review Master D). The SER recommended that Health

[36] Respiratory rate (a normal respiratory rate for a child aged 1–3 years is 24–40 breaths per minute).
[37] Heart rate (a normal heart rate for a child aged 2–5 years is 95–40 beats per minute).
[38] Oxygen saturation (for a child, the normal oxygen saturation is between 95 and 100%).
[39] Temperature (normal body temperature for a child is around 37°C).

NZ implement a Kōrero Mai pathway or another suitable pathway for parents to escalate their concerns about a child.

78. RN A told HDC:

> 'Personally, I believe that I responded appropriately to both the parents' concerns and my own, regarding [Master D's] deterioration, During my response, I tried to remain as calm and professional as I could …'

79. RN Conway noted that at no point during the admission were parental concerns documented on Master D's chart. RN Conway advised that while caregiver or whānau concern is a non-scoring area of the PEWS chart, it can trigger escalation and further medical review if the caregiver expresses concern about their child in the absence of abnormal vital signs.

80. RN Conway considers that the failure to record parental concerns was a missed opportunity to explore the signs Master D was exhibiting that were unusual or worrying to his parents and trigger an earlier medical review of Master D. RN Conway advised that RN A's failure to act on or record parental concern about fever and vomiting was a moderate departure from the accepted standard of care.

81. I acknowledge that at the time, Health NZ did not have a formal mechanism by which family members could escalate their concerns. However, I agree that RN A did not respond appropriately to the concerns raised by Master D's parents.

777 emergency call system[40]

82. The SER identified that no calls were made using the 777 emergency call system when Master D became unresponsive. RN A paged RN E and Dr B to attend the children's ward. When Dr B answered RN A's page, he instructed that Dr C be called to assist. RN A promptly paged Dr C.

83. The SER also identified that RN A had had no experience of a 777 call being made. RN A had never instigated a call herself, nor had she witnessed the response to a call.

84. RN A told HDC that while she was working at the public hospital, if she had concerns regarding a patient's condition, she would keep a portable phone on her so that she could quickly notify the doctors and/or the senior nurse. RN A said that in hindsight, a 777 should have been made by 'one of us'.

85. The Paediatric Orientation Booklet provided to RN A outlines that for 'emergencies dial 777'. RN A had completed the orientation tasks listed under 'Resuscitation', which included using the 'emergency number'.

[40] The 777 emergency call system is used to activate a rapid response team. There are different types of emergency calls where certain members of different teams are expected to respond. A group call is sent via the 777 emergency call system to relevant staff. This helps to ensure consistency in who responds to the emergency event.

86. The SER noted that 777 emergency calls are made less often in paediatrics, and, considering this, the SER recommended that it would be advantageous to conduct periodic drills to ensure that all staff are exposed over several drill scenarios.

87. RN Conway advised that the standard for calling a clinical emergency was either to press the green clinical emergency button or ring 777. The failure to follow policy for activating a clinical emergency caused a delay in the time it took for the emergency response to occur. RN Conway advised that RN A's failure to call a clinical emergency using the 777 system was a severe departure from the accepted standard of care.

88. I acknowledge RN A's comments that she had had no previous experience using the 777 emergency call system at the public hospital. However, I remain critical of RN A's failure, as the sole nurse in charge, to utilise the appropriate emergency systems on Day 2 Month1 2020. I note that the paediatric orientation booklet completed by RN A clearly outlined that in the case of an 'emergency, dial 777'.

Conclusion

89. Guided by RN Conway and the findings of the SER, I consider that there were critical missed opportunities for earlier action and escalation of Master D's care. Specifically, there was inadequate fluid balance monitoring, incomplete PEWS, a delay in escalation of care, a lack of response to parental concerns, and a failure to utilise the 777 emergency call system. Although I cannot make a finding on whether a different course of action would have changed the outcome for Master D, I remain critical of the care RN A provided to Master D. Accordingly, I find RN A in breach of Right 4(1) of the Code.

Opinion: Dr B — breach

Introduction

90. Dr B was the locum junior medical officer on call during Master D's admission to the children's ward. Dr B reviewed Master D at approximately 3.30am and was involved in Master D's attempted resuscitation over the following 90 minutes. Dr B was responsible for ensuring that he provided care that complied with relevant clinical guidelines and standards.

91. I have undertaken a thorough assessment of the information gathered in light of Mrs D's complaint, and I consider that there were shortcomings in the care Dr B provided to Master D. These shortcomings are highlighted in the SER and in the conclusions reached by my independent advisor, Dr Clarke. I recognise that extenuating factors are likely to have had some bearing on the actions Dr B took in response to Master D's deteriorating condition. Most notably, Dr B had not received sufficient orientation to Health NZ 's systems, policies, and guidelines relevant to the paediatric inpatient unit, and, by his own admission, he had no specific, dedicated paediatrics experience. While I have some sympathy for the extremely challenging scenario with which Dr B was confronted, I remain critical that aspects of Dr B's care

of Master D did not comply with relevant standards. Therefore, I find Dr B in breach of Right 4(1)[41] of the Code. My reasoning for this decision is outlined below.

Delay in administration of IV antibiotics

92. Following Dr B's assessment of Master D (after the onset of a rash), Dr B's documented plan was to await the gram stain results before starting antibiotics. Dr B's plan considered the possibility of sepsis.

93. Dr B told HDC that he perceived that he had some time to administer antibiotics once subsequent tests and investigations had been completed. He said that he was awaiting the gram stain results before undertaking a follow-up examination prior to contacting the on-call consultant for advice, as would be his usual practice. Dr B considers that given the time frames involved, he does not believe that antibiotics would have been commenced prior to Master D's subsequent rapid decline.

94. The SER found that Dr B's decision to delay administration of IV antibiotics until the gram stain results were received was contrary to the Starship Fever Investigation and Management guideline, which he accessed and reviewed when assessing Master D. The guideline gave specific guidance for any child who has 'any of the following: reduced conscious level, poor perfusion, a petechial rash, signs of cerebral irritation, or just looks very sick'. Master D had a CRT of less than 3 seconds (ie, poor perfusion) and a petechial rash. Given that Master D had met the criteria, the guideline dictates that IV antibiotics (cefotaxime[42] 50mg per kg 6 hourly) are to be administered 'pending culture results' (ie, before the results of tests, such as gram stains, are received).

95. However, the first dose of empirical antibiotics (1g of ceftriaxone) was administered to Master D at 5.25am, as initially Dr B had decided to await the results of the gram stain before commencing antibiotics. At 5.56am the results of the first gram stain were phoned to clinical staff.

96. Dr Clarke advised that IV antibiotics should have been started earlier. She noted that Dr B had woken Master D during examination of the rash, and the decision not to administer a broad-spectrum antibiotic at this point was a moderate departure from accepted standards. Dr Clarke advised that this opinion is supported by the teaching on sepsis on the Advanced Paediatric Life Support course, where early administration of broad-spectrum antibiotics is considered standard care in the management of sepsis, as it was at the time of this event.

97. Dr Clarke advised that it cannot be known whether earlier administration of antibiotics would have changed Master D's devastating outcome.

[41] Right 4(1) states: 'Every consumer has the right to have services provided with reasonable care and skill.'
[42] An antibiotic used to treat several types of bacterial infection.

98. The Starship guideline is clear that IV antibiotics should be administered while awaiting gram stain results. I am critical of Dr B's decision to delay the administration of IV antibiotics rather than follow the relevant guideline.

Failure to administer IV fluid bolus after Master D's deterioration

99. Following Dr B's review at 3.30am he charted IV fluids to be administered to Master D at 70% maintenance once a VBG sample had been obtained. Dr Clarke advised that this was an appropriate rate for a child of Master D's weight, and that the inclusion of potassium chloride was appropriate to replace the slightly low potassium levels identified in Master D's blood test. The IV fluids were eventually administered during resuscitation efforts.

100. At approximately 4.30am Dr B was called back to the children's ward urgently, as Master D had become unresponsive. Dr B noted that at this stage, the IV fluids were being prepared by RN A but had yet to be administered. RN A advised that she commenced the 'IV fluids maintenance' shortly after Dr B commenced chest compressions on Master D.

101. Dr Clarke advised that it is considered standard care to give a rapid bolus of IV fluid to a child in septic shock, which is consistent with Master D's presentation when Dr B reattended. However, Dr Clarke noted that it appears that the IV fluids were commenced at the rate Dr B had charted earlier in the evening following his initial review of Master D, rather than as a bolus. Dr Clarke advised that failing to give a bolus of IV fluid to a child in septic shock resulting in cardiac arrest would be considered a severe departure from the accepted standard of care. There is no documentation to suggest that a fluid bolus was given when Dr B reattended after Master D's deterioration, nor at any point during the resuscitation period. RN A's documentation confirms that the fluids given were at the maintenance rate, rather than a bolus. I am critical that Dr B did not reassess Master D's fluid requirement when he reattended and resuscitation efforts commenced.

Conclusion

102. I am critical of Dr B's management of Master D's care and consider that there were missed opportunities for earlier intervention and escalation of Master D's care. I am also critical of Dr B's decision to delay the administration of IV antibiotics, which contravened the Starship guidelines he had reviewed, and of Dr B's failure to administer a bolus of fluid during resuscitation efforts. Accordingly, I find Dr B in breach of Right 4(1) of the Code.

Opinion: Dr C — educational comment

Introduction

103. Dr C was the senior doctor who assessed Master D in the ED on Day 1 Month1 2020. Dr C admitted Master D to the children's ward overnight for further observation and monitoring. Following Master D's admission, Dr C had no further involvement in Master D's care until called urgently to assist with the resuscitation of Master D.

104. I have undertaken a thorough assessment of the information gathered in light of Mrs D's complaint, and I have identified that overall Dr C's actions were appropriate. However, there was an aspect of Dr C's care that warrants an educational comment.

Documentation of assessment of fluid hydration status and fluid management

105. Dr Clarke advised that when a child has sepsis, the capillary return and perfusion can appear normal while the hydration can still be inadequate as the septic state can cause vasodilation of the blood vessels in the skin, thus assessment requires other signs to be considered.

106. Dr Clarke advised that if Dr C did further assess hydration and found Master D to be well hydrated, but did not document this, then the decision to admit nil by mouth and later to push oral fluids would be considered standard of care, and the failure to document would be considered a mild departure.

107. Dr Clarke noted that Dr C documented a normal capillary return and that Master D was warm and well perfused. However, Dr Clarke also noted that Dr C did not document other signs of hydration, including skin turgor, moistness of the mucus membranes, recent urine output, or BP.

108. Dr C told HDC that he examined Master D's hydration status and fluid needs systematically, both in ED and in the ward, before he left the hospital. Dr C advised that his clinical notes of his assessment in ED reference his assessment of Master D's skin, which includes skin turgor, and his ear, nose and throat (ENT) examination, which included assessing the mucous membranes. Dr C advised that both were unremarkable. This confirmed that there were no clinically significant fluid shifts present. Dr C noted that urine output was measured in ED. He advised that ED staff were unable to obtain a BP reading for Master D, as at that time the ED was being decommissioned and did not have an appropriate BP cuff for Master D.

109. Dr C advised that he obtained IV access with the intention to prescribe maintenance IV fluids, as is standard practice. However, after discussion with a senior colleague and considering Master D's state in ED at the time, it was agreed that Master D's fluid needs could addressed with clear oral fluids and ongoing monitoring, on admission to the children's ward.

110. Dr C advised that he examined Master D again on the ward prior to leaving the hospital. Dr C said that he was reassured by RN A that the PEWS score was zero. He assumed that the PEWS score had included formal BP recordings, but he did not check specifically. Dr C stated that Master D was tolerating oral fluids and did not appear to show any clinical signs of fluid deficit. As such, Dr C did not consider that a bolus of IV fluid was warranted at that stage.

111. Dr C stated that he did not formally document his assessment of Master D's fluid status on the children's ward before he left the hospital. However, he said that his documentation of his assessment of Master D's fluid hydration status was adequate and contained all elements of a thorough assessment of Master D, including the systems that give rise to the clinical signs of dehydration. Dr C accepted that his documentation of Master D's fluid status could have been more thorough and said that he will endeavour to do better in the future.

Conclusion

While it appears that Dr C examined and assessed Master D's fluid status and needs thoroughly and was reassured by the status update provided by RN A at the time, I consider that Dr C's lack of formal documentation in relation to his brief assessment of Master D on the children's ward highlights the importance of maintaining clear and accurate patient records. It is appropriate that Dr C has reflected on his documentation and has taken steps to improve this.

Decision to withhold antibiotics and further testing — other comment

112. Mrs D raised concerns about whether antibiotics and further investigations were indicated when Master D was assessed by Dr C in the ED.

113. When Dr C examined Master D in the ED, his plan was to admit Master D to the children's ward for further observation without the administration of antibiotics. Prior to Master D's transfer and admission to the children's ward, Dr C reviewed the blood test results obtained in the ED. The blood results showed a high WBC and neutrophil count, a C-reactive protein (CRP)[43] of less than 3, and low potassium levels. Dr C told HDC that he discussed the blood test results with another senior doctor. While the blood results were consistent with an infection, in isolation, they did not indicate the need for empiric antibiotic treatment.

114. Dr Clarke advised that Dr C's decision to admit Master D for observation without the administration of antibiotics was appropriate and constituted standard care. Dr Clarke noted that the Starship 'Fever and Investigation and Management' guideline in place at the time stated that 'FBC and CRP are not useful in determining the risk of bacterial sepsis in a child presenting acutely with fever'. In light of this, Dr Clarke acknowledged that it would be difficult to quantify the importance of an abnormal WBC in isolation.

Lack of imaging considered in ED — other comment

115. Mrs D said that Dr C advised that neither an X-ray nor a computed tomography (CT) scan would be undertaken when Master D was assessed in the ED. The SER outlined that an ultrasound scan (US) or CT scan are not part of the routine work-up for a child with suspected appendicitis, and that this is consistent with Starship Hospital guidelines on the investigation and management of acute abdominal pain. Given that when Master D was in the ED he had no coughing or focal chest signs, a normal respiration rate, and no requirement for supplementary oxygen, a chest X-ray was not requested for Master D.[44] Accordingly, I am not critical of this.

Responses to provisional opinion

116. Health NZ, Dr B, RN A, and Dr C were given the opportunity to provide a response to the provisional decision.

[43] C-reactive protein is produced by the liver and rises when inflammation is present in the body. For children, a CRP <10mg/L is normal.

[44] The SER outlined that the decision not to obtain an X-ray or CT scan was consistent with Starship Hospital's guidelines on the investigation and management of acute abdominal pain.

117. Health NZ accepted the proposed breach findings and said that it will work towards the proposed recommendations. Health NZ stated that work is already underway to address these.

118. Dr B provided no further comment in response to the provisional opinion. In his apology letter to Master D's family, he accepted that the severity of the situation should have led to the immediate involvement of senior medical staff. Dr B stated that his lack of any Advanced Paediatric Life Support training at the time may also have lessened his degree of urgency during the response.

119. Dr C provided a response to the proposed findings. He stated that Master D's fluid hydration status was assessed and considered thoroughly in ED, and this was reflected in the relevant clinical documentation. Dr C accepted that there was a lack of formal documentation of Master D's fluid status when he assessed Master D on the children's ward prior to leaving the hospital.

120. RN A accepted the proposed criticisms around the care provided, and the recommendations proposed. However, RN A disputed the proposed breach finding. RN A stated that given the serious systems failings, the proposed breach finding as it related to her should be reduced to an adverse comment.

121. Mr and Mrs D were given the opportunity to review the full provisional decision. Mr and Mrs D told HDC that they have had to relive the trauma, from which they will never recover, and that no words can mend the deep wounds they carry. They remain concerned about RN A's continued practice, and her apparent lack of reflective practice and ability to take responsibility for her actions. While they find it encouraging that Health NZ has taken steps to improve care, they remain concerned about how these actions will be monitored to ensure that they are sustained. Mr and Mrs D find it concerning that this decision has some similarities to a previous HDC investigation decision regarding care provided by Health NZ. Mr and Mrs D wish to ensure that the changes implemented reduce the chances of others going through the same pain.

Changes made since events

Health NZ

122. Health NZ advised that the following actions have been taken:

- Revised staff models across acute zone and paediatrics (including no longer rostering sole registered nurses to work night duties).
- Implementation of a Kōrero Mai escalation of care pathway across all district inpatient acute care facilities inpatient acute care facilities at the Health NZ district where the public hospital is located.
- Implementation of a new model of senior medical staffing. There is now a combined medical handover attended by medical, rural hospital medical doctors, and/or ED senior medical staff each morning along with all oncoming junior medical officers. At these meetings, all paediatric patients will be discussed with the responsible senior doctor should a review be required.

- The junior medical officer orientation process now includes specific advice to refer to the local hospital Health Pathways. Junior medical officers are advised to utilise relevant Health NZ district Health Pathways if no localised version is available. Junior medical officers are to collaborate and discuss patients with senior nursing staff and duty nurse managers.
- Increased frequency of Advanced Cardiac Life Support (ACLS) training and education packages provided on site, to ensure that all relevant staff have the opportunity to maintain training and attend courses. All junior medical officers are required to maintain CPR currency. Locum junior medical officers are required to be current for CPR to be considered appropriate for employment.
- The hospital Health Pathways site has been made accessible across all local hospital logins. Guidelines (including child health guidelines) that have not been localised default to the neighbouring Health NZ district's health guidelines.
- The Paediatric Sepsis Screening and Action Tool is held on local Health NZ servers and is accessible from all local hospital logins.
- The electronic Patient system has been implemented for all hospital inpatients, including paediatric patients.
- Implementation of regular auditing of early warning scoring systems to ensure compliance with the prescribed actions.
- Shifting to a rural generalist model of nursing. This includes:
    - All nurses working in the Acute Care Zone provide nursing care for inpatient paediatric patients. These nurses work across ED, the Adult Assessment Unit, and the children's ward. Nurses working in this environment rotate between these areas of work, with all staff required to work day shifts regularly.
    - The employment process now specifically reviews the volume of paediatric experience a nurse has, with specific on-boarding upskilling and training provided (including attaining and maintaining appropriate CPR training).
    - Extra training and clinical support services are provided for nursing staff. This includes a paediatric clinical nurse educator from Health NZ, who provides regular week-long block training sessions to nursing staff.
    - 24/7 direct access to the Health NZ nursing clinical coordinator for nursing staff to discuss any cases or concerns with a specialist paediatrics nurse.
- Frequent clinical emergency drills are facilitated by the resuscitation coordinator. Several scenarios are incorporated into these sessions, including sepsis.
- Review of the process for blood culture notifications. When a blood culture has a positive result, this information is automatically pushed to the electronic clinical record for immediate viewing. Health NZ advised that the laboratory does not have sufficient capacity for a 24/7 on-site presence to be maintained.

Dr B

123. Dr B told HDC that on reflection, he could have forcibly rushed the response and interventions for sepsis, as at the time he considered this as a differential diagnosis. Dr B said that the biggest change he would have implemented is an urgent early call to the senior doctor in the event of any paediatric concern.

124. Dr B said that overall, it was an extremely stressful situation for a junior doctor with minimal paediatric experience working independently overnight in a rural hospital. As a locum doctor, he had limited inherent knowledge of the operating system at the public hospital.

125. Dr B is committed to learning from this experience and ensuring that such an error never occurs again. He now places greater emphasis on accelerating important interventions to be instituted, and early escalation in similar future situations.

126. Dr B no longer works as a junior medical officer.

Dr C

127. Dr C is an advocate of the Sepsis Pathway as it exists today and uses it whenever confronted by a febrile unwell child. He openly discusses Master D's case with the junior medical officers he supervises, and the use of the Sepsis Pathway is central to these discussions.

128. Dr C advised that his documentation has since evolved, and he now ensures that his documentation is thorough and comprehensive.

RN A

129. RN A no longer works in a position where she is the sole nurse.

Recommendations

Health NZ

130. Taking into consideration the changes made since the events, I recommend that Health NZ:

a) Undertake an audit of the use of the Paediatric Sepsis Screening and Action Tool, to identify whether all paediatric patients admitted to the children's ward from ED and those cared for as inpatients who meet the criteria to commence this tool are being managed appropriately on this pathway. A summary of the audit findings with any corrective actions should be provided to HDC within six months of the date this report.

b) Undertake an audit of its compliance with the PEWS policy and identify areas of improvement. A summary of the audit findings with corrective actions implemented should non-compliance be identified is to be provided to HDC within six months of the date of this report.

c) Provide re-education about accurate fluid balance recording, including calculation of output in ml/kg/hour for children, and provide evidence of the education/training in the

form of education/training material and staff attendance records, within three months of the date of this report.

d) Confirm the implementation of the Kōrero Mai escalation of care pathway across all inpatient acute care facilities at the Health NZ district where the public hospital is located, and conduct a review of the effectiveness of this policy/process, and report back to HDC within three months of the date of this report. Evidence of implementation is to be confirmed by providing a copy of the new policy, including education delivered to staff.

e) Share an anonymised version of this report with staff as a learning opportunity.

RN A

131. Taking into consideration the changes made since the events, I recommend that RN A reflect on the deficiencies in care identified in this case, particularly around escalation of care in deteriorating patients, relevant sepsis guidelines for paediatric patients, initiation of a clinical emergency, and the use of early warning score charts, and provide a written report on her reflections and the changes made to practice as a result of this case, within three months of the date of this report.

Dr B

132. I recommend that Dr B reflect on the deficiencies in care identified in this case, particularly around paediatric guidelines for sepsis and monitoring of fluid balance in paediatric patients, management of paediatric patients presenting with acute symptoms of vomiting and fever, and escalation of care to the senior Doctor, and provide a written report on his reflections and the changes to his practice instigated as a result of this case, within three months of the date of this report.

Dr C

133. I recommend that Dr C reflect on the deficiencies in care identified in this case, particularly around the management of a child presenting with vomiting and fever, and provide a written report on his reflections and any changes made to his practice as a result of this case, within three months of the date of this report.

Follow-up actions

134. A copy of this report with details identifying the parties removed, except Health NZ and the advisors on this case, will be sent to the Medical Council of New Zealand, and it will be advised of Dr B's and Dr C's name.

135. A copy of this report with details identifying the parties removed, except Health NZ and the advisors on this case, will be sent to the Nursing Council of New Zealand, and it will be advised of RN A's name.

136. I will be writing to Health NZ National Office to highlight the features of this case and notably the resourcing issues that Health NZ was experiencing when Master D presented to the hospital's ED Day 1 Month1 2020. Since the events, Health NZ has made changes to prevent a

similar situation occurring in the future, but I will be encouraging Health NZ to review all remote hospital settings regularly and ensure that sole charge clinical staff are suitably equipped to perform their roles, and that there are protocols for managing scenarios where staff experience is limited.

137. A copy of this report with details identifying the parties removed, except Health NZ and the advisors on this case, will be placed on the Health and Disability Commissioner website, www.hdc.org.nz, for educational purposes.

Appendix A: Independent clinical advice to Commissioner

The following independent advice was obtained from Dr Sarah Clarke:

> 'My name is Dr Sarah Leanne Clarke and I have been asked to provide an opinion to the Commissioner on case number 20HDC01585. I have read, and agree to follow, the HDC's guidelines for independent advisors and I am not aware of any conflicts of interest. I am a registered medical practitioner with vocational registration in the scopes of Urgent Care and Rural Hospital Medicine. I have worked in Rural Hospital Medicine for approximately 13 years including seven years of experience in rural hospital clinical leadership.
>
> I have been instructed by the Commissioner to provide my advice as to whether the care provided by [Health NZ] to [Master D] between Day 1 and Day 2 Month1 2020 was reasonable in the circumstance, and why.
>
> In particular, I have been asked to comment on:
>
> 1. The adequacy of the care provided to [Master D] by [Health NZ] as an organisation.
> 2. The adequacy of the care provided by [Master D] by the relevant staff at [Health NZ] on Day1–Day 2 Month1 2020 in particular: a. Whether [Dr B] provided [Master D] with care of an accepted standard.
> 3. The adequacy of the relevant policies, procedures, and staff training at [Health NZ] at the time of these events.
> 4. Any other matters in this case that you consider warrant comment.
>
> My opinions are based on the documents that have been provided to me by the Commissioner including:
>
> 1. Letter of complaint dated 2020
> 2. [Health NZ] response dated 2020
> 3. [Health NZ] response dated 2021
> 4. [Health NZ] response dated 2022
> 5. ED notes from [Health NZ]
> 6. Clinical records from [Health NZ] covering the period Day 1–Day 2 Month1 2020
> 7. Phone logs from [Health NZ]
> 8. Audit access for CBC, Biochem and gas
> 9. Paediatric Orientation Booklet from [Health NZ]
> 10. Cardiopulmonary Resuscitation CPR Policy from [Health NZ]
> 11. Ad hoc orientation from [Health NZ]

12. LIS report with narrative provided 2023.

For each question I have been asked to advise:

a. What is the standard of care/accepted practice?

b. If there has been a departure from the standard of care or accepted practice, how significant a departure (mild, moderate, or severe) do you consider this to be?

c. How would it be viewed by your peers?

d. Recommendations for improvement that may help to prevent a similar occurrence in future.

Before I begin my advice, I wish to acknowledge the tragic loss of [Master D] and the massive impact this will have had on all involved, especially his whānau, and also on the health professionals involved in his care.

Background:
On Day 1 Month1 2020, at approximately 9:41pm, [Master D] was taken to [the public hospital's] emergency department (ED) after his parents were concerned that he had been vomiting and developed a fever. [Master D] was subsequently admitted to the children's ward at approximately 11:30pm for observation overnight.

From 12:30am–2am, [Master D's] condition deteriorated as he continued to vomit and become increasingly grizzly. At approximately 3am, [Master D's] mother reported to the attending nurse that [Master D] was hot, clammy, and had started vomiting mucus. [Master D's] parents also raised concerns that he had noted weakness in his limbs when going to the toilet.

At around 3:30am, [Master D's] mother reported to [RN E] that he was still vomiting up mucus and was very hot. When [RN E] turned on the room lights to examine [Master D], she discovered that a rash was covering [Master D's] face and body. [RN E] immediately paged the attending nurse and the on-call doctor [Dr B] to attend.

At approximately 4:55am, [Master D] becomes unresponsive. From 5am onwards, chest compressions and resuscitation efforts commenced. [Subsequently,] CPR is stopped, and [Master D] sadly passes away. Master D's cause of death was listed as cardiac arrest secondary to Streptococcus pneumoniae septicaemia.

The adequacy of the care provided to [Master D] by [Health NZ] as an organisation:
Almost invariably, when a critical incident occurs within a hospital setting there are system level issues that have contributed to the event itself. For this event I particularly note the following:

Staffing:

While it is fairly common in rural and provincial centres for a junior doctor to be onsite without senior medical support their level of inexperience is often mitigated through the maintenance of senior nursing staff with relevant experience on each shift. If the nursing staff in a department lack the experience and seniority to be able to support, and sometimes override, the junior doctor then the combination of staffing becomes unsafe. It is expected that the most experienced person on the team will lead an emergency response, and often this will be the senior nurse with relevant experience and training. This makes it difficult to pinpoint exact levels of training and experience necessary for the individuals in a team, as it is the sum of the individuals that keeps things safe. Suffice to say, it seems that the combination of staff onsite responsible for the paediatric ward at the time of this event lacked sufficient paediatric specific training and experience to provide the expected standard of care for a rural paediatric inpatient service. This would be considered a moderate deviation of accepted standard of care for the organisation.

The response to the SEA suggests that the rostering at the time of this event allowed for a sole nurse working in the paediatric unit, and that the nurse on this shift was professionally isolated by working solely night shifts (so always worked alone). It is a known risk to work in such professional isolation and would not be considered accepted safe rostering by the organisation. Given workforce constraints, this is not altogether an unusual practice in rural hospitals and thus would be considered a mild deviation from the standard of care.

Training:

As above, while it may be necessary, and reasonable, to employ junior doctors (doctors in training) to rural hospitals who then cover a generalist workload including paediatrics, it is imperative that the onsite team on any given day has the appropriate expertise to manage a paediatric emergency. Currency of CPR training, including advanced cardiac life support training, is not sufficient as the first offers only basic life support, and the latter teaches adult advanced care. While it would be ideal for all medical staff going to work in this environment to undertake paediatric specific emergency training such as Advanced Paediatric Life Support (APLS), it would be beyond the capacity of the system to deliver this for all junior medical staff who might be in this position for a relatively short rotation. This training is expensive and time consuming, and medically is reserved for those junior doctors who will pursue a paediatric, emergency/critical care or rural generalist career, or for senior doctors who look after critically unwell children. Despite this, there remains a long waiting list to attend this training.

More important then becomes the training of the nursing team. Nurses are more likely to remain in their role and location for a long time as compared to junior doctors who are generally on rotation for training purposes. It would be accepted standard that a nurse in charge of a paediatric inpatient unit would have undertaken paediatric specific emergency training. I note that the Paediatric Orientation Book has APLS as a checklist item for training. APLS is a 3-day intensive course focussed specifically on the recognition and management of paediatric emergencies. It would be unusual for a rural hospital to expect all acute/ paediatric nursing staff to successfully complete this course. It would be more usual to

expect that they successfully complete a one- or two-day paediatric emergency specific course (with time appropriate refreshers) such as Paediatric Life Support (PLS) or Paediatric Advanced Life Support (PALS).

If all of the nursing staff employed to the … ward had successfully completed the APLS course, then the organisation exceeded expected standard of care. If the nursing staff responsible for the … ward had successfully completed PLS or PALS (or equivalent paediatric specific emergency training) then the organisation would have provided standard care but would have breached their checklist in their Paediatric Orientation Book. If the nursing staff responsible for the paediatric unit had not undertaken any such paediatric specific emergency training, and neither had the medical staff onsite, then this would be considered a moderate departure from the standard of care.

Paediatric Sepsis screening and action tool:
I note that the Paediatric Sepsis screening and action tool is held on local [Health NZ] servers and is accessible to all [local] hospital logins. It is unclear if this was the case on the date of the event. Regardless, availability of a pathway doesn't imply familiarity with it. If staff were orientated to this tool, and it was clearly expected that the tool be used for eligible presentations, then the organisation met the standard of care. If the tool was online but staff not sufficiently orientated to the tool as to use it, then this is a mild deviation of accepted care by the organisation. If no paediatric sepsis tool was available locally, given that it has been standard of care to use cognitive tools to recognise and manage SIRS and sepsis for a number of years in Aotearoa now, then this would constitute a severe departure from the standard of care.

Mechanisms for calling for help:
I note that [RN A] made 3 attempts to contact the Emergency Department to summon help at 4.38am, 4.56am and 4.57am, and was answered on the third attempt. It is unclear whether there were other mechanisms available to summon immediate help. If there was an emergency alarm system available in the room to seek immediate assistance, then the organisation has met accepted care. If paging was the only option for seeking this assistance, then this would be considered a severe departure from the standard of care, especially for a ward where the nurse is sole charge.

The adequacy of the care provided to [Master D] by the relevant staff at [Health NZ] on Day1–Day 2 Month1 2020 in particular:

- **Whether [Dr B] provided [Master D] with care of an accepted standard.**

Care provided in the Emergency Department including assessment and admission by [Dr C]:
[Master D] presented to the Emergency Department of [the public hospital] at approximately 9.42pm on [Day 1 Month1] 2020 with a fever of 40.2°C, raised heart rate of 168 beats per minute (BPM), a normal respiratory rate (for age) of 28, a normal oxygen saturation level of 97%, and a normal blood sugar level of 6.3mmol, with good perfusion.

He was appropriately assessed by the triage nurse (name not legible) as having a triage score of 2 according to the Australasian Triage Scale (ATS) indicating a potential threat to life and warranting assessment and treatment within 10 minutes. These observations constitute a Paediatric Early Warning Score (PEWS) of 3 and meet the criteria for Systemic Inflammatory Response Syndrome (SIRS) which warrants commencement of a paediatric sepsis action pathway. This would be consistent with the Sepsis.org.nz Paediatric Sepsis screening and action tool and would constitute standard of care at that time.

[Master D's] care was handed over to the ED nurse at 9.50pm and he was seen promptly by [Dr C]. At 9.50pm, the ED nurse documented that they had inserted an intravenous line and that blood tests had been done, suggesting that [Dr C] had attended within the triage time.

[Dr C] recorded attending [Master D] at 9.41pm and noted [Master D's] recent medical history, including symptoms of a viral upper respiratory infection for a week before presentation, and that earlier on the day of presentation [Master D] had been well, played soccer, and had gone to his grandparents' house for a sleepover, before developing a high fever and vomiting that led to presentation to hospital. [Dr C] noted that [Master D] was alert but grizzly, with a fever of 40.2°C, a heart rate of 160 BPM (high) that settled to 140 BPM (high), normal oxygen saturation and a clear chest. The blood pressure is not reported, and these vital signs remained consistent with SIRS. [Dr C] noted that [Master D] was tender in his right iliac fossa (lower part of the abdomen, and the area that typically overlies the appendix) on deep palpation and on percussion (a test that assesses for peritonism, a sign associated with inflammation of the peritoneum or lining of the abdominal cavity that is consistent with, and not limited to, appendicitis). He noted that [Master D] had a normal conscious level, Brudinski [sic] negative and there was no meningism (a sign associated with irritation of the lining of the brain and spinal cord consistent with, and not limited to, meningitis). He recorded no abnormality of the skin, a normal throat exam, and redness of both ear drums which he attributed to the high fever. [Dr C] surmised that [Master D] had probable mesenteric adenitis, which is inflammation of the lymph nodes in the mesentery (supporting tissues of the bowel) that often follows a viral infection, and he noted that the differential diagnosis included possible early appendicitis. [Dr C] was unable to identify the appendix on point of care ultrasound scan, which is expected as the appendix can be hard to locate by even the most experienced operator. He asked for a urinalysis, blood test (including blood cultures where the blood is incubated to identify any bacteria in the blood) and for paracetamol and ibuprofen in order to reduce the fever. He requested admission under "RHM" (Rural Hospital Medicine) and suggested that a surgical review be considered in the morning if [Master D's] pain were to localise into the right iliac fossa. He also requested that [Master D] be kept nil by mouth which is generally done when there is a possibility of requiring a general anaesthetic for surgery, though later changed this decision after discussion with the surgeon.

Point of care urinalysis tested at 11.05pm screened negative for a urine infection. That [Master D] was able to produce a urine sample is one indication that he, at least, had not been significantly dehydrated for a long time prior to this.

Blood results (viewed by [Dr C] at 11.16pm) showed a white blood cell count of 23 (high, a non-specific marker of infection and/or inflammation) with a neutrophilia of 19.6 (more suggestive of, though not specific for, a bacterial infection), a C-reactive protein (CRP) of less than 3 (normal, a non-specific marker of infection and/or inflammation) and a potassium of 3.1 (moderately low).

On arrival to the ward at 11.30pm [RN A] recorded that [Master D] was responsive when asked, chatty and interactive, "but is still sick". [Master D] was reported to have finished a 60ml ice block, at 11.30pm which indicates that he had a reasonable level of consciousness and functioning at that time.

It is recorded that [Dr C] returned to update the family after having spoken with the surgeons, and that the differential diagnosis included mesenteric adenitis and appendicitis as above. A surgical review was planned for the following morning, with a plan to encourage fluid intake (noting the change in plan from the admission advice to remain nil by mouth), and that there was no need for a bolus of intravenous fluid. At this time [Master D's] vital signs were near normal, with a calculated Paediatric Early Warning Score (PEWS) of zero, which would be considered reassuring.

Omission of a Paediatric Sepsis action pathway:
As described above, when [Master D] arrived in the Emergency Department his vital signs were consistent with SIRS and would warrant commencement of a Paediatric Sepsis action pathway. This pathway could have been commenced by either RN … or by [Dr C] and may have acted as a prompt to the consideration of sepsis as part of the presenting illness. Use of cognitive aids such as this is becoming more commonplace but is still not consistently used across rural hospitals in Aotearoa, thus a group of my peers would consider failure to implement a pathway as a mild departure from the accepted standard of care.

Documentation of fluid/hydration status and subsequent fluid management:
[Dr C] recorded [Master D's] vital signs and noted a normal capillary return, and that [Master D] was "warm, well perfused". He did not document other signs of hydration including skin turgor, moistness of the mucus membranes, recent urine output, or the blood pressure. When a child has sepsis the capillary return and perfusion can appear normal while the hydration can still be inadequate as the septic state can cause vasodilation of the blood vessels in the skin, thus assessment requires other signs to be considered. If [Dr C] did further assess hydration and found [Master D] to be well hydrated, but did not document this, then the decision to admit nil by mouth and later to push oral fluids would be considered standard of care and the failure to document would be considered a mild departure. If [Dr C] did not further assess [Master D's] hydration status then this would be

considered a moderate deviation from the standard of care for a child presenting with fever and vomiting.

Decision to withhold antibiotics in favour of a period of observation on the ward:
It is common for children to present to emergency departments with symptoms suffered by [Master D] and it is usual practice to observe children for improvement or deterioration, particularly where the vital signs are reassuring and where a viral illness is suspected. The initial decision to admit [Master D] for observation without antibiotics would be considered standard of care and would have been one of the options on the Sepsis.org.nz Paediatric Sepsis screening and action tool.

Once the Full Blood Count result had been received, reconsideration of antibiotic therapy was warranted. [Dr C] had also measured the CRP which was normal. It is important to note that CRP only begins to rise 4–8 hours after tissue is damaged, and [Master D's] clinical deterioration prior to arrival had been rapid (he was playing soccer during the day) so it may have been too soon for the CRP to rise and it should not have been considered reassuring (BPAC.org.nz). With the information to hand, including the clinical picture and the Full Blood Count result, most rural Senior Medical Officers (SMOs) would have either sought additional tests to help determine the need for antibiotics (such as procalcitonin and/or lactate), or would have commenced antibiotic therapy while continuing observation. The decision to continue observation without further testing or commencing antibiotic therapy at this point would be considered a moderate deviation from standard of care.

Care provided by [RN A]:
[RN A] has documented a thorough assessment after [Master D's] admission and has recorded frequent observations up until 3.20am.

From 12.30am to 2.30am [Master D] is recorded to have vomited six times, once a "large amount" and the rest "small amount". At 2.45am he is recorded to have been up to the toilet to pass both urine and a bowel motion, indicating a degree of alertness at this time. From 1230am until the final vital signs recording on the chart at 3.20am [Master D's] conscious level is recorded as "asleep". It is difficult to know whether he was sleeping, or rather had a reduced level of consciousness that was not noticed because he wasn't woken.

At 3.20am it is recorded that [Master D's] mother reported that [Master D] was hot, and he was found to have a fever of 38.5°C with a heart rate of 144 (high) and normal oxygen saturation. A rash was noted on [Master D's] trunk and face.

Subsequent nursing notes were recorded retrospectively at 6.00am. [RN A] reported that [Master D] had been up to the toilet to pass urine and a bowel motion at around 2.45am and that [Master D] was interactive at that time. [RN A] went on a break at 3.00am and upon return from break was handed over that [Master D] had a rash all over his body that was of a "mottled appearance" and "non-blanching", noting a fever at 38.5°C and a

capillary refill time of less than 3 seconds (normal, non-specific, and implying reasonable blood flow to the skin). [RN A] asked for the doctor to review which occurred as described below. [RN A] gave ibuprofen, and noted that IV fluids were to be commenced after a venous blood gas test had been obtained. [Master D] was noted to be "still grizzly" at 3.50am. Vital signs at 4.10am were recorded as a fever at 38.5°C, heart rate of 172 (very high), respiratory rate of 40 (high) and oxygen saturations of 92% (low). Blood pressure measurement was attempted twice but unsuccessfully and a note was made as "still moving" which may refer to the reason presumed to be causing the blood pressure machine not to read, suggestive that an automatic machine was being used. At this time the PEWS score (had it been calculated) would have been at least 6, requiring notification of the nurse in charge (who was present at 4.15am to perform the blood gas) and review by the doctor within 15 minutes, as well as discussion with the senior clinician covering paediatrics. A venous blood gas test was obtained at 4.15am and sent by [RN E]. At around 4.30am [RN A] reports that [Master D] was unresponsive to his mother's call, breathing fast, cyanotic (blue colouring, indicative of poor oxygenation and/or circulation), with nasal flaring and grunting (both signs of respiratory distress). The oxygen saturation monitor was attached but not reading which can be a sign of poor circulation. [RN A] requested help from [RN E] who attended immediately, and paged [Dr B] who attended after 5.01am (having responded to his pager at this time). [RN F] attended from the Emergency Department to assist at 5.06am. It is recorded that bag valve mask ventilation was commenced and that Master D was mottled, cool peripherally, and that the monitor was not reading the vital signs. IV fluids were commenced "for maintenance". CPR was commenced at 5.10am and the rest of the notes are consistent with those recorded above. A dose of broad-spectrum antibiotic ceftriaxone was given.

Recording of conscious level when assessing vital signs:

It would be considered normal practice to allow a child with otherwise normal observations and no change to continue to sleep through some measurements of vital signs throughout the night. It would be standard of care to wake a child and check their level of consciousness at any time of significant change, including upon development of the reported rash. If [RN A] did not attempt to wake [Master D] to assess his level of consciousness at the time of clinical change (rash) this would be considered a moderate deviation from the standard of care.

Lack of blood pressure recording:

While it is becoming more widely accepted that the recording of blood pressure is a useful sign upon presentation of an unwell child, it is still not routine across rural hospitals in Aotearoa thus the lack of blood pressure recording on presentation to the Emergency Department and prior to deterioration on the ward would be considered a mild departure from standard of care. Once [Master D] became more unwell [RN A] appropriately attempted to record the blood pressure but was unable to do so on two attempts, citing movement as the reason for this. Movement artefact can often interfere with an automatic blood pressure machine, and the usual response would be to perform a manual blood pressure reading when the automatic machine fails. If this was the case then failure to

attempt a manual blood pressure reading would be considered a moderate departure from the standard of care, although it may have been impractical if the manual equipment was a distance away and considering that a lot of tasks needed completing at this time. If [RN A] had attempted a manual reading and was unable to obtain this because of movement then this would be accepted as standard of care under the circumstances and an attempt would be repeated when more people were available to assist.

PEWS not calculated during period of deterioration:
At 4.10am, according to the observations noted, the PEWS was at least 6. — may have been an opportunity to intervene sooner.

Care provided by [Dr B]:
At 3.30am [Dr B] reviewed [Master D]. He noted a review of the presenting history. He documented examination findings including that [Master D] was moving all limbs and was "rolling in bed in uncomfortable sleep". The rash was described as "non blanching", "non petechial/pupura [sic]" (suggesting that [Dr B] did not think the rash looked consistent with a typical rash associated with meningococcal septicaemia). Fever was again noted at 38.5°C, heart rate 133 (high), oxygen saturation normal at 99% breathing room air, respiratory rate 30 (high normal), and with normal perfusion (warm periphery and a capillary refill time of less than 3 seconds). [Master D's] breathing was described as non-distressed and not laboured. It is not clear whether [Dr B] listened to [Master D's] chest at this time. It is noted there was no angioedema (a sign consistent with and not limited to allergic reaction), no meningism (a sign consistent with meningitis) and no clonus (a non-specific neurological sign that can be consistent with cerebral irritation, among other things). The abdominal exam revealed a soft abdomen which would be considered reassuring, and there was "no response to palpation" of the abdomen. It is unclear whether this meant that there was no indication of pain, or no response at all. If there was no response at all, it is not clear whether this was because [Master D] was comfortable, or whether he was asleep, or whether he was unconscious at the time of the examination. [Dr B] recorded [Master D's] blood test results from admission and particularly noted the raised white blood cell and neutrophil counts, suggestive of infection, the low potassium, and that the blood culture test had since become "positive" indicating bacterial growth in the blood sample.

[Dr B] concluded that [Master D] was developing sepsis (a life-threatening medical emergency where the immune system has a dangerous reaction to an infection causing injury to organs and tissues) due to an unknown organism which he thought most likely to be "non-Meningococcal", and made a comment likely about the rash that is not completely legible. He elected to call the laboratory scientist to perform a gram stain, which is a laboratory test that helps to determine the type of bacteria present in the blood sample. [Dr B] noted a plan to administer intravenous antibiotics according to the result of the above test. He requested a venous blood gas test, noting the result to be "?metabolic acidosis". The nursing notes say that the blood sample was taken at 4.15am which I note to be a retrospective entry by the nurse, and the laboratory audit access notes show that

the VBG result was received by the Éclair computer system at 4.58am thus it appears that this result was likely added to the note retrospectively, although it is not recorded as such. He requested paracetamol, cooling cares, and intravenous fluids at a rate of 40mL/hr which is appropriately noted as being 70% of the maintenance intravenous fluid rate for a child of [Master D's] weight, and with the inclusion of potassium chloride which was an appropriate choice to replace the slightly low potassium.

At 4.30am [Dr B] was urgently called back to see [Master D] "for clinical emergency". He noted that of the interventions he had requested earlier, the venous blood gas had been drawn and the intravenous fluids were being prepared. [Dr B] noted that [Master D] was unresponsive and that nursing staff were providing "support" with oxygen "via mask". [Master D] was mottled and was recorded as having a "gulping" breathing pattern, which is consistent, and not limited to, agonal breathing associated with cardiac arrest. An Oro-pharyngeal airway was placed which, while an appropriate thing to do, indicates that [Master D] was deeply unconscious at this point. Breathing was supported by positive pressure ventilation via a bag valve mask, and [Dr B] could hear air moving in both lung fields. The pulse oximeter was unable to measure [Master D's] oxygen saturation, which can occur when there is poor perfusion as a result of low blood pressure or cardiac arrest. The "senior consultant" was called to attend urgently and when he arrived it was noted that [Master D] had no cardiac output so it is documented that cardiopulmonary resuscitation (CPR) was commenced.

Care provided by [Dr B] after the arrival of the senior clinicians was guided by their leadership. Resuscitation efforts included 5 cycles of escalating doses of adrenaline and endotracheal intubation to secure the airway. There was no return of spontaneous circulation despite these efforts.

Whether or not [Master D] was awoken at the time of assessment of rash:
It would be considered standard of care to assess the level of consciousness of a child with fever and change in condition. If [Dr B] did not attempt to wake [Master D] to assess his level of consciousness at the time of examining [Master D's] rash this would be considered a moderate deviation from the standard of care.

Decision to delay administration of IV antibiotics while awaiting gram stain and potential lack of recognition of shock:
When [Dr B] reviewed the blood results he noted that the blood culture was positive indicating bacterial growth in the sample bottle. He made the decision to delay antibiotic administration until he received the gram stain, which seems from the notes to have taken about 2 hours to be reported from time of request. We aim to administer IV antibiotics as quickly as we can in sepsis. The Starship Clinical Guideline for Sepsis states "For every hour a child remains in septic shock the mortality risk doubles. Care delivered in the first hour after presentation or sepsis identification is crucial in ensuring the optimum outcome for the patient." However, one study of children treated for sepsis in the intensive care unit found that there was an escalating risk of mortality with each hour delay in antibiotic

administration after sepsis recognition, although this did not achieve significance until after 3 hours had passed from onset (https://pubmed.ncbi.nlm.nih.gov/25148597). Without knowing [Master D's] level of consciousness and blood pressure when he was assessed for the rash it is not possible to determine whether he was developing sepsis or had entered a state of septic shock. If the blood pressure had been low, or the pulse pressure had been wide (the difference between the systolic and diastolic blood pressures), or if [Master D] had an abnormal level of consciousness, then he would have been considered to be in septic shock, and the decision to withhold antibiotics at this time would have constituted a severe departure from standard of care. In this case resuscitative efforts would also need to be commenced including intravenous fluids and escalation of care. If the blood pressure and pulse pressure had been normal and [Master D] had demonstrated a normal level of consciousness on waking, then most of my peers would administer a broad-spectrum antibiotic and the decision to delay this while awaiting a gram stain would be considered a moderate deviation from standard of care.

Interpretation of the VBG result:

[Dr B] requested a venous blood gas be performed when he reviewed [Master D] at 3.30am. The nursing notes report this to have been taken at 4.15am. The lab audit shows the report having entered Éclair at 4.58am. Dr B had recorded the results of a venous blood gas in his note from 3.30am, which I note to have been grossly abnormal indicating a mixed acidosis consistent with a low perfusion state and inadequate ventilation, suggesting inadequate respiratory effort.

If the result that [Dr B] recorded alongside the note from 3.30am was the same result reported at 4.58am then it would not have altered the management at 4.58am, and failure to document that this was added retrospectively to the note would be considered a mild departure from accepted care. If there were two venous blood gas tests performed (one done at 4.15am with no report provided to me, and one drawn later and reported at 4.58am) then this result should have been escalated to [Dr B] by the tester and acted upon with immediacy. If received at 4.15am while [Master D] had not yet become unrousable, failure of the RN to escalate a venous blood gas with this degree of abnormality, or failure to act on that result once received by the doctor, would be considered a severe departure from the standard of care.

Decision regarding intravenous fluid (IV) delivery rate after [Master D's] deterioration:

[Dr B] had ordered IV fluids at 70% maintenance after review at 3.30am. These were not commenced until [Master D] deteriorated further, and it appears this was commenced at the originally prescribed rate. It would be considered standard of care to give a rapid bolus of IV fluid to a child in septic shock, a state that [Master D's] presentation was consistent with when [Dr B] reattended after deterioration. If a fluid bolus was given but not recorded this would be considered a mild departure from accepted care in the context of a paediatric resuscitation. Failure to give a bolus of IV fluid to a child in septic shock resulting in cardiac arrest would be considered a severe departure from standard of care. I note also that there

is no recorded fluid bolus given throughout the entire resuscitation period even after the attendance of senior medical support.

Care provided by [RN F]:
[RN F] has written an account of events from her arrival. They are mostly consistent with those recorded by others, and any minor inconsistencies I have noted are unlikely to be of consequence. [RN F] documented the details of the resuscitation attempt and from the information given to me appears to have provided care of accepted standard.

Care provided by [Dr C] during and following the resuscitation attempt:
[Dr C] noted the history including that [Master D] had recorded PEWS of zero throughout the early morning, the development of rash, and the sudden deterioration at 4.30am. He noted being called at 5.10am and found [Master D] to be receiving supported ventilation via bag valve mask, to be in asystole (a cardiac arrest rhythm indicating no electrical activity within the heart), to have perimortem oedema (fluid in the lungs resulting from cardiac arrest and resuscitation) and resuscitative efforts were performed as described above. He noted the oxygen saturation to be reading 88–90% throughout the resuscitation which is indicative of effective CPR. He recorded that there was no return of cardiac rhythm at any point and that resuscitation was ceased at … as continuation was thought to be futile.

[Dr C] notes that the bacteria grown on the blood culture were identified as gram-negative diplococci (describing the dye uptake and shape of the bacteria under the microscope) presumed to be Neisseria meningitidis. While there are other gram-negative diplococci, it is common to "presume" Neisseria meningitidis in the first instance as whānau and staff who have had close contact with a person with Neisseria meningitidis may require prophylactic antibiotic treatment following this exposure. [Dr C] noted that police had been notified on behalf of the coroner, and that Public Health had also been informed in line with the presumed Neisseria meningitidis infection.

At 11.30am [Dr C] has recorded that the formal interim identification of the bacteria growing in the blood culture returned a result of "Strep pneumoniae". Streptococcus pneumoniae is a gram-positive diplococcus that can cause overwhelming sepsis. That this bacterium was identified does not imply that [Master D] had the disease pneumonia (infection in the lung), as this bacterium can cause infection in various parts of the body including the middle ear, brain, sinuses, and lung.

[Dr C] goes on to surmise the possible reasons for [Master D's] "precipitous demise". While his explanations are possible, it is also my experience that children with sepsis can be relatively well and rapidly deteriorate in this manner. Either way, the exact cause of [Master D's] deterioration is immaterial to the questions that this advice seeks to answer.

Based on the information available to me [Dr C's] care during and after resuscitation meets the accepted standard.

Care provided by [Dr G]:

[Dr G] documented an urgent call from the hospital being received at 5.21am and having arrived at the hospital at 5.25am. He recorded that CPR was in progress when he arrived including ventilatory support via a bag valve mask, cardiac (chest) compressions and that there was an intravenous line in place and 4 doses of adrenaline had been given. The monitor was displaying chest compressions being given at a rate of 90–100 per minute ad oxygen saturations 80–85%. [Dr G] has recorded intubating (placing a breathing tube into the trachea) [Master D], and that CPR continued until … [the] time of death was recorded.

I note that the saturations recorded by [Dr C] and [Dr G] are not the same, although both are suggestive of a degree of oxygenation and perfusion in the context of a child undergoing CPR, and this difference is inconsequential.

It is noted that several attempts at intubation were required. Intubation while CPR is being performed in a child the age of [Master D] would be difficult for even the most experienced operator, and intubation is not imperative during a resuscitation attempt. The failed attempts at intubation would be considered standard of care during resuscitation in a chid this age. Based on the information available to me [Dr G's] care during and after resuscitation meets the accepted standard.

Misidentification of organism on gram stain by laboratory scientist:
The initial gram stain report recorded by [Dr C] was of a gram-negative diplococcus that was presumed to be Neisseria meningitidis. Subsequent identification found the bacteria to be Streptococcus pneumoniae which is a gram-positive diplococcus. It is outside my scope to determine the standard of care for a laboratory scientist in performing a gram stain overnight, and worth noting that had an antibiotic been chosen based on the incorrect interpretation (N meningitidis) that it likely would have also treated S pneumoniae.

The adequacy of the relevant policies, procedures, and staff training at [Health NZ] at the time of these events.

Cardiopulmonary Resuscitation (CPR) Policy:
I note the supplied policy was issued in September 2020 and may not have been in place at the time of this event. It was due for review in September 2023. A period of three years between reviews may miss New Zealand Resuscitation Council updates. Should new updates be published between review periods the document should be updated to reflect this.

For the most part this document would be considered standard and I have only a few comments. I do note that clinicians may decline to offer treatments to people if those treatments (including CPR) are deemed clinically inappropriate or futile whether or not the person is competent to make their own informed choice, and this is not reflected in the document. The language chosen is also not gender inclusive.

Summoning immediate medical assistance in [the public hospital] requires pressing a speed dial number labelled "Hot potato". While this may have been chosen to aid privacy or to

avoid unplanned calls to the medical officer, it could also be ambiguous to those who may not have had a complete orientation to the department. In a true emergency in a small rural hospital all staff and affiliates are required to help out, and this could include asking a health student to make this call. A more standard speed-dial like "MO emergency" or similar may help to reduce any ambiguity.

2.5 "Offsite/on-call members of the Clinical Emergency Team should be at the patient's location within 10 minutes of initial request for assistance." Presuming the initial request is hitting the alarm or paging, 10 minutes seems an unrealistic timeframe to attend from off-site, especially at night, or should be considered on-duty not on call.

5.6 Neonatal education and training refers to midwives and nurses working with the maternity population being required to maintain competency, but does not include medical staff who are likely to assist in a neonatal emergency.

Paediatric Brief Orientation document:
Again, I note that this document was issued in September 2020 so may not have been the document in use at the time of this event. It is a very brief ward orientation document and would not be sufficient in isolation for orientation of a sole nurse on the paediatric ward but may be sufficient for someone who was already paediatrically trained and was perhaps a second or third nurse assisting on a day shift.

Paediatric Orientation Document:
This document appears to be a concise ward and procedure orientation checklist and I have not identified any obvious omissions. I note the term "RMO" is listed as "Registered Medical Officers" but usually denotes "Resident Medical Officers" i.e., doctors in training. I am not familiar with the acronym MIV in the training checklist.

Any other matters that I consider warrant comment:
Based on the information available to me, the organisational response to this event appears to have been proactive and thorough in the approach, and genuinely centred on improving the system for future patients and whānau. I commend their early response, and their self-directed initiation of an external serious event analysis, and even more so their implementation of the suggested improvements. I also note their open communication with [Master D's] whānau.

I note that I have not received a copy of the serious events analysis (SEA) commissioned by [Health NZ] and referred to in the correspondence.

Additionally, I want to comment on the timing of recognition of cardiac arrest and commencement of CPR. I note some inconsistency throughout the notes as to exactly when cardiac arrest was identified, and cardiac compressions were commenced. RN A notes that [Dr B] attended at 4.45am while he only responded to his pager per the phone record at 5.01am, when [Dr B] recognised "gulping" breathing. It is possible that this was agonal breathing associated with cardiac arrest. [RN F] arrived at 5.06am and recorded that the

compressions started at 5.12am. There is no documentation of a pulse check or check for "signs of life". [Master D's] mother reports in the initial complaint that by the time [Master D's] grandparents and [Dr C] were arriving "[Dr B] had started CPR on [Master D]", while [Dr C's] note suggests CPR was commenced after his arrival. During resuscitation the standard of care would require a check for "signs of life", sometimes assessed by checking for a pulse, normal breathing, and other clinical signs of life. If signs of life are absent after rescue breaths are given to a child, then chest compressions should be commenced. Any registered health professional would be expected to hold basic CPR certification and be able to assess for signs of life and commence CPR, including the nursing staff and [Dr B]. If [Master D] was assessed for signs of life and they were initially present, then continuation with ventilatory support via bag valve mask would be considered standard of care (while other treatments were being instituted such as the IV fluids). If signs of life had not been assessed and [Master D] was in cardiac arrest but not receiving chest compressions, then this would be considered a severe departure from standard care by a group of my peers.

Recommendations:
Many of the issues that I have identified including those described above have already been recognised and addressed in the responses from [Health NZ]. I particularly note the following:

- Change in nursing roster patterns to reduce professional isolation and ensuring that acute/paediatric nursing staff have paediatric experience when recruiting.
- Minimum standard training in basic life support and advanced cardiac life support.
- Regular senior medical input at handover and mandatory discussion with a senior doctor of any elevated PEWS or concern requiring junior medical officer review.
- Introduction of the "Kōrero mai" initiative allowing whānau concern to be escalated directly to senior clinical staff if staff present are not adequately resolving the concern.
- Introduction of simulation of 777 emergency calls, during rostered working hours.

While I recognise that the Paediatric Sepsis screening and action tool is available locally, and RMOs are orientated to the local pathways, it takes a team to ensure that cognitive tools are consistently used. This tool can be initiated by nursing or medical staff at any point in the patient journey. ***I recommend that [Health NZ] undertake an audit of the use of this tool to identify whether all paediatric patients being admitted to Parfitt ward from the Emergency Department, and those cared for as inpatients, who meet criteria to commence the tool are being started on this pathway.***

[Master D's] mother referred to several concerns in her complaint that were suggestive of a resuscitation that could have been made simpler through ease of access to the correct sizes of equipment without too much equipment getting in the way. Many rural hospitals use the "Broselow tape" method of sizing equipment for resuscitation, and then store equipment in drawers or boxes that hold a complete set of emergency equipment for each size range of child, colour and age coded to allow rapid identification of the correct

drawer/box. ***If this has not been implemented as part of the move to the new … hospital, then I recommend that [Health NZ] implement this in the resuscitation trolleys in the acute and paediatric areas.***

I have discussed paediatric specific emergency training above, and ***I recommend that any nurse who will be in charge of the paediatric and/or acute areas of the hospital successfully complete at least PLS/PALS or equivalent training with recommended refreshers when required. I recommend that all senior medical offers that may be on call for a shift covering paediatric presentations successfully complete APLS or equivalent.*** Ideally, rural hospital trainee doctors will also undertake APLS training, and other junior medical officers who will manage acute paediatric cases will undertake PLS/PALS at least, although I acknowledge that constraints in the system may make this difficult to achieve.

Signed: Dr Sarah Leanne Clarke 15 Nov 2023'

Further advice

The following further independent clinical advice was provided to the Commissioner:

'My name is Dr Sarah Leanne Clarke and I have been asked to provide an opinion to the Commissioner on case number 20HDC01585. I have read, and agree to follow, the HDC's guidelines for independent advisors and I am not aware of any conflicts of interest. I am a registered medical practitioner with vocational registration in the scopes of Urgent Care and Rural Hospital Medicine. I have worked in Rural Hospital Medicine for approximately 15 years including nine years of experience in rural hospital clinical leadership.

I have been provided with responses from [Dr C] and [Dr B] to my initial advice and have been given copies of the initial internal Serious Event Review and the Independent Serious Event Review. I note that it is standard process for HDC to not provide independent expert advisors a copy of any Serious Event Review reports in the first instance, and as such they were not provided to me prior to my original advice. This is intended to minimise hindsight bias.

I have been asked to consider whether this information changes my original expert advice report, and whether I have any further comments regarding the responses received and additional information provided.

My further opinions are based on the documents that have been provided to me by the Commissioner including:

1. 20HDC01585 Copy of Independent Serious Event Review
2. 20HDC01585 Copy of Internal Serious Event Review
3. 20HDC01585 Copy of [Dr B's] response
4. 20HDC01585 Copy of [Dr C's] response
5. 20HDC01585 EA Report Dr Sarah Clarke

After consideration of [Dr C's] response:

I have updated my advice regarding commencement on a Paediatric Sepsis screening and action pathway, and administration of antibiotics following receipt of the initial blood results.

Paediatric Sepsis screening and action tool

By Month1 2020 paediatric sepsis was well recognised as a phenomenon across the OECD including Aotearoa, and many guidelines and pathways for identification and management of paediatric sepsis existed. For example, Johns Hopkins first published its "Pediatric Sepsis Clinical Pathway" online in February 2017 (sepsis-3_13_23.pdf). In June 2018 BPAC published a New Zealand contextualisation of the NICE guidelines (2015) for all age groups titled "Sepsis: recognition, diagnosis and early management" which included links to age-specific guidance and risk stratification tools (https://bpac.org.nz/guidelines/4/docs/Sepsis.pdf). In 2019 the Sepsis Trust published "A National Sepsis Action Plan for Aotearoa, New Zealand." (https://www.sepsis.org.nz/wpcontent/uploads/Technical_and_Consensus_Report_P2.pdf) The "Surviving Sepsis Campaign International Guidelines for the Management of Septic Shock and Sepsis-Associated Organ Dysfunction in Children" (Weiss et al) was published in the Journal of Pediatric Critical Care Medicine in February 2020. As such, I stand by my references to SIRS and sepsis in my original advice. Additionally, the Independent Serious Event Review provided states that "there was a presentation about sepsis available in hard copy on the ward at the time along with a Paediatric Sepsis Screening tool published by Sepsis Trust NZ".

Despite this, it is widely accepted that change in best practice takes time to become standard practice. Following receipt of [Dr C's] response I reread the original documentation provided. In my original advice, I noted that "the Paediatric Sepsis screening and action tool is held on local [Health NZ] servers and is accessible to all … hospital logins" and that it was "unclear if this was the case on the date of the event".

Upon reviewing [Dr C's] response and the Serious Event Analysis now provided, it has been confirmed that while the above mentioned was on the ward, the "relevant local guidelines" were not available on the [Health NZ] intranet at the time of the event. As such, it likely would not have been standard care to commence a Paediatric Sepsis screening and action plan in [Health NZ] at the time of this event, and I withdraw my advice regarding any failure to do so.

Administration of antibiotics following receipt of the initial blood results

In my original advice I stated that "Once the Full Blood Count result had been received, reconsideration of antibiotic therapy was warranted". [Dr C's] response now confirms that the question of initiating antibiotics was reconsidered at this point, and that this decision not to commence antibiotics was shared with another senior medical officer …

I also stated that "most rural Senior Medical Officers (SMOs) would have either sought additional tests to help determine the need for antibiotics (such as procalcitonin and/or lactate), or would have commenced antibiotic therapy while continuing observation". I based this opinion on my experience working across various rural hospitals where procalcitonin is available (and has been for over a decade) and where lactate testing is regularly performed through point of care testing at the time of the blood collect for both adults and children in the emergency setting. For clarification, I did not base this advice on the result of the film mentioned in [Dr C's] response, as I am aware that was not available at the time that this decision was made. I also note that the Starship "Fever Investigation and Management" guideline in use at the time stated that "FBC and CRP are not useful in determining the risk of bacterial sepsis in a child presently acutely with fever" and thus quantification of the importance of an abnormal white cell count (with neutrophilia) in isolation would be difficult. At the time of my initial advice, I asked peers what they thought they would do given a similarly raised white cell count with neutrophilia in the context of a febrile child under 5 presenting to their hospital, and their responses contributed to my advice. I recognise that the colleagues I spoke with have practised in similar contexts to me, with ready availability and use of both procalcitonin and lactate. Given the further context provided, I wish to amend my advice that the decision to continue observation without further testing or commencing antibiotic therapy at this point would be considered a moderate deviation from standard of care. Instead, based on the context provided and particularly following discussion and shared decision making with a fellow SMO, I believe that the decision to observe without administration of antibiotics at the point of admission constituted standard care.

After consideration of [Dr B's] response:

I have responded point by point to the responses provided.

Assess consciousness

[Dr B] recalls waking [Master D] at the time of reviewing the rash, thus assessment of consciousness was performed which would constitute standard care.

Antibiotics

Given that at the time of reviewing the rash [Master D] "was awoken and verbalized [sic] clear words during the performance of this thorough exam" it appears that he was conscious. Still, the decision not to administer a broad-spectrum antibiotic at this point of developing sepsis would be considered a moderate deviation from standard care by a group of my peers. This opinion is supported by the teaching on sepsis on the Advanced Paediatric Life Support course, where early administration of broad-spectrum antibiotics is considered standard care in the management of sepsis, as it was at the time of this event.

The response provided further highlights that [Dr B] appears not to have recognised the severity of the situation, as "usual practice" for a junior doctor, once sepsis is identified in a child, is to immediately involve senior support.

It cannot be known whether earlier administration of antibiotics would have changed [Master D's] devastating outcome. Regardless, I have based my advice on the decision made with the information available at that point in time, and to the best of my ability I have refrained from considering the outcome in providing this advice.

VBG result

The clarification provided confirms that the note "?metabolic acidosis" written at 0330 was not a result, but rather a working consideration. As such I withdraw my advice regarding the interpretation of the VBG result as the result reported at 4.58 am would not have altered the management at that time.

IV Bolus

As no fluid bolus was documented, and recollection is unclear as to whether one was given, my advice regarding a fluid bolus remains unchanged.

I note that IV fluids charted at 70% maintenance would not be considered "restorative" nor "rehydration" but rather would go some way toward lessening further deterioration in a child without shock who was not maintaining adequate oral intake. This rate of fluid administration would not be considered a resuscitative bolus of fluid.

Signs of life

In [Dr B's] response he recalls that [Master D] had heart sounds and peripheral pulses initially (upon deterioration) which led him to use airway support and to concentrate on oxygen supplementation in initial resuscitation attempts which would constitute standard care in the presence of adequate cardiac output. At some time between this assessment and the arrival of the SMO [Master D] lost cardiac output, as [Dr C] reported [Master D] to be in asystole upon his arrival (a cardiac rhythm inconsistent with cardiac output).

Thus, I wish to amend my advice regarding signs of life as follows: If life support algorithms were followed and signs of life were reassessed at regular intervals during the initial resuscitative phase while other treatments were being instituted (including the attachment of defibrillator pads which monitor cardiac rhythm), then this would constitute standard care. If signs of life had not been re-assessed regularly then this would be considered a moderate departure from standard care by a group of my peers.

Further comments:

Training

The addition of the internal and independent Serious Event Reviews has been useful, particularly in seeing a more thorough approach taken to assessing training expectations and the degree to which each contributing staff member had met those at the time of Master D's presentation. I will refrain from commenting further on training as between my previous advice and the serious event reviews this is well covered.

Staffing

I commented on staffing in my original advice, mainly regarding staff mix and the need for paediatric experience across the team on duty.

I note that one of the recommendations in the Independent Serious Event Review is "That upon an RMO being called to review a patient on the paediatric ward, it is mandated that there has to be a check in with the SMO on duty to check on intended management". This seems a reasonable and safe expectation, and I am concerned about the impact of this (and other increasing expectations on SMOs across the system) on safe rostering.

In [Dr C's] response to my initial advice there were a couple of comments made that allude to strenuous SMO rostering/hours including that "Rural Generalists are on call for 24 hours weekdays and 72 hours over weekends" and (when referring to his documentation of fluid status) "By then I had been at work for nearly 18 hours … ". While I recognise the workforce shortages across Aotearoa, and the gross overrepresentation of these shortages in rural areas, I also recognise that this kind of rostering enhances a reluctance for on-duty staff (including junior doctors and nursing staff) to call on call SMOs who have been on duty for long periods. I question the safety of allowing such rostering practices as 72 hour on-calls as the on-call workload continues to be increased through increased presentations, acuity and important safety measures such as mandatory on-call SMO check-ins for paediatric ward reviews.

Once again, I wish to acknowledge the tragic loss of [Master D] and the immeasurable impact this will have had on all involved, most especially his whānau, and also on the health professionals involved in his care and in this ongoing review.

Signed:

Dr Sarah Leanne Clarke 12 March 2025'

Appendix B: Independent clinical advice to Commissioner

The following independent advice was obtained from RN Rebecca Conway:

'**Expert opinion 20HDC01585**

Statement of request for expert advice

I have been asked to provide an opinion to the Commissioner on case number 20HDC01585. I have read and agree to follow the Commissioner's Guidelines for Independent Advisors. I am not aware of any conflicts of interest.

Qualification and relevant experience

I am a Registered Nurse of 34 years and have spent most of my professional life working in paediatric specialty practice where I have held positions as Staff Nurse, Nurse Educator and Charge Nurse Manager. I am currently employed as a Senior Nurse Coordinator in Care Capacity Demand. My highest academic qualification is a Post Graduate Diploma in Nursing.

Instructions from the Commissioner

I have been asked to review the documentation that was sent to me and to advise whether I consider the care provided to [Master D] by [RN A] was reasonable in the circumstances, and I have been asked to comment on:

1. Whether [RN A] provided [Master D] with an accepted standard of care from Day 1 Month1 to Day 2 Month1 2020
2. The adequacy of the relevant policies, procedures, and staff training at [Health NZ] as it pertains to [RN A]
3. Any other matters in this case that you consider warrant comment

For each question, I have been asked to advise:

a. What is the standard of care/accepted practice?
b. If there has been a departure from the standard of care or accepted practice, how significant a departure (mild, moderate, or severe) do you consider this to be?
c. How would it be viewed by my peers?
d. Recommendations for improvement that may help to prevent a similar occurrence in future.

I have been advised that if there are different versions of events in the information provided, that I should provide advice in each alternative scenario.

The facts and assumptions on which my opinion is based

On Day 1 Month1 2020, at approximately 9:41pm, [Master D] was taken to [a public hospital] emergency department (ED) after his parents were concerned that he had been vomiting and developed a fever. [Master D] was subsequently admitted to the children's ward at approximately 11:30pm for observation overnight.

From 12:30–2 am, [Master D's] condition deteriorated as he continued to vomit and become increasingly grizzly. At approximately 3am, [Master D's] mother reported to [RN A] that [Master D] was hot, clammy, and had started vomiting mucus. [Master D's] parents also raised concerns with [RN A] that he had noted weakness in his limbs when going to the toilet.

At around 3:30am, [Master D's] mother reported to [RN E] that he was still vomiting up mucus and was very hot. When [RN E] turned on the room lights to examine [Master D], she discovered that a rash was covering [Master D's] face and body. [RN E] immediately paged [RN A] and the on-call doctor [Dr B] to attend.

At approximately 4:55am, [Master D] becomes unresponsive. From 5am onwards, chest compressions and resuscitation efforts commenced. At … CPR is stopped … [Master D's] cause of death was listed as cardiac arrest secondary to streptococcus pneumoniae septicaemia.

Sources of information

In preparing this report, I have used the following documents that were sent to me from the office for the Health and Disability Commissioner:

1. Letter of complaint dated 2020
2. [Health NZ] response dated 2020
3. [Health NZ] response dated 2021
4. [Health NZ] response dated 2022
5. ED notes from Te Whatu Ora
6. Clinical records from [Health NZ] covering the period Day1–Day 2 Month1 2020
7. Phone logs from [Health NZ]
8. Audit access for CBC, Biochem and gas
9. Paediatric Orientation Booklet from [Health NZ]
10. Cardiopulmonary Resuscitation CPR Policy from [Health NZ]
11. Ad hoc orientation from [Health NZ]
12. Copy of response from [RN A] dated 2023
13. Attachment A — [RN A's] response dated 2020

14. Attachment B — [RN A's] orientation to paediatric work book

15. Attachment C — [RN A's] online learning record

16. Attachment D — [RN A's] certificate of resuscitation

17. Attachment E — [RN A's] performance appraisal

1. Whether [RN A] provided [Master D] with an accepted standard of care from Day 1 Month1 to Day 2 Month1 2020

There are three areas where I will make comment about the standard of care provided:

1.1 Fluid balance monitoring

1.1.1 Critical thinking about dehydration

1.1.2 Delayed treatment for sepsis

1.2 Paediatric Early warning score

1.2.1 Charting and frequency of observations

1.2.2 Temperature

1.2.3 Blood pressure

1.2.4 Capillary refill time (CRT)

1.2.5 Parental concern

1.3 Clinical emergency and resuscitation

1.3.1 Initiation of a clinical emergency

1.3.2 Preparation and administration of emergency medication

1.3.3 Familiarity with equipment on the emergency trolley

1.3.4 Post resuscitation care of the whānau and [Master D's] body

1.1 Fluid balance monitoring

1.1.1 Critical thinking about dehydration

In her statement, [Mrs D] notes that when [Master D] was being examined in the Emergency Department "[Master D] was not drinking fluids at all".

In her admission summary (clinical nursing notes 2330 hrs), [RN A] recorded that [Master D] had vomited "8–10 times" prior to his admission to the children's ward.

There are 6 entries in the fluid balance out-put column that record the number of times [Master D] vomited following admission to the Children's Ward. None of these was measured, but descriptors are given including "large amount", "small amount, approx. 6 ml", and 4 entries with "vomit phlegm (small amount)", and "UTT HPU'd" indicating that [Master D] had got up to the toilet and had passed urine.

According to [Mrs D's] statement, at 0300 she was worried that [Master D] was vomiting and hot and alerted [RN A], [Mrs D's] account was that she continued to show further vomits to [RN A] between 0300 and 0330.

The fluid balance chart indicates 4 phlegm vomits between 0200–0230. [RN A] went on her break at 0300 hours at which time [RN E] took over [Master D's] care and documented the discovery of a non-blanching rash at 0320 hours. It is unclear whether [Master D] was vomiting between 0200 and 0230 or 0300 and 0330.

If [Master D] was vomiting from 0200–0230, as documented in the fluid balance chart, there is no record that an attempt was made to re-evaluate [Master D's] level of dehydration before [RN A] started her break. [Master D] had vomited up to 16 times in total since 2000 hrs the previous evening. In addition, he would have had increased insensible losses caused by fever and sweating.

In her statement dated December 2020 (para 22, 26), [RN A] states in relation to [Master D] vomiting at 2330 hours that "it was not overly concerning that he had vomited because the medical staff were aware of his previous vomiting and so it was not a new symptom that required further escalation." At 0230 she went on to record a further four vomits on the fluid balance chart.

In my opinion, [RN A] should have informed a medical officer of [Master D's] continued vomiting and lack of oral fluid intake by 0300 hours. It is not clear whether she was not concerned about dehydration, or whether she was tentative about calling the doctor. According to the hospital telephone log a call was not made from … ward until 0327 hours, which was after the rash on [Master D's] trunk and face had been reported by [RN E].

1.1.2 Delayed treatment for sepsis

Following the discovery of the rash at 0320 hours, [Master D] was medically reviewed. Sepsis was suspected at this point. The medical plan was for a venous blood gas, IV fluids, IV antibiotics, cooling cares and continued anti-pyretic therapy. [Mrs D's] account notes that intravenous fluids were not started and that the nursing staff had trouble obtaining the blood test.

There were a number of factors which led to delays in the treatment for sepsis. I note that the antibiotic was not prescribed on [Master D's] medication chart. The IV fluids were prescribed at 70% of maintenance, and the start time was omitted in the prescription. Time was taken obtaining the prescribed fluid bag from the Emergency department. There is no indication that RN A questioned the prescription for IV fluids regarding the start time, type of fluid prescribed or the rate.

[RN A's] nursing notes record that the venous blood gas sample was taken at 0415 hours. Her revised statement dated June 2023 (para. 5.b), amends the time of the blood sample to between 0430–0438 hours. It is seldom easy to take a blood sample from a child who is

[Master D's] age. In addition, his state of dehydration and poor perfusion may have made it more difficult to successfully obtain a specimen.

The laboratory record shows 0458 hours as the time the specimen was received. Very soon after the blood test, [Master D] had become unresponsive. In the period from 0320–0438 hours, neither IV fluids nor IV antibiotic therapy were given.

Optimal therapy for suspected sepsis should be given with urgency and within an hour of detection[45] [46]. A sepsis pathway would indicate that 6 measures known as the "sepsis six" commence immediately and are completed within the hour including oxygen, IV access, IV antibiotics, a normal saline fluid bolus, regular reassessment and consideration of inotropes. My opinion is that the urgency for life preserving treatment was poorly understood by [RN A]. I believe that [RN A] required help from other clinicians to administer the treatment to address sepsis at 0330 hours.

a. What is the standard of care/accepted practice?
The fluid balance documentation is complete only in as far as there are entries indicating fluid intake and output. There is no indication that [RN A] raised concerns with medical staff or with [RN E] about [Master D's] excessive fluid loss and degree of dehydration.

In her initial admission note at 2330, [RN A] wrote that the plan was to "keep pushing fluids, no need for IV fluid bolus", which is consistent with [Mrs D's] account of the medical plan. There is no indication in the nursing notes or the fluid balance chart that oral fluids were offered after the ice block at 2330 hours. Nor is there evidence that medical review or IV fluids were requested despite continued vomiting and insensible fluid loss caused by fever up until 0330 hours.

In my opinion, the fluid balance monitoring fell short of the standard in that there is a lack of critical thinking about fluid intake and output in the context of a young child who was vomiting frequently with a high fever. The plan to push oral fluids should have included some instruction about how much fluid to take each hour and should have triggered a request for a medical review.

I do not find fault with [RN A's] blood sampling technique, but only the timeliness of the sampling which was 55 minutes after the rash had been discovered. I would have expected that any RN in this situation would require and would have asked for assistance from another nurse or doctor.

b. If there has been a departure from the standard of care or accepted practice, how significant a departure (mild, moderate, or severe) do you consider this to be?

[45] Sepsis Trust NZ. (2023). Clinical Tools: resources for Health Professionals. Paediatric screening and action tool. Clinical Tools — Sepsis Trust NZ. Accessed 24 June
[46] Health Quality and Safety Commission. (2021) Factsheet: Patient deterioration and sepsis. Search for page | Health Quality & Safety Commission (hqsc.govt.nz). Accessed 25 June 2023

I consider that the lack of critical thinking regarding [Master D's] fluid balance status demonstrates a moderate departure from the accepted standard of care expected.

I consider the delay to blood testing and commencement of IV fluids a mild departure from the standard of care accepted, and I do not think that the responsibility for this lay with [RN A] alone.

c. How would it be viewed by your peers?
My peers would consider that fundamental fluid balance monitoring did not occur to the expected standard.

My peers would consider that [RN A] ought to have requested a fluid review by 0300 hours.

My peers would consider that a Registered Nurse caring for a deteriorating patient who had to complete multiple tasks with urgency would speak up and ask for help.

d. Recommendations for improvement that may help to prevent a similar occurrence in future.
I recommend that with regards to oral rehydration, that the hospital adopts as system for making an agreed plan between the medical and nursing staff about the goal for fluid intake which includes a time for review. I would expect the plan to be shared with the whānau.

I recommend re-education about accurate fluid balance recording including calculation of output in ml/kg/hour for children.

It could be helpful to add design features into the fluid balance chart that enable staff to calculate total output every hour, and in ml/kg/ hr.

1.2 Paediatric Early Warning Score (PEWS)

The PEWS recording and scoring of child observations is used to help clinicians recognise patient deterioration and is utilised as an adjunct to professional clinical judgement[47]. A full set of recordings is required to calculate a full PEWS score using each of the vital sign fields on the chart.

The reverse side of the Child Observation chart used for [Master D] had instructions for calculating PEWS and a management plan for escalating care if patient deterioration was detected. The PEWS policy … sets out minimum standards for the frequency of observations when a child is acutely admitted to hospital[48].

I make the following observations about PEWS documentation for [Master D's] admission:

[47] Te Tāhū Hauora, Health Quality and Safety Commission. (2023) Paediatric warning system. Paediatric early warning system | Health Quality & Safety Commission (hqsc.govt.nz). Accessed 3 July 2023.
[48] Te Whatu Ora Health New Zealand, Policies and Procedures. (2023). Nursing Observation and Monitoring — Paediatrics. Nursing Observation and Monitoring (PPCH16).docx (health.nz). Accessed 3 July 2023.

1.2.1 Charting and frequency of observations

The correct chart was selected (1–4 years). The frequency of observations was hourly after the first set of recordings. In total, 7 sets of recordings were documented on the PEWS chart. All recordings were partial rather than full PEWS, even though a full set of recordings was a local requirement on admission and on transfer between clinical areas as described on the reverse side of the PEWS chart[49].

Four of the seven recordings included an entry in the "total PEWS" field giving a numerical score. 3 of the 4 scores were "0". One score of "1" was triggered at 0320 when [Master D's] heart rate increased to 144.

At 0230 hrs, only the temperature and the neuro values were recorded. The next set of recordings was triggered on discovery of the rash as noted in the clinical notes at 0320 hours by [RN E].

Further recordings were taken at 0410 including an attempted blood pressure, in the context of patient deterioration. The PEWS score at this time would have been 6 (possibly more had a blood pressure been recorded), but these values were only documented retrospectively in nursing notes and not on a PEWS chart. Failure to enter the recordings directly onto the PEWS chart led to a missed opportunity to call for an urgent medical review.

In her statement dated December 2020 (para. 15), RN A acknowledges that the initial set of PEWS observations at the time of [Master D's] transfer from the Emergency Department to the ward should have been a full set including blood pressure. She gave [Master D's] distress as her reason for omitting this recording. She reasoned that because the PEWS score was "0", that policy only required [Master D's] recordings be completed 4-hourly, despite only a partial set of observations being recorded. On the other hand, she stated that she was concerned about [Master D's] temperature and "accordingly completed more frequent observations than required" (December 2020, para 17). Although concerned, [RN A] never recorded observation of the full PEWS.

1.2.2 Temperature

[Master D's] temperature was very high in the time prior to admission and in the emergency department. The use of anti-pyretic medication (paracetamol and brufen) would have reduced his fever. Although temperature is a non-scoring value on the PEWS chart, the source of [Master D's] fever was unknown and therefore concerning. Temperatures above 39 degrees Celsius and parental concern are both known as amber flags for sepsis[50].

[49] District Health Board (2019) 1–4 years Child Observation Chart, Ref: C280011C p.2, Calculating PEWS Scores
[50] Sepsis Trust NZ. (2023). Clinical Tools: resources for Health Professionals. Paediatric screening and action tool. Clinical Tools — Sepsis Trust NZ. Accessed 24 June

In her statement dated December 2020 (para. 23), [RN A] states that she was "concerned about [Master D's] high temperature, which is why I increased my level of observations beyond what was required". I note that this concern did not trigger a full set of PEWS recordings or a call to the duty doctor, which perhaps suggests that [RN A] was tentative about her knowledge and nursing responsibilities.

1.2.3 Blood pressure

At no point was a blood pressure recorded on the Child Observation Chart during the admission to ED or the ward. No note was entered on the PEWS chart to show a blood pressure was attempted, nor was there evidence of a subsequent attempt to record [Master D's] blood pressure as he became more settled after transfer to the paediatric ward. There was a written record of 2 attempts to take [Master D's] blood pressure at 0410 hours in [RN A's] nursing notes which she wrote at 0600 hours, in the context of [Master D's] rapid deterioration.

Blood pressure is often a challenging recording to obtain from a child in the 1–4-year-old age group. Children are often frightened by the unfamiliarity of clinical surroundings and find the tightening inflatable arm cuff uncomfortable. It can be necessary to re-attempt the blood pressure once the child becomes more settled in his or her surroundings. [RN A's] statement dated December 2020 (para.13) describes [Master D] as "chatty and interactive" after arrival on the ward. I would expect an attempt to take a blood pressure to be noted on the PEWS chart on admission, and a further attempt to be made once a therapeutic relationship had been established with [Master D].

1.2.4 Capillary refill time (CRT)

At no point was a CRT value entered in the Child Observation chart during the admission. CRT helps to determine abnormal perfusion and is a red flag sign for sepsis. According to a sepsis screening tool, if one red flag for sepsis is detected, further urgent assessment and treatment is immediately required including oxygen administration, blood tests, antibiotics, fluid bolus and where necessary, inotrope therapy to help restore perfusion[51].

CRT is a relatively easy recording to obtain, even when a child appears fearful or uncooperative. To obtain a CRT, a clinician must press gently but firmly down on the child's sternum with a thumb for 3 seconds, then observe how long it takes for the blanched skin to become pink. A CRT of more than 3 seconds is abnormal. Carrying out a CRT examination also presents an opportunity to observe the child's skin for warmth, rashes and ascertain whether the child is alert, sleeping normally or has a reduced level of consciousness.

It is impossible to know when [Master D's] CRT value changed. The Emergency Department Treatment Summary notes "Cap=2" meaning his capillary refill time or CRT was 2 seconds, which was normal, at the time of admission. By 0430 hours [Master D] was cyanotic,

[51] Sepsis Trust NZ. (2023). Clinical Tools: resources for Health Professionals. Paediatric screening and action tool. Clinical Tools — Sepsis Trust NZ. Accessed 24 June

indicating that he was very poorly perfused. On [Master D's] PEWS chart, an abnormal CRT if it had been detected, would have scored a PEWS of 1. Subsequent revised scoring would now rate an abnormally long CRT as a score of 4[52]. The failure to record CRT was a missed opportunity.

1.2.4 Parental concern

At no point was Parental Concern recorded on the Child Observation chart during the admission. Caregiver or whānau concern is a non-scoring area of the PEWS chart but can trigger escalation and further medical review if the caregiver is worried about their child in the absence of abnormal vital signs. Acting on parental concern works on the premise that parents or caregivers know their children best, and that they work in partnership with clinicians during a child's admission to hospital. Parental/caregiver concerns should be listened to, alleviated, and where concern remains, escalated to the medical team and documented in the patient notes[53].

In her statement, [Mrs D] reports alerting [RN A] at 0300 that [Master D] was hot, clammy and vomiting stringy mucous. He was given paracetamol and vomited again. [Mrs D] reported feeling that [RN A] was "not worried" and "not concerned". There is no account in [RN A's] nursing notes about [Master D's] parents alerting her to [Master D] having limb weakness when he went to the toilet.

It is possible that [RN A] was trying to be calm and reassuring, but [Mrs D] felt her concern was unvalidated. [RN A] did not document any reported parental concerns in the nursing notes prior to 0320 hours, or following the attempted resuscitation. [RN E] recorded parental concern about [Master D] being hot in the nursing notes, and the subsequent discovery of a non-blanching rash at 0320.

a. What is the standard of care/accepted practice?
[Master D] should have had full PEWS recorded including blood pressure and CRT on admission to the Emergency Department and on transfer to the children's ward. Even if [Master D] had been uncooperative, I would have expected documentation of an attempt to take his blood pressure as well as a re-attempt once [Master D] was more settled in the ward.

Failure to record a CRT and blood pressure was a missed opportunity to detect alteration in perfusion, as well as the emergence of the non-blanching rash.

[52] Health Quality and Safety Commission (2023). PVSC-user-guide-national-final 29 March 2023.pdf (hqsc.govt.nz) accessed 19 June 2023, p24
[53] Health Quality and Safety Commission. (2023). Aotearoa New Zealand national paediatric early warning system and paediatric vital signs chart user guide. PVSC-user-guide-national-final_29March2023.pdf (hqsc.govt.nz) Accessed 24 June 2023. P13.

The failure to record parental concern was a missed opportunity to explore further what signs [Master D] was exhibiting that were unusual or worrying to [Mrs D]. Parental concern can trigger a medical review, even in the absence of abnormal vital signs.

b. If there has been a departure from the standard of care or accepted practice, how significant a departure (mild, moderate, or severe) do you consider this to be?
I consider that the failure to complete blood pressure and CRT as per policy to be a moderate departure from the expected standard. None of the three RNs documented full PEWS observations, and nor was blood pressure recorded or requested by the admitting doctor. There appears to have been a poor systemic understanding of the minimum requirements for full and core PEWS recordings.

I consider the failure to act on or record [Mrs D's] concern about fever and vomiting as a moderate departure from the expected standard of practice.

c. How would it be viewed by your peers?
My peers would consider the failure to record full PEWS on admission and transfer, including blood pressure and CRT a serious departure from a fundamental nursing task. The policy is clear about when to record a full set of PEWS. Even if a clinician is not thinking of sepsis per se, documentation of complete and accurate data can help detection of deterioration, and at the very least provides a baseline on which to compare subsequent observations.

My peers would also consider acting on parent/caregiver concerns to be a fundamental and important part of nursing practice.

d. Recommendations for improvement that may help to prevent a similar occurrence in future.

I recommend that regardless of whether the PEWS are recorded on paper charts or electronically, that regular audits and regular education are scheduled at [Health NZ] to ensure compliance with the PEWS policy. This is especially important to arrest waning compliance and ensure continued awareness in locations where there is staff turnover.

I note that as a result of [Master D's] death, Kōrero Mai is to be implemented across acute care facilities. I recommend that regular audits take place to ensure that patients and caregivers are always orientated to this pathway and understand how to use it.

1.3 Clinical emergency and resuscitation

1.3.1 Initiating a clinical emergency.
When [Master D] lost consciousness [RN A's] statement dated December 2020 (para. 42) records that she initiated the clinical emergency by making separate phone calls to [RN E] and [Dr B] from the phone in her pocket. She has subsequently acknowledged that local policy is to activate a clinical emergency. The Te Whatu Ora Cardiopulmonary Resuscitation policy is for a clinical emergency to be activated using the green clinical emergency button

in the ward or call 777. In this case, calling 777 would have been the best option as [RN A] could have alerted the entire Clinical Emergency team at once while remaining with [Master D] as sole clinician.

I note that the telephone log shows calls from … ward at 0438, 0456 and 0457 hours. The Emergency Department answered a page and called … ward at 0457 hours. A further call from [the ward] to the hospital operator was made at 0458. At 0459 [Dr B] answers a pager from … ward. It appears that precious time was wasted by failing to make a 777-emergency call.

[RN A] appropriately commenced oxygen via a mask at a flow of 10 litres per minute. The size of the mask used would not have mattered provided that it was covering [Master D's] mouth and nose.

1.3.2 Preparation and administration of emergency medications

[Mrs D's] account of the resuscitation describes that when [RN A] was preparing adrenaline "she kept drawing the wrong amounts up that were asked for and also into the wrong sized syringes and had to repeat this on multiple occasions". [RN A's] statement dated December 2020 (para. 48, 49) recounts that she was asked for 0.2 ml adrenaline 1:1000 at 0514 and 0520 hours which she prepared and gave to [RN E] to administer. The Clinical Emergency Record/Drug Treatment Form shows that 0.2 ml adrenaline was administered at 0514 and 0520 hours. The concentration was not recorded.

0.2 ml is a very small volume to administer accurately. The recommendation is to use a less concentrated form of adrenaline so that a larger volume can be administered. Subsequent adrenaline doses were recorded at 0530, 0540 and 0545 hours (5 ml, concentration 1:10,000). The strength and doses of adrenaline were also recorded in the nursing notes by [RN F] from the Emergency Department.

The standard dosing for adrenaline in advanced life support for infants and children is 10 micrograms per kilogram with a single maximum dose of 1 mg given every second loop or 3–5 minutes[54]. This guidance is included in the Te Whatu Ora CPR policy. This guidance dated September 2020 did not make explicit which concentration of adrenaline to use. Selection of the correct concentration of adrenaline is usually taught in annual CPR updates but would be difficult to remember when not practiced regularly. Two forms of adrenaline are available in the emergency trolley, the more concentrated form is for treatment of anaphylaxis, the less concentrated form for CPR.

Many New Zealand Child Health units use a pre-populated emergency prescription chart which is generated on the *Starship emergency drug dose calculator*[55]. This chart provides

[54] ANZCOR Guidelines. (2023). Paediatric Advanced Life hours Support. 12.3 Adrenaline. Guideline 12.2 — Paediatric Advanced Life Support (PALS) (anzcor.org). Accessed 25 June 2023

[55] Starship Children's Health (2016). Hospitalised Children Calculators. Patient Details (paediatricdrugs.net) Accessed 25 June 2023

an individualised list of emergency drugs with doses ready-calculated based on the child's weight including the correct strength of adrenaline for CPR. The practice of routinely printing this chart on admission of every child ensures that emergency drug doses are rapidly on hand, and that staff are familiar through regular practice with the location of the online drug calculator.

1.3.3 Familiarity with the equipment on the emergency trolley

[Mrs D's] account of the attempts at intubation during resuscitation describes [RN A] "giving the wrong sized tubing". [RN A's] account in her statement dated December 2020 (para. 46, 50, 52) describes being asked for endotracheal tubes at 0514, 0525, on a further "several occasions" and at 0540 hours. Initial intubations were unsuccessful. It is not recorded in [RN A's] notes or other clinical notes whether she had trouble identifying which tube to select. The situation for all of the resuscitation team and for the whānau would have been extremely pressured at this point, and requests for equipment would have been made with urgency.

I note that in a performance appraisal dated February 2021, her line manager commented that [RN A] regularly checked the Emergency Trolley and was familiar with how to call a clinical emergency or raise a patient deterioration alert.

1.3.4 Post resuscitation care of the family and [Master D's] body

The care of [Master D's] body and of this family following death has left a lasting impression on [Mrs D]. She recounts being left alone in the chaos of the post-resuscitation room with [Master D's] soiled body. Her words were that he was in an "indecent" state.

[RN A's] statement dated December 2020 (para. 53) details that the family were provided with emotional support and alone time with [Master D's] body. She handed over to the morning staff to provide further support. There is no account of post deceased care in her nursing notes and nor are there notes from the oncoming nursing shift.

Following [Master D's] death, [RN A] would have been required to discuss aspects of care with other members of the resuscitation team, complete detailed nursing notes and hand over to the morning team. It is possible that her understanding of the postmortem process and subsequent referral to the Coroner may have led her to think she was unable to clean [Master D's] soiled body.

This situation would have been outside the experience of many nurses. [RN A's] uncertainty about post deceased care is understandable. However, I would have expected [Master D's] family to have been comforted and not left alone unless they had requested this. I would have expected other clinicians who were present to have helped [RN A] with the post deceased care tasks.

a. What is the standard of care/accepted practice?

The standard for calling a clinical emergency was to either press the green clinical emergency button or ring 777. The failure to follow policy for activating a clinical emergency caused a delay in the time it took for the emergency response to occur.

The standard adrenaline concentration and volume for CPR was not used for the initial 2 doses. I note that this confusion may not have rested with [RN A] alone as there were other clinicians present who could have identified the required 1:10,000 strength adrenaline. This drug would have been double checked by another clinician.

RNs should be familiar with the contents of the emergency trolley. The practice of daily checks helps build familiarity. However, a full resuscitation is an uncommon occurrence in a paediatric ward. Some hesitancy in locating drugs and equipment under pressure is an understandably human response.

Bereaved family support and post deceased care of the body are fundamental aspects of nursing. However, following a catastrophic event, it would be my expectation for other nursing and medical colleagues to pitch in and help and I do not hold [RN A] solely responsible for this.

b. If there has been a departure from the standard of care or accepted practice, how significant a departure (mild, moderate, or severe) do you consider this to be?
[RN A's] failure to call a clinical emergency using the 777 system was a severe departure from the accepted standard.

[RN A's] failure to identify the order for adrenaline in the correct concentration is a mild departure from accepted practice.

Failure to administer post deceased care for [Master D] and his family was a moderate departure from the expected standard but did not rest with [RN A] alone.

c. How would it be viewed by my peers?
My peers would consider correctly calling a clinical emergency and identifying the correct concentration and volume of emergency adrenaline both fundamental aspects of a nursing responsibility in a clinical emergency.

My peers would have expected the team involved to have coordinated post deceased care for Master D and his family.

d. Recommendations for improvement that may help to prevent a similar occurrence in future.
It is my recommendation that the *Starship Hospitalised Children Emergency Drug calculator*[56] is used routinely for all inpatient admissions.

[56] Starship Children's Health (2016). Hospitalised Children Calculators. Patient Details (paediatricdrugs.net) Accessed 25 June 2023

I also recommend that the local CPR policy and algorithm for paediatric cardiac arrest includes clear instruction for the strength of adrenaline that should be used as well as the dose in mcg/kg as well as ml/kg.

2. The adequacy of the relevant policies, procedures, and staff training at [Health NZ] as it pertains to [RN A]

There are two areas where I will make comment about the adequacy of policies and staff training.

2.1 Policies

2.1.1 Cardiopulmonary resuscitation policy

2.2 Staff training

2.2.1 Nursing orientation to paediatrics

2.2.2 Preparation for nurse in charge/sole charge role

2.1.1 Cardiopulmonary resuscitation policy

I have reviewed the CPR policy dated September 2020. With regards to staff training, the policy requires staff to maintain this competency annually. My view is that completion of a resuscitation competency does not mean that an individual will necessarily be competent when faced with an emergency.

In preparing this opinion I have discussed this case with a Nurse Educator who coordinates CPR training for a large hospital. Her opinion is that CPR assessments only provide staff with an opportunity to practise a skill in an environment that is not their real workplace. It is a considerable leap to transfer CPR skills from a classroom to the bedside of a rapidly deteriorating patient.

I note that in the letter of response from [Health NZ] dated 12 April 2022, that emergency training drills including scenarios with sepsis have been established at the hospital. In my opinion, it would be of benefit to have a means of ensuring that all clinical staff regularly attend simulation training in their clinical areas, as this is the most realistic means other than actual clinical practice for learning and developing emergency skills.

2.1.2 Orientation to paediatrics

I have reviewed a copy of the orientation to paediatrics booklet that was used when [RN A] commenced in November 2019. The booklet is comprised of checklists covering the clinical environment, clinical equipment, emergency equipment, required learning, health applications and paediatric specific care including resuscitation.

[RN A's] orientation book is signed off as complete. Her performance appraisal shows that she completed an annual CPR update in November 2020. There is no documented record of CPR training during the period of her induction.

In addition to her orientation booklet, [RN A] completed a number of online modules in HealthLearn between 2019 and 2020 and these included:

- Paediatric Early warning score
- Paediatric fluid and electrolyte management
- IV therapy: Paediatric intravenous care

She completed an online sepsis module in 2020 after Alexzander's admission.

Although [RN A's] record of learning was ticked off as complete, the events surrounding [Master D's] admission and deterioration suggest that she was not able to translate the theoretical learning into practice when caring for a deteriorating child and working in a sole charge role. She made fundamental errors in

- Critical thinking about fluid balance monitoring
- Detecting and escalating deterioration
- Speaking up
- Calling a clinical emergency

2.2.2 Preparation for sole charge role

I make the following comments with caution, as I have never personally worked in a sole charge role.

I have not been able to identify any specific checklist in the paediatric orientation book for the sole charge role. I have not been provided with a local policy for sole charge, and nor am I aware of how an RN is assessed as ready for the sole charge responsibility.

I note in her statement dated December 2020 (para. 3) that most of [RN A's] 11 years of prior nursing experience was on a Neonatal Intensive Care unit at a large metropolitan hospital in … She completed her Competency Assessment Programme in … prior to her contract at [Health NZ]. Though an experienced NICU nurse, at the time that [Master D] was admitted, [RN A] was new to New Zealand, new to the paediatric nursing specialty, new to working in a small hospital and new to sole charge albeit with the support of [RN E].

In my experience as a former paediatric Charge Nurse Manager, most RNs take 6 months to feel comfortable in a new role, particularly when they are new to the specialty or new to the New Zealand nursing context. Readiness to be in charge of a ward takes somewhat longer. It is my opinion that [RN A] was not ready to be nurse in charge, let alone sole charge of a paediatric ward.

a. What is the standard of care/accepted practice?

The standard for nurses working in an acute care area is that they are able to sequence the tasks associated with deteriorating patient care including:

• Identification of deterioration

• Initiating a clinical emergency using the emergency call button or the 777-emergency operator number

• Administering life-saving therapy

• Locating emergency equipment

Learning emergency procedure begins at induction into a new role and is repeated with annual CPR updates. Familiarity with resuscitation equipment is reinforced with regular quality checks of the defibrillator and resuscitation trolley that are required by policy.

Further learning occurs when working alongside other nurses when patients deteriorate. In these situations, more experienced clinicians role model emergency patient care, and staff can spend time in mutual reflection and debriefing. Simulation learning in the clinical environment also provides opportunities to practise skills and correct mistakes.

If [RN A] updated her CPR competency when she commenced her role at the hospital, I have not been able to identify a record of this. [RN A's] nursing orientation to paediatrics was signed off as complete and she had completed relevant online theoretical learning. Her relatively short tenure in paediatrics suggests that her level of experiential learning would have been limited, and therefore she was not able to translate the theoretical learning into practice when faced with [Master D's] deteriorating condition.

b. If there has been a departure from the standard of care or accepted practice, how significant a departure (mild, moderate, or severe) do you consider this to be?
In my opinion, [RN A] should not have been rostered in a sole charge role. Rostering [RN A] as sole charge RN was a moderate departure from the expected standard. Most nurses are just finding their feet at about 6 months into a new role. RN A was new to the hospital, new to the paediatric specialty, and new to nursing in the New Zealand context.

c. How would it be viewed by my peers?
My peers would consider that the organisation ought not to have put [RN A] in a position where she was sole charge of a ward. Other provisions such as a change of roster or transferring [Master D] to an area where [RN A] could care for him with support from other RNs should have been made.

d. Recommendations for improvement that may help to prevent a similar occurrence in future.
I recommend that the organisation continues to utilise simulation training to help clinicians improve their practice with deteriorating patients and emergency scenarios.

I would encourage the use of regular structured debriefing to enhance interdisciplinary reflection and learning.

I recommend that the model of care is reviewed to avoid nurses having to operate in sole charge situations.

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

No.

Rebecca Conway (Becky)

7 July, 2023'

Appendix C: Independent Serious Event Review

'NAME: [Master D]
NHI: …
DATE OF EVENT: Day 2 Month1 2020
… EVENT REFERENCE: …

8 July 2021

PREFACE

This review has been performed completely independent of [Health NZ]. It has drawn on material that was initially gathered as part of a review process at [Health NZ]. However, through interviews and further enquiries, additional material not previously accessed has been obtained so as to form a more comprehensive picture of the factual events that occurred, which has assisted in identifying care delivery problems and to suggest recommendations.

Given the independence of the review, this resulting report has attempted to be more comprehensive than internal … reviews after significant events would sometimes be. The recommendations are made independently and, therefore, those that would be tasked with considering the implementation of recommendations have not been consulted with. There may be good reason why certain recommendations cannot be implemented but, if that is the case, it is hoped that another step can be taken to produce the same outcome as the recommendation is aimed at addressing.

FACTUAL INFORMATION

PATIENT BACKGROUND

[Master D] lived in … with his mother [Mrs D], and father [Mr D] … [Master D] was a generally well 3-year-old boy. His medical history was limited to investigation for recurrent skin lesions anterior to his left ear, thought to be related to a pre-auricular sinus.

[Master D] was up to date with his immunisations including pneumococcal PCV13 at 6 weeks, 3 and 5 months and then PCV10 at 15 months. He took no regular medication and did not have any allergies. He was meeting his developmental milestones.

[Master D] was a well child. He met his milestones at appropriate times and generally had good health. He was fully immunised and took no regular medications. He had been suffering from upper respiratory tract symptoms consistent with a viral infection for several days prior to his admission to hospital. Despite these symptoms, he was able to attend preschool. He had attended soccer practice on Day 1 Month1 2020 without any difficulty.

DESCRIPTION OF EVENTS

Admission

[Master D] was admitted to … with a febrile illness.

Blood tests taken in the ED showed an elevated white blood cell count, elevated neutrophils with peripheral metamyelocytes. The CRP was less than 3. The peripheral blood film noted:

> *Irregular shaped cells occasional; Neutrophils show toxic granulation; neutrophils show vacuolation; Platelet clumps present.*

These results are consistent with an infection, but in isolation, consistent with available guidelines, did not indicate the need for empiric antibiotic treatment.

The complete blood count and biochemistry were viewed by [Dr C] at 2316, prior to [Master D] leaving the ED.

Based on the clinical history, examination findings and blood test results, [Dr C] considered that [Master D] had viral mesenteric adenitis or early appendicitis. A plan was made to admit [Master D] under the care of [Dr C] for monitoring, and surgical review in the morning. This was discussed with [a senior staff member] who agreed this was appropriate.

[Master D] had no coughing, no focal chest signs, had no supplementary oxygen requirement, and had a normal respiratory rate, so no chest X-ray was requested. This is consistent with Starship Hospital guidelines on the investigation and management of acute abdominal pain. An ultrasound scan or CT scan is not part of the routine work up for a child with suspected appendicitis.

On the ward

[Master D's] parents were concerned at [Master D's] progressive deterioration over the course of the night from approximately 0030, and especially from 0200 onwards. He was vomiting more and his behaviour was abnormal, and their instinct was that he was getting worse. Their worry was communicated to [RN A].

At 0245 when [Master D] went to the toilet, his parents advised that he had marked weakness in his limbs.

[Master D] continued to deteriorate and was severely unwell by 0320. He had a positive blood culture (seen by [RN A] and [Dr B] at 0336), and a mottled rash pathognomonic with sepsis, and significant parental concern was expressed. At this stage he met the criteria for sepsis. This was acknowledged in the note from [Dr B] who recorded his impression of "developing sepsis".

[Dr B] also viewed the blood results available at that time, which included the full blood count results showing the increased white cell count, the electrolyte results and also the positive blood cultures with an organism that at that stage had not been identified.

[Dr B] paged the on-call laboratory scientist through the operator at 0351 after this was suggested by [RN E]. [Dr B] informed the scientist that there was a positive blood culture on a

child and the laboratory scientist knew this would have been the same child whom she had processed blood results on earlier that night. The impression conveyed to the scientist was that the results could not wait until the morning, and that the result of the gram stain was going to influence the management of the child. The scientist therefore agreed to come in and perform the gram stain.

[RN E] suggested to [Dr B] that he call [Dr C], but [Dr B] told her he did not think it was necessary and that [Dr C] had not left the hospital until about midnight, presumably to justify his not calling [Dr C].

[Dr B] documented his plan to await the gram stain result before starting antibiotics. Maintenance IV fluids were charted based on the Starship Intravenous Fluid Guideline that he accessed. That Intravenous Fluid Guideline dictates "maintenance fluids" for a child at [Master D's] age as per what [Dr B] charted. It also gives specific instruction on resuscitation and refers to the Starship Sepsis Guideline. [Dr B] did not review the sepsis guideline. [Dr B] claims to have also reviewed the Starship Fever Investigation and Management Guideline. However, the Starship Fever and Investigation Guideline gives specific guidance for any child that has "any of the following: reduced conscious level, poor perfusion, a petechial rash, signs of cerebral irritation, or just 'looks very sick'". At the time that [Dr B] reviewed [Master D], there was definitely evidence of poor perfusion as he noted, and [Master D] "looked very sick". That criteria having been met dictated a full sepsis work-up, most of which was already underway for [Master D] with the full blood count having been taken on admission, and a blood culture pending, but importantly the guideline dictates that IV antibiotics are to be administered "pending culture results" and cefotaxime 50mg per kg per dose 6 hourly is suggested. There is also a note that "children with poor perfusion, tachycardia or hypotension will require urgent fluid resuscitation: 20ml/kg of normal saline as an initial bolus". At this time, [Master D] had poor perfusion and tachycardia, and potentially hypotension although a blood pressure was unable to be taken. The requirements for urgent fluid resuscitation were present.

The Starship Sepsis Guidelines were not reviewed. Those guidelines indicate that severe sepsis or septic shock should be suspected in a patient with suspected or proven infection, fever and any one of a number of following signs. Those signs include altered mental state in terms of reduced level of consciousness, lethargy, irritability, or floppiness (which was present in [Master D] at the time); reduced peripheral perfusion, cool or mottled skin (which [Master D] also had at the time). The Sepsis guidelines recommend a "code pink" call for patients with suspected severe sepsis/septic shock on the ward. While not immediately evident in the guideline, a code pink call is a 777 call corresponding to an emergency situation. The Sepsis Guidelines also recommend blood tests, the most significant one in [Master D's] case, given the blood tests already available, being a venous blood gas to check lactate levels. [Dr B] ordered that this occur. But empiric intravenous antibiotic cover was not administered as the guidelines would suggest should occur. [Master D] already had IV access available. The guidelines, the same as the Fever Investigation and Management Guidelines, recommended administration of cefotaxime.

At 0352 (16 minutes after viewing the positive culture result), the laboratory scientist was called in to perform a gram stain.

The maintenance fluids that [Dr B] charted were not available on the ward, rather there was a sign within the cupboard where fluids were stored indicating that these could be located in the Emergency Department. [Dr B] offered to [RN A] that he would retrieve these fluids from the Emergency Department for her and did so. RN H, who was an ED nurse working in ED, recalls looking at the clock in ED at the time she had an interaction with [Dr B] when he retrieved the fluids. That time was recalled as 0440 or within five minutes or so of that time. However, the DNM was paged to return to the Children's Ward at 0438, and when she got there a minute or two after the page, the fluids were already in the ward, so [Dr B] must have got them by 0435 at the latest.

[Dr B] was the only on-call doctor in the hospital overnight. He reported leaving the Children's Ward to attend another patient in the hospital following his review of [Master D], which would be consistent with him leaving the Children's Ward to review another patient and then returning before going to ED for the fluids.

At approximately 0430 [RN A] took another set of observations of [Master D]. At that time, those observations were RR 40, HR 144, SpO2 92% on air, T 38.5. These observations were recorded on a piece of paper and [RN A] intended to record this on the PEWS chart after taking a VBG. But events overtook this intention, and the observations were only recorded retrospectively (with an incorrect time of 0410) in the clinical notes. A blood pressure was attempted but was not able to be obtained. [RN A] did not alert any other staff to these observations.

A venous blood gas was taken from [Master D's] hand by [RN A], assisted by the DNM and Sapphire. The exact timing when the venous blood gas was taken cannot be ascertained. However, a page was made from the Children's Ward at 0438 consistent with the DNM being paged to return to the ward to assist. Eclair was also accessed at 0451 by [RN A] so the VBG must have been taken before or after this time. Given the senior nurse [RN E] travelled with the sample of blood taken from [Master D] to ED to perform the VBG test immediately after it was taken, and the timing of that test, as shown on the laboratory record, being automatically routed through to the laboratory, says 0458, the VBG must have been taken some time around 0455.

There is a time period between 0350 (when Ibuprofen was administered) and 0455 (when the VBG was taken) when there are few steps to address [Master D's] deteriorating condition. During that time period, [RN A]'s login has been used to access blood results off the computer on repeated occasions, repeat observations have been taken at approximately 0430, and the senior nurse [RN E] has been paged at 0438. The equipment for the VBG and IV fluids would also have been readied for use. But no steps consistent with the urgency of the situation have been taken. [Master D's] parents also report [RN A] spending a large amount of time at the

nursing station on the computer. The audits report of blood results being accessed support that account.

The VBG result … showed a very high lactate (11.1mmol/L with a normal reference range being <2.0mmol/L) indicative of poor tissue perfusion at the time the sample was taken.

Resuscitation
Shortly after the VBG was taken, [Master D] significantly deteriorated, with increasingly abnormal breathing with grunting, nasal flaring and cyanosis. This progressed to loss of consciousness, lack of responsiveness to stimulation, and eventual respiratory arrest. …

[RN A] administered oxygen at 10L/min via a face mask.

[RN A] quickly paged for [RN E] and [Dr B] to attend the … Ward. Two pager calls were sent: at 0456 and 0457 consistent with these pages. No 777 call was made.

[RN E] answered a pager from the ED at 0457, consistent with her being present in ED for a VBG test at 0458 (clocks on the machine are not necessarily exactly synchronised with the pager clock and could be a few minutes different). [Dr B] was attending a patient on … ward when he was paged to attend. Phone logs note this was the page sent at 0457 and answered at 0459. [Dr B] instructed that [Dr C] be called to assist while moving to the … Ward. [RN E] prompted an independent call to [Dr C]. [Dr C] was paged at 0501. When [Dr B] arrived, it is not clear who was present in addition to [RN A] at the time. But [Dr C], RN H and [RN E] arrived within a short space of time. Breathing support was initiated with bag mask ventilation and an oro-pharyngeal airway inserted. While the ventilation was being provided, there was ineffective monitoring of [Master D's] cardiac status with an oximeter attached to his toe that was not reading effectively. At some point it was noticed that [Master D's] heart had stopped. It is not clear how this was noticed. But with the arrival of RN H, this allowed [Dr B] and RN H to alternate the respiratory support being provided and would have allowed the [Dr B] to listen to [Master D's] chest. This may be what made it apparent that [Master D's] heart had stopped and chest compressions commenced. It cannot be established how long [Master D's] heart had stopped beating prior to this … The best that can be gauged is his heart had stopped between …

[Dr C] arrived at approximately 0510 and immediately led resuscitation efforts. A defibrillator was attached at 0512. At this time [Dr C] noted that [Master D] had widely dilated pupils, and was in asystole, and had perimortem pulmonary oedema. [Dr C] considered that [Master D] had already passed away prior to CPR starting.

The blood culture flagged as positive on the laboratory automated system at 0308 and became available to view electronically in [Health NZ's] electronic health records system, … at 0309. This positive result was accessed and first viewed at 0336 using [RN A]'s login. [Dr B] viewed the result while it was logged in by [RN A]. This was likely one or more times between 0336 and 0401. It was repeatedly viewed at 0338, 0348, 0350, 0401, 0406, 0419, 0424, 0444, and 0451 all under [RN A]'s login. The views between 0406 and 0451 are almost certainly by [RN A] given she was the only staff member on the ward at the time.

Upon his arrival, [Dr C] took charge of the resuscitation to provide effective, but unfortunately futile, resuscitation efforts.

Resuscitation efforts were documented to have occurred in a manner consistent with ACLS and ANZCOR guidelines. Two minute cycles of chest compressions with pulse checks and IV adrenaline administration commenced. 200mcg IV adrenaline was administered at 0514 and 0520. [Dr C] elected to use a high dose adrenaline strategy with 3 subsequent doses of adrenaline given as 500mcg boluses. At no stage was a cardiac rhythm amenable to defibrillation noted, with the resuscitation being managed as an asystolic arrest.

Chest compressions were performed by several of the staff members involved. The manner in which staff positioned themselves on the bed varied. The specific hand placement technique also varied with some staff using a one hand technique while others used a two handed technique. The effectiveness of chest compressions was adequate however, as evidenced by the return of pulsatile blood flow on the attached monitor (noted only while compressions were being performed). ANZCOR paediatric guidelines are that a one hand or two hand technique for chest compressions is acceptable if a 1/3 anteroposterior diameter compression is achieved. These guidelines specify the patient should be supine on a flat surface but do not specify how the individual performing chest compressions should position themselves.

Notes from the senior clinicians involved state that the timing and conduct of chest compressions was of good quality once CPR had been established. [Master D's] family recall assertive and directive instructions (yelling) being given to various team members regarding the speed of chest compressions after [Dr C] arrived. Discussions with the staff involved however indicate the directions and conversations held were typical for a resuscitation situation.

[Dr C] attempted to intubate [Master D] at approximately 0520. This was technically challenging due to [Master D's] age, his heavily soiled airway, and prominent pulmonary oedema. It was not immediately obvious if the ETT tube had been placed in the trachea, hence this was removed and the ventilation management strategy returned to bag mask ventilation. This approach is consistent with ANZCOR paediatric resuscitation guidelines.

… [Master D was successfully intubated] with a size 5.0 endotracheal tube. This was noted to be leaking and so was swapped out for a size 5.5 tube. Ventilation continued via this ETT with chest compressions ongoing.

It is noted that the three episodes of laryngoscopy and endotracheal intubation elicited no response despite being performed without the assistance of an induction agent or muscle relaxant.

The first dose of empirical antibiotics was administered at 0525 when 1g of ceftriaxone was given IV.

The first gram stain result was phoned to the clinical staff at 0556. This was after resuscitation had stopped … This initial gram stain was reported as a gram-negative diplococcus with a suspicion for *Neisseria meningitidis*.

Subsequent testing instead clarified this as *Streptococcus pneumoniae*. Both of these organisms are typically sensitive to ceftriaxone.

Outcome of patient

No post mortem was performed that would have provided a clearer picture of any reasons why [Master D] might have deteriorated so quickly (for instance, if [Master D] had a congenital condition of having no spleen, that would be relevant to his fast deterioration). That decision was made in consultation with [Master D's] parents and the Coroner.

[Master D's] death certificate listed his cause of death as:

1. Cardiac arrest secondary to (2)
2. Strep pneumoniae septicaemia
3. Intercurrent viral illness (URTI)

The *Streptococcus pneumoniae* was subsequently identified as serotype 23b — this serotype is not covered by childhood PCV10 or PCV 13 immunisations that [Master D] had received.

OTHER FACTORS

Personnel information

This serious incident took place on [Dr B's] second set of nights when working as a locum in [the public hospital]. [Dr C] had worked a week of night shifts the previous week at [Health NZ]. He has a number of years experience working … and is a registered medical practitioner with the Medical Council of NZ.

…

[Dr C] qualified as a medical practitioner in … and is registered with the Medical Council of NZ. He has worked in a number of … roles across both New Zealand and Australia. He has been employed by [Health NZ] …

[RN A] was rostered to work on the … Ward when [Master D] was admitted from ED.

[RN A] is a registered nurse who has worked with [Health NZ] since … She is registered with the NZ Nursing Council and is registered to work in general and obstetric nursing roles, as is typical for most registered nurses in New Zealand including nurses working in paediatrics. [RN A] obtained her nursing qualification overseas. She completed a Competence Assessment Programme to gain registration with the New Zealand Nursing Council … Prior to this she worked in multiple neonatal intensive care units outside of New Zealand. At the time of [Master D's] admission, [RN A] regularly worked night shifts. The night of this event was the first of her

rostered set of nights. [RN A] has participated in many professional development courses throughout her time at [Health NZ]. In particular she has completed courses on the paediatric early warning score, paediatric fluid management, paediatric intravenous care, communication, ISBAR communication, and cannulation and venepuncture. [RN A] had also reviewed documentation that was present on the … [ward] directed at identification and management of sepsis. This information had previously been provided to nurses as an in-service education session which [RN A] did not attend. Her review of this information was completely self-directed.

… [RN E] is a senior and very experienced nurse who has worked for [Health NZ] … She has worked as a [senior staff member] since … She has no specific paediatric experience, although she has been involved with paediatric patients in her capacity as a …

RN F is a registered nurse working in the Emergency Department. She has been registered with the NZ Nursing Council since 2014.

CPR training

The [Health NZ] CPR requirements for permanent staff are documented as:

> CORE intermediate for all nursing staff working on wards.
>
> CPR CORE advanced for all staff working in critical care environments.

All clinical staff are required to attend a [Health NZ] CPR refresher course within 3 months of appointment to [Health NZ], and then on an ongoing annual basis. CPR CORE advanced training is refreshed every 3 years at [Health NZ].

The [ward's] orientation for registered nurses requires that [Health NZ] CPR, NLS and CPR CORE resuscitation courses are completed and attained.

Clinical staff CPR training records are as follows:

[RN A] — External CPR training as a component of the New Zealand Nursing Council Competence Assessment Programme course in … [RN A] did not undergo a CPR refresher course within 3 months of employment. Courses had been available in 2019, and 2020 but were placed on hold due to the COVID-19 pandemic. [RN A] was due to attend a [Health NZ] CPR course on …

[RN E] — [Health NZ] CORE advanced training in …

[RN F] — [Health NZ] CPR refresher training in … No CORE training yet completed at the time of [Master D's] admission …

[Dr B has attended] the ACRRM Rural Emergency Skills Training course. This is an intensive multi-day course focusing on cardiac life support, paediatric life support and trauma and is generally considered equivalent to CPR CORE advanced, ACLS and APLS.

[Dr C] — Pre-engagement documentation noted that [Dr C] had attended … courses on the recognition and response to the critically ill patient … These courses cover CPR. [Health NZ] did not confirm the currency of CPR training prior to the appointment of a locum doctor.

Supervision

The lines of reporting and supervision for this case relate to the medical team and the nursing team.

[Dr B] reported to [Dr C] on the night shift for patients admitted under paediatric medicine, although [Dr B] and [Dr C] never interacted prior to [Dr C] attending the resuscitation. [Dr C] reviewed [Master D] after he was admitted to [the ward]. [Dr C's] next contact point was when he was asked to attend after [Master D] had collapsed.

Nursing reporting lines were to [RN E] for the night …

Communication

Documents, letters, emails

A standard welcome letter was emailed to [Dr B] prior to him starting work on … The welcome letter is brief, providing information about the clinical functioning of the hospital. It details start and finish times for the locum work, junior medical officer handover, the role of the senior nurse, how to contact SMOs, notification of patient admissions and investigation ordering, IT access, the roster, practical aspects of ordering tests, the junior medical officer office, notes and ACC information, as well as details for locum accommodation and general information about [the public hospital]. This letter contains no references to the [ward], or expectations for management of paediatric patients.

The locum contract for [Dr B] details the hours of work and what wards he would be covering. It does not include a detailed job description.

A locum junior medical officer orientation pack is available at the start of their first shift and contains the following:

— Use of the Regional Health Connect and result sign off requirements
— Electronic radiology results viewer
— Junior medical officer "a day in the life of" detailing day-to-day functioning of this hospital from junior medical officer perspective.
— EWS pathway
— AED operation instructions
— NFR guidelines
— CPR, Massive Transfusion and Advance Directive policy
— NLS, ACLS, CICV, choking, difficult airway, anaphylaxis and BLS pathways

— Information about the Paediatric Emergency Drug Dose calculator

The orientation pack is about the clinical functioning of the hospital. There is no specific detail about the threshold for involving a consultant in clinical decision making, or how this may differ from large tertiary hospitals. There is no guidance on paediatric admissions, the rural environment and transalpine model of care, SMO notification or the use of Hospital HealthPathways. [Dr B] stated that, as a locum where he does not know the supervising SMO, his threshold for calling the SMO is low.

Individual/team interaction

Communication between [Dr B] and [Dr C] did not occur until after [Master D] had collapsed.

A written admission note from the Emergency Department documented a plan to admit [Master D] under RHM/Paediatrics and consider surgical review in the morning if his abdominal pain localised to the RIF. This plan was discussed with the surgeon on call and [the ward's] nurse [RN A]. [Dr C] considered the documented admission plan was self-explanatory so did not directly communicate this to the on-call doctor [Dr B]. The documented plan provided no prompt to be alert for any deterioration or what might prompt a reference back to the SMO. It simply stated "*Admit RHM overnight, Consider Surgical Review mane if localises pain into RIF. NBM*".

The electronic Emergency Department admission note for [Master D] was reviewed by clinical staff multiple times through the course of the night including midnight, 0240, 0256, 0337, 0339, 0340, 0401, 0411 and 0419.

RN A had a discussion with [Dr B] about the significance of [Master D's] condition and suggested contacting the SMO. [Dr B] decided to call [Dr C] after the VBG and gram stain results were known.

RN E saw [Dr B] when he went to ED to get fluids. She suggested [Dr B] could call the SMO caring for [Master D] and reassured [Dr B] that the SMO would not mind being called. She had not been directly involved in [Master D's] care previously, and did not know [Master D's] current condition, and therefore had no information to suggest a concern about [Master D's] condition. Her suggestion, which was more of a reassurance that any contact with the SMO was okay, was not taken up. However she was aware that when [Master D] was admitted to the Children's Ward he wasn't considered to be seriously unwell.

[Dr B] was described as being calm and confident during interactions which reassured others that there was no cause for concern.

Information provided to patient/relative

[Master D's] parents report they felt their concerns that [Master D] was deteriorating throughout the night were heard but not acted upon. They reported that he had vomited several times, and that this was worsening. They also had concerns his behaviour was abnormal

and that his condition was deteriorating. They report repeatedly notifying [RN A] and the on-call doctor about these concerns. The response of [RN A] was reportedly by way of hand signals giving a thumbs up or thumbs down, with only two conversations with the family throughout the shift. One was on an admission form to be completed, and the second obtaining a urine sample. At the time of [Master D's] arrest, [Master D's] mother reports that she offered to [RN A] that she could call ED for additional assistance as there was an apparent lack of urgency by [RN A]. The on-call doctor reportedly reassured the family that [Master D's] condition was consistent with a viral illness and was not of concern at the time instructions were given to commence IV fluids and obtain a gram stain.

The vital signs chart includes an element where the person completing the chart can indicate parental concern. This element does not contribute to the PEWS score, and was not ticked at any time on [Master D's] chart. There is nothing at that Health NZ district that mandates what is to occur if this box is ticked (unlike other Health NZ districts where the form is also used). There is no formal mechanism in the [Health NZ district where this public hospital is located] by which family members can escalate their concerns.

ORGANISATION AND MANAGEMENT

This event occurred at [the Public] hospital.

At [the Public] hospital, it routinely rostered one employed nurse to cover the Children's Ward night shift. The Children's Ward is located midway between the ED and the surgical/ medical wards.

Policies, procedures, guidelines

Health NZ policies relevant to this case include:

— Inpatient Care of Children at [public hospital] Procedure

— Blood Culture Guidelines

— Antibiotic Use Policy

— Cardiopulmonary Resuscitation Policy

— Clinical Management — Death of a Patient

Nursing procedures relevant to this case include:

— Lippincott: Venepuncture, paediatric

— Lippincott: Cardiopulmonary arrest management, paediatric

— Hospital Health Pathway: Paediatric Early Warning Scores

Health NZ district resources relevant to this case include:

— Sepsis in Children Hospital Health Pathway (not available at the time of [Master D's] death)

— Paediatric Sepsis Screening and Action Tool (not directly accessible from [Health NZ] at the time of [Master D's] death)

— Paediatric Early Warning Scores (PEWS) Hospital HealthPathway

— Empiric Antimicrobial Guidelines in Children Hospital HealthPathway

— Death of a Child Hospital HealthPathway

— APLS Advanced Life Support Algorithm

The [public Hospital (located in another Health NZ district)] HealthPathways are accessible via the [local public Hospital HealthPathways site/intranet] (subject to the specific exclusions above). They are headed with a caution that they are unadapted for the [local public hospital].

LABORATORY REVIEW

From 7am to 11pm every day there is a remotely monitored alarm that alerts a laboratory scientist to a positive blood culture who would normally view the result and contact the doctor on duty. Outside of these hours, the alarm system is not monitored and does not notify any staff about a positive result unless they are in the laboratory to hear an audible alarm.

For the purposes of this review, people associated with that review have been spoken to, but the entire review has not been duplicated. Nonetheless, it is appropriate to mention in the context of this review one pertinent point that, to an outside observer, may raise concern.

That issue is the non-monitoring of the alarm on blood cultures overnight (between 11pm and 7am). That set up is reported to be the same as what is in place in many areas around the country. That is because it is impractical to be able to staff the laboratories after-hours to monitor for this type of alarm.

The alarm is also non-specific in terms of generating a positive result. In practical terms, that means there will be a considerable number of false positives where the alarm goes off but is of no significance. Consistent with that position, the Laboratory Service has previously audited the positive alarms out of hours, and these alarms outside of working hours overwhelmingly would not have altered any clinical management.

There are also two other important factors to comprehend with the laboratory system around alerts on blood cultures. First, blood cultures are typically cultured for a longer period than occurred in this case before they become positive. There is no indication when an alarm arises how long the blood culture has been cultured for. Accordingly, the majority of positive cultures are likely to become positive after more than 24 hours of culture. The fact that the alarm in this case became positive so soon after the taking of the sample, within approximately four hours, is unusual and would represent severe bacteraemia.

The second point is that the fact of a positive blood culture is not something on its own that would or should guide clinical practice. Rather, it is one piece of the puzzle that a clinician can take into account. The fact of a positive blood culture is evident on the system, as it was in this case, when the clinician reviews a patient. That information allows empiric treatment with antibiotics if that is deemed clinically appropriate, and in accordance with available clinical guidelines.

The laboratory review recommended certain actions, and these are not duplicated for the purposes of this review.

ANALYSIS/CARE DELIVERY PROBLEMS AND ROOT CAUSES

Attached as a schedule is a flowchart detailing certain events during [Master D's] stay in hospital, spanning from his admission to the ward at 2330hrs and his peri-arrest state at approximately 0456–0459hrs. That flowchart also identifies certain analysis of these steps, and identifies care delivery problems in accordance with the guidance provided by the London Protocol. In addition to these care delivery problems being identified, where possible and where applicable, contributory factors (root causes) are set out.

The flowchart identifies 0320 as a critical point in time. That identification should not be taken to suggest that if different action was taken at this time that [Master D] would have survived. The reference is intended to indicate that at this point in time there were clear indications to take urgent action that may have resulted in a different outcome.

There are certain actions in the period of 0410hrs to 0455hrs where no contributory factors have been able to be identified in relation to the care delivery problems. Each of these particular points in time on the flowchart are addressed below.

2330HRS OBSERVATION

The admission of [Master D] for observation with a high white cell count and neutrophilia with no antibiotics administered is consistent with applicable guidelines such as the Starship Fever Investigation and Management Guideline. As that guideline specifies, for a child presenting as [Master D] did, children with this presentation have a rate of bacteraemia of approximately 2% and the majority of these cases resolve spontaneously.

DETERIORATION ON WARD — 0030–0230HRS

[Master D's] parents describe a noticeable deterioration in [Master D's] condition during this time period. Their interactions with the nurse were described in a way that would be unusual for a nurse who in this case only had one patient to attend to. The parents describe a lack of verbal communication and that the nurse's responses were simply a thumbs up or a thumbs down based on what they were telling them. Overall, the impression given to the parents was that the nurse was not concerned at what they were informing her of and they took reassurance from this. This perception may have been contributed to by [RN A]'s quiet personality. Nonetheless, [RN A] during interview did explain that the parents were worried, so she must

have appreciated that fact, but instead of notifying others of that concern she sought to act confidently to reassure the parents.

There are a number of contributory factors that can be identified in terms of [RN A] failing to appreciate the significance of [Master D's] deterioration during this period.

First, the documented admission plan gave no suggestion that there should be any deterioration expected with [Master D], nor provided any guidance as to parameters that should be acted upon to escalate or seek further review.

Had the documented plan given a greater suspicion of a possibility of deterioration, this could have increased the chances of prompting an earlier review.

Regardless of a plan, there should have been a greater response by the nurse to the parental concern. The only steps that were taken were hourly observations, and no information to suggest other actions were taken such as performing a more detailed examination of [Master D] (like the senior nurse [RN E] did when the parents reported a concern to her) to potentially identify his deteriorated condition; or calling the on-call doctor to review [Master D].

In considering these contributory factors, there is potential relevance of the fact that [RN A] regularly works nights and has less exposure to colleagues than some other nurses that more regularly work day shifts. A nurse frequently working on night shift, particularly in an isolated way, is susceptible to slipping under the radar in terms of what would generally be expected of a nurse's actions in the clinical setting.

[RN A]'s prior experience features time overseas in neonatal intensive care units. While children in those units can be severely ill, a neonatal intensive care unit involves care in a highly monitored environment with many staff immediately available. That is quite a different setting to the night shift at [the public hospital] as the sole nurse present. The employment and orientation process of any paediatric nurse needs to focus on the specifics of the nurse's paediatric experience in terms of suitability and what further experience may be required before working alone.

EVIDENCE OF RASH — 0320

Photographs were taken of [Master D] by his parents that clearly show a rash that is pathognomonic of sepsis. [Dr C] has also been shown a photograph of another patient that is available on the internet with the same rash and he has confirmed this was the rash that was present at the time of his review.

This point in time was a significant one in being able to identify that [Master D's] condition was severe. He had a rash that was consistent with sepsis, he had a high white cell count, he was febrile, and it was known that he had positive blood cultures (albeit the organism had not been identified). There was also parental concern.

[The public hospital] had not ensured that [Dr B] had the appropriate information regarding local hospital pathways and other clinical decision support tools before starting his locum. Some clinical tools are the same as for other [Health NZ districts] where he was employed, but there was no clear directive to use these while at [the public hospital] and under what clinical circumstances the pathways should be adhered to. The orientation package was not specific and detailed to cover the role that the locum was undertaking and assumptions were made regarding technology knowledge and the overlap of [the public hospital] and [other Health NZ district systems]. Nonetheless, [Dr B] was able to access, and did access, guidelines available through Starship. If those had been correctly followed, they should have prompted urgent action, instead clinical priority was given to identifying the organism with a gram stain, obtaining a VBG and starting maintenance fluids, as opposed to early antibiotics, calling for senior help, and fluid resuscitation.

Despite being able to access clinical guidelines available through Starship that any member of the public can access, there is additional benefit to be obtained by having a ready route of access through to applicable guidelines that could be available through another Health NZ district.

It is also relevant that there was a presentation about sepsis available in hard copy on the ward at the time along with a Paediatric Sepsis Screening tool published by Sepsis Trust NZ. [RN A] had viewed that prior to the night in question. Had the guidance in that material been followed, it would have prompted several steps to be taken including calling a senior clinician, and administration of antibiotics.

Overall, with all of the staff present around the critical time, being [Dr B], [RN A], and [RN E], no one had sufficient paediatric experience so as to be able to recognise the significance of [Master D's] condition. Deference seems to have been paid to Dr B's views. Unfortunately, this is an example of a doctor not knowing what they do not know. Recommendation 5 below attempts to address this scenario.

The recommendations below contemplate the fact that future staff experience may also be limited, and so steps to access experience are needed.

INCREASE IN PEWS SCORE — 0430 APROX.

At approximately 0430 a further set of observations were taken of [Master D's] condition. At this time, his PEWS score had increased to 6, even with the absence of a blood pressure reading. A blood pressure was attempted to be taken but was unsuccessful.

The increase of a PEWS score to 6 should have prompted escalation in accordance with the PEWS policy. That policy dictates that urgent review is to be requested if a score has increased by greater than four in the last hour. The score of 6 on its own also dictates that an on-call doctor or senior doctor review should be requested within 15 minutes and that the matter should be discussed with a senior clinician covering paediatrics. None of these actions were put into effect.

[RN A] was the only staff member who knew of this PEWS score, as it was not conveyed to anybody else. [RN A] had been through specific training on the paediatric early warning score at the start of 2020, and the documentation is explicit on the requirement to call for a PEWS score of 6. In response to a draft version of this report, [RN A] explained that the observations were recorded on a piece of paper for transcription into the PEWS score later; and that the PEWS score was not actually calculated at the time. It was also explained that the VBG was then taken and, with [Master D's] sudden deterioration, these were not able to be written into the notes until after [Master D's] unsuccessful resuscitation.

However, that explanation does not explain the failure to act on a significant increase in [Master D's] respiratory rate and heart rate, which should have triggered alarm. When interviewed, [RN A] also explained that her rationale for attempting to obtain a blood pressure reading was to exclude hypotension when his other readings had increased compared to previous ones. She also explained her perception that [Master D] was noticed to be sicker at this time. With that rationale and knowledge that [RN A] had, it is of concern that a VBG and administration of fluids was prioritised over escalation to the on-call doctor about [Master D's] condition. It is also of concern that observations were recorded either without identifying the time they were taken on the paper being used at the time, or with the wrong time. This concern suggests a lack of appreciation of the importance of accurate observations and the need to act on them.

There is no systemic contributory factor able to be identified for this care delivery problem.

SUGGESTION TO RMO TO CALL SENIOR — 0430 APPROX.

At approximately 0430, RN H, who knew nothing about the current state of [Master D], made a suggestion to [Dr B] that [Dr C] could be called despite the time. That suggestion was dismissed by [Dr C], no doubt due to his lack of appreciation of the seriousness of [Master D's] condition at the time.

This care delivery problem is addressed by the recommendations made above.

TAKING OF BLOOD GAS — 0455

At the time a venous blood gas was taken from [Master D], he would have been in a peri-arrest situation. His PEWS score, if it had been taken, would likely have been at least 6 given it had been at this level approximately 25 minutes earlier, and we now know that he arrested soon after.

Given that likely scenario, to a clinician experienced in paediatric medicine, they likely would have recognised just by [Master D's] appearance that he was in a precarious situation. Unfortunately, due to the lack of relevant paediatric experience, neither [RN A] nor [RN E] were able to recognise this.

This lack of experience is hard to address by way of a recommendation as it is very individualised to particular staff, and it cannot be identified which staff are going to come across which scenario into the future. For this reason, it is imperative that at an early stage, in this case at

approximately 0320, there is escalation so as to obtain experienced assistance. The above recommendations are intended to serve that need.

ARREST — 0457

At the time that [Master D] went into a peri-arrest state, calls for assistance were made, but this was not done through the emergency 777 system. On questioning [RN A], she had had no experience with a 777 call ever being made, and that lack of experience included no instigation of a call herself, nor witnessing the response to a call. It was suggested during the review process that any person would know that 777 is the call that is made in a clinical emergency. However, while that may be correct for a New Zealand-trained professional, it is not necessarily so clear to somebody that has received training in a foreign country and worked in different hospital settings. That is particularly the case in paediatrics where emergency calls would seemingly be made less often than others. Given the irregularity of a 777 call in the paediatric environment, there is likely to be advantage in conducting periodic drills, ensuring that these drills are timed so as to ensure all staff are exposed over several drill scenarios. This is in a similar way to fire alarms being addressed via drills.

OTHER ISSUES

At no stage during the night was there a complete set of observations taken to calculate [Master D's] PEWS score. In particular, a blood pressure reading was never taken. It is accepted that a blood pressure reading can be sometimes difficult to obtain on a child of [Master D's] age. But this case stresses the importance of having all available information and there should be a high threshold for deciding that a blood pressure is too hard to obtain.

The events in this case could usefully be used to demonstrate, as part of ongoing education of staff, the importance of obtaining a blood pressure in a child. Further, PatientTrack has been suggested for implementation in the Children's Ward at [the public hospital]. If that has not already occurred, it should be.

As is referred to above, there was a lack of currency in staff CPR training. This likely was not relevant to the outcome of [Master D], but highlights that CPR training needs to be current for all staff and assured for locum staff that are employed at [the public hospital].

POSTSCRIPT

The circumstances of this review were quite unusual in that steps have been taken to review the care internally prior to this review occurring. That has meant that some information was already available, and new information was gained so as to provide a fuller picture of what occurred during [Master D's] care.

It was helpful that all staff involved, except [Dr C], were willing to participate in this review process. Further, while difficult for them, [Master D's] family provided useful insights into what they experienced during the night in question. They made comments to the effect that they understand that even if events had occurred in a perfect way, the outcome for [Master D] may

have been the same. That appears to be a correct view, but as they also relevantly, and correctly, added [Master D] was not given the best chance.

It is hoped that, with this review and serious consideration of the recommendations made, a future similar event can be avoided. Nonetheless, cases of pneumococcal sepsis can cause a devastating outcome despite the best care being provided. But, ensuring that staff follow the procedures in place, and having a process that mandates a call being made to a senior doctor, will hopefully enable suitable intervention to occur earlier. The staffing situation of [the public hospital] cannot ultimately rely on an assumption that staff will have the necessary experience to immediately recognise an extremely serious situation, and steps need to be taken to address that scenario so as to avoid a repeat.

It was also mentioned by several people interviewed that there could be benefit in having more than one nursing staff member present on the Children's Ward overnight. That suggestion has not been adopted as a recommendation and, given the potential significance of it to some people, the fact that it has not been adopted warrants comment. In this case, the overwhelming view as to why escalation did not occur earlier, was that staff did not recognise the severity of the situation and, tied in with that, the speed at which [Master D] would deteriorate. That situation will not necessarily be solved by having another staff member present at the time. The number of patients on the paediatric ward would also seemingly not warrant the additional staff resource. It also commonly occurs, in the situation of adverse events, that a situation of "group thought" occurs. That situation is only likely to be replicated by having an additional nurse present. The recommendation that contact be made with the SMO upon a triggering event of an on-call doctor review, would appear to be a better solution that is not so dependent on staff experience or the number of staff present.'