**Canterbury District Health Board** 

A Report by the Deputy Health and Disability Commissioner

(Case 18HDC02160)



# Contents

Executive summary	1
Complaint and investigation	2
Information gathered during investigation	3
Opinion: Canterbury District Health Board — breach	
Opinion: Medical centre — adverse comment	24
Opinion: Urgent care clinic — adverse comment	26
Recommendations	27
Follow-up actions	28
Appendix A: Independent advice to the Commissioner	29
Appendix B: Independent advice to the Commissioner	
Appendix C: In-house advice to the Commissioner	46

## **Executive summary**

- 1. This report considers the care provided to a three-year-old boy by three group providers over two days.
- 2. The boy became unwell and was seen twice at a medical centre. On the second presentation, the GP kept the boy for observation until the clinic closed in the evening, and then transferred him to an urgent care clinic. He was then referred by the urgent care clinic to a public hospital.
- 3. On arrival at the public hospital, a Child Observation Chart was commenced for the boy and he was transferred to the children's ward. Observations were entered into the chart on nine occasions. However, specific observations were not taken regularly or entered into the chart accurately and, as a result, the corresponding Paediatric Early Warning Scores (PEWS) were inaccurate. Overnight the boy's observations remained fairly stable, but in the morning his condition deteriorated rapidly. Tragically, he passed away. The cause of his death identified at post mortem was bilateral pneumococcal pneumonia.

## Findings

## Canterbury District Health Board (CDHB)

The Deputy Commissioner considered that there were a number of failures by CDHB's staff 4. and systems in the care provided to the boy. Specifically, staff made multiple assumptions, including that the boy's illness was pneumonia without sepsis, that because his PEWS (calculated incorrectly) were relatively stable overnight he was not deteriorating, and, when his observations did indicate deterioration, that he would be reviewed promptly during the morning ward round. In addition, the PEWS management plan and care plan documents did not state that observations were to be undertaken hourly for a child receiving oxygen therapy; nursing staff did not obtain complete sets of observations, and made multiple errors in entering data into the chart and calculating the PEWS; nursing staff failed to think critically about the boy's overall clinical picture and recognise the signs of deterioration and, as a result, failed to escalate the boy's care appropriately; medical staff failed to consider the overall clinical situation presented by the boy's symptoms, signs, PEWS, and his blood results, and to explore the possibility of sepsis more thoroughly; and there was a culture of non-compliance with the PEWS management plan by nursing and medical staff. Accordingly, the Deputy Commissioner found CDHB in breach of Right 4(1) of the Code.

## Medical centre

5. The Deputy Commissioner was critical that in respect of the boy's second presentation to the medical centre, pneumonia was not included in the differential diagnosis, and other than the triage nurse's observations, no further observations were recorded in the clinical notes.

## Urgent care clinic

6. The Deputy Commissioner noted that ideally the Child Observation Chart at the urgent care clinic would have recorded full observations, including responsiveness and BP.



#### Recommendations

- 7. The Deputy Commissioner recommended that CDHB provide evidence that all the recommendations from its Serious Event Review have been implemented and their impact evaluated; provide training to paediatric nursing and medical staff on recognition of the deteriorating child based on the management plan dictated by the PEWS and responding to the overall clinical picture, and on critical thinking and challenging assumptions; and provide a written apology to the boy's parents.
- 8. The Deputy Commissioner recommended that the medical centre provide training to clinical staff on the recognition and treatment of sepsis in children, and provide a written apology to the boy's parents.

## **Complaint and investigation**

- 9. The Health and Disability Commissioner (HDC) received a complaint about the services provided to Master A by Canterbury District Health Board (CDHB). The following issue was identified for investigation:
  - Whether Canterbury District Health Board provided Master A with an appropriate standard of care in 2018.
- 10. This report is the opinion of Rose Wall, Deputy Health and Disability Commissioner, and is made in accordance with the power delegated to her by the Commissioner.
- 11. The parties directly involved in the investigation were:

Mr A	Complainant/consumer's father
СДНВ	Provider
Dr B	Consultant paediatrician
Dr C	Paediatric registrar
Dr D	Paediatric registrar
RN E	Clinical Nurse Co-ordinator
RN F	Registered nurse
RN G	Charge Nurse Manager
RN H	Registered nurse
RNI	Registered nurse
RN J	Registered nurse

12. Further information was received from:

Medical centre	General practice
Urgent care clinic	
Dr K	General practitioner (GP)
Dr L	Urgent care physician
Office of the Coroner	



30 November 2020

13. Also mentioned in this report:

Dr M

GP

Independent clinical advice was obtained from a paediatrician, Dr Simon Rowley (Appendix A), and from a paediatric nurse, RN Thomas Gorte (Appendix B). In-house clinical advice was obtained from GP Dr David Maplesden (Appendix C).

## Information gathered during investigation

#### Introduction

15. This report considers the care provided to Master A, a three-year-old boy, by three providers over two days. Tragically, Master A passed away. The cause of his death identified at post mortem was bilateral pneumococcal pneumonia.

#### Background

<sup>16.</sup> On Day 1,<sup>1</sup> Master A became unwell with a runny nose, cough, and a temperature. During the day on Day 2, he appeared to improve slightly. However, in the evening, he vomited when his mother, Mrs A, gave him paracetamol and ibuprofen. Master A slept poorly overnight.

## Day 3

#### First presentation to medical centre

- 17. On Day 3, Mrs A took Master A to a medical centre. At 11.33am, Master A was seen by a nurse for a triage assessment. The nurse noted that Master A had been unwell with a fever and cough for the preceding few days, and that he was grunting while breathing. She documented his vital signs as: temperature 36.9°C; respiratory rate 28 breaths per minute; oxygen saturation 94–95%; and heart rate 178 beats per minute (bpm).<sup>2</sup>
- <sup>18.</sup> GP Dr K saw Master A at 11.52am. Dr K noted that Master A was lethargic and tachycardic<sup>3</sup> but otherwise his observations were stable. Dr K's impression was that Master A had a viral upper respiratory tract infection and was dehydrated. He prescribed Pedialyte<sup>4</sup> and Brufen,<sup>5</sup> and noted that Master A was to be brought back to the clinic if he became worse.



<sup>&</sup>lt;sup>1</sup> Relevant dates are referred to as Days 1–4 to protect privacy.

 $<sup>^{2}</sup>$  The normal body temperature for a healthy three-year-old child is approximately 37°C; the normal respiratory rate is 25–30 breaths per minute; normal oxygen saturation is generally 95–100%; and normal heart rate is 95–140bpm.

<sup>&</sup>lt;sup>3</sup> A faster than normal heart rate.

<sup>&</sup>lt;sup>4</sup> An oral solution used to prevent dehydration in children.

<sup>&</sup>lt;sup>5</sup> Ibuprofen (a non-steroidal anti-inflammatory medication).

## Second presentation to medical centre

- 19. After returning home from the medical centre, Master A's condition did not improve. He was sleepy and did not want to eat or drink. Mrs A told HDC that she rang the telephone health information service at approximately 5.30pm, and was advised to return to the medical centre.
- 20. Mrs A and Master A arrived at the medical centre at 6.46pm, and Master A was seen by the triage nurse at 6.48pm. The nurse noted that Master A was lethargic and his breathing was "heavy", with a "low pitched grunt". She documented his vital signs as: temperature 36.2°C; heart rate 162bpm; oxygen saturation 92%; and respiratory rate 47 breaths per minute.<sup>6</sup> No further sets of observations were recorded.
- 21. At 7.01pm, Master A was seen by GP Dr M. Dr M noted that Master A had a "mild dry tongue", "mild [increased work of breathing]", and crepitations.<sup>7</sup> Dr M's impression was that Master A was mildly dehydrated with a viral wheeze. Dr M told HDC that they initiated observation and treatment at the medical centre, which involved administering six puffs of salbutamol<sup>8</sup> via a spacer to Master A at 7.25pm and administering 2.4ml of Redipred<sup>9</sup> at 7.28pm. Dr M documented that staff were to repeat observations every 30 minutes. Dr M stated that she intended to review Master A again in an hour's time.
- Dr M told HDC that Master A fell asleep after being given the medication, but then woke up with heavy breathing. She said that he was observed in the medical centre until it closed at 8pm, but she did not consider that his condition had improved enough for her to discharge him home safely. Therefore, she rang the urgent care clinic and spoke with the doctor on duty, urgent care physician Dr L. Dr M documented that Dr L agreed to observe Master A at the urgent care clinic's observation unit, and Dr M sent a formal referral at 8.14pm.

## Transfer to urgent care clinic

- <sup>23.</sup> Master A arrived at the urgent care clinic with Mrs A at 8.45pm. On arrival, the triage nurse documented Master A's vital signs in the clinical notes as: temperature 36.3°C; heart rate 167bpm; respiratory rate 40 breaths per minute; and oxygen saturation 100%. The triage nurse also documented that Master A did not have an increased work in breathing but had an occasional mild grunt. Dr L stated that the triage nurse recalled doubting the oxygen saturation reading, and therefore readjusted the probe and confirmed the reading to be 100%. Master A was admitted to the observation unit at 8.50pm.
- 24. A Child Observation Chart was commenced, and Master A's vital signs as documented by the triage nurse at 8.45pm were recorded on the chart, although it was also recorded that Master A had moderate respiratory distress. Blood pressure (BP) and responsiveness were not recorded on the chart. In response to the provisional opinion, the urgent care clinic acknowledged that Master A's responsiveness had not been recorded on the chart.

4

<sup>&</sup>lt;sup>6</sup> The normal respiratory rate for children aged two to five years ranges from 25 to 30 breaths per minute.

<sup>&</sup>lt;sup>7</sup> A grating or crackling sound when breathing.

<sup>&</sup>lt;sup>8</sup> A medication used to treat tightening and narrowing of the muscles that line the airways in the lungs.

<sup>&</sup>lt;sup>9</sup> A medication used to treat inflammation and swelling of the airways.

- <sup>25.</sup> Dr L reviewed Master A at 9.05pm. She documented that Master A continued to have tachypnoea<sup>10</sup> and hypoxia,<sup>11</sup> with left lower lobe crepitations on inhalation. She stated that although not documented, she measured his oxygen saturation at this time, and the reading was 88% on room air. She said that this reading surprised her, as the reading at triage had been 100%. Dr L stated: "In my mind, he was more unwell than I initially thought when I accepted his transfer from [the medical centre]."
- 26. Dr L ordered a chest X-ray and asked the nurse to administer six puffs of salbutamol immediately to see whether this improved Master A's oxygen saturation. At 9.15pm, the nurse documented Master A's vital signs in the chart as: respiratory rate 40 breaths per minute; moderate respiratory distress; oxygen saturation 89%; heart rate 167bpm; and temperature 36.2°C. Master A's BP and responsiveness were not recorded, but his PEWS<sup>12</sup> was recorded as 8. According to the chart, for PEWS of 6 or more, a number of steps are to be followed, including increasing observations to every 15 minutes or attaching a monitor. Master A was given six puffs of salbutamol, after which his oxygen saturation was 92%. In response to the provisional opinion, the urgent care clinic noted that both the nurse and Dr L mentioned Master A's level of consciousness in their notes at least once, including at 8.50pm when the nurse wrote, "[Master A] looks very tired", and at 9.05pm when Dr L wrote that Master A had "[b]een very sleepy".
- 27. At 9.25pm, Master A was taken for the chest X-ray (at a facility co-located at the urgent care clinic, adjacent to the observation unit). The urgent care clinic told HDC that if any delay in obtaining an X-ray had been anticipated, referral to the hospital for review in the first instance would have been appropriate. The X-ray was reported as showing possible right upper lobe and left lower lobe pneumonia.
- Dr L considered that the X-ray indicated significant infection, and when Master A returned from the X-ray, an oxygen probe was attached to monitor his oxygen saturation, which had dropped below 92%. Master A was given oxygen (initially four litres per minute, increased to six litres) via a mask. On six litres of oxygen, Master A's oxygen saturation increased to 95–97%. Dr L discussed Master A with the on-call paediatric registrar at the public hospital's Children's Acute Assessment Unit (CAAU) and they decided that Master A should be transferred to the CAAU. At 9.50pm, the following vital signs were recorded in the chart: respiratory rate 40 breaths per minute, oxygen saturation 97%, and heart rate 167bpm. Master A's level of respiratory distress, BP, and responsiveness were not recorded.
- 29. At approximately 10.21pm, Dr L rang to request an ambulance to transfer Master A to the hospital. The ambulance arrived at 10.31pm.



<sup>&</sup>lt;sup>10</sup> Abnormally rapid breathing.

<sup>&</sup>lt;sup>11</sup> A deficiency of oxygen reaching the tissues of the body.

 $<sup>^{12}</sup>$  Paediatric Early Warning Score — used to identify patients at risk of clinical deterioration.

<sup>30</sup> November 2020

## Transfer to hospital

- 30. The ambulance service's notes record the following initial vital sign recordings for Master A: temperature 36.1°C; heart rate 170bpm; oxygen saturation 90%; respiratory rate 50 breaths per minute; and capillary refill time one second. Master A was administered six litres of oxygen via a mask, following which his oxygen saturation increased to 96% and his heart rate decreased to 160bpm.
- Master A was admitted to hospital at 11.07pm. He was transferred to CAAU at 11.20pm.

## Child Observation Chart

- <sup>32.</sup> Upon arrival in the CAAU, a Child Observation Chart was commenced for Master A. The chart enables clinicians to record vital signs and calculate the corresponding PEWS. The observations included in calculating the PEWS are: respiratory rate; level of respiratory distress; amount of supplementary oxygen being provided; oxygen saturation; heart rate; capillary refill time; blood pressure; and neurological observations. There is also space for recording temperature and method of oxygen delivery, although these do not factor in the calculation of the PEWS.
- <sup>33.</sup> For PEWS of 4–5, the PEWS management plan included with the chart requires the following steps to be taken:
  - The nurse in charge and RMO<sup>13</sup> are to be notified, and the patient's condition discussed with the RMO.
  - The full PEWS is to be calculated.
  - Treatment is to be optimised.
  - A plan is to be formulated and documented, including a timeframe and criteria for review and frequency of observations.
  - The PEWS is to be recalculated following interventions.
- In addition, for PEWS of 6–7, registrar review within 15 minutes is to be requested, observations are to be undertaken every hour at a minimum, and admission to the Paediatric High Dependency Unit (PHDU) is to be considered. For PEWS of 8+, urgent registrar attendance is to be requested, the registrar is to notify the consultant, observations are to be undertaken every 30 minutes, and the patient is to be transferred to PHDU with consideration given to contacting the Intensive Care Unit.

## Assessments in CAAU

35. At 11.20pm, RN F recorded the following observations in the chart: respiratory rate approximately 50 breaths per minute; moderate respiratory distress; oxygen saturation 86–88% on room air; and heart rate approximately 163–165bpm. Master A's BP, temperature, and total PEWS were not recorded. RN F told HDC that she was partway through completing these observations when she saw paediatric registrar Dr C nearby and requested immediate medical review. She stated: "I did this because I could see that

<sup>&</sup>lt;sup>13</sup> Resident Medical Officer — this includes house officers, senior house officers, and registrars.



Names have been removed (except CDHB and the experts who advised on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

[Master A] was unwell, even though I had not completed the PEWS calculation or initial assessment."

- <sup>36.</sup> At 11.25pm, RN F recorded in the chart that Master A was receiving 6 litres of oxygen via a mask, and his temperature was 36.3°C. His total PEWS was recorded as 7. However, according to the chart's calculation algorithm, even without BP and capillary refill time recorded, it should have been 8.<sup>14</sup>
- 37. In respect of the lack of BP recording, RN F stated:

"[Master A] was attempting to remove the oxygen mask and was becoming distressed. A priority at this time was maintaining good oxygen saturation and so not only was obtaining an accurate blood pressure not possible ([Master A] would have needed restraining), it was not a priority."

<sup>38.</sup> Master A's oxygen saturation was not recorded at 11.25pm. RN F cannot recall why she did not record Master A's oxygen saturation, but commented that by this stage it was likely that she had Master A on continuous monitoring or had been unable to record his oxygen saturation as she was busy with other interventions.

#### Day 4

#### Registrar review

- <sup>39.</sup> Dr C told HDC that he reviewed Master A around midnight, and Master A appeared well hydrated and well perfused, and was alert but miserable. At 12.05am on Day 4, Dr C documented Master A's vital signs as: respiratory rate 44 breaths per minute; oxygen saturation 96% on two litres of oxygen via nasal prongs, or 88% on room air; heart rate 168bpm; and temperature 36.3°C. He noted that Master A's capillary refill time was less than two seconds, that Master A was warm peripherally, and that he had moderately increased work of breathing and grunting, as well as crackles and dullness on respiratory examination.
- <sup>40.</sup> Dr C recorded his impression as left-sided pneumonia. His plan was to keep Master A's oxygen saturation above 92% and commence IV benzylpenicillin.<sup>15</sup> Dr C told HDC that it took three attempts to insert the IV cannula, as Master A kept jerking away. RN F told HDC that during this time Master A's oxygen saturation improved, so they replaced his oxygen mask with nasal prongs and reduced the oxygen to two litres per minute. CDHB told HDC that the first dose of benzylpenicillin was given at 12.02am on Day 4. Master A was also given 190 milligrams of paracetamol at 12.08am.
- 41. Dr C told HDC that the X-ray report, which confirmed bilateral pneumonia, was available to view but he could not access software to view the chest X-ray itself. However, he said that



Names have been removed (except CDHB and the experts who advised on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

<sup>&</sup>lt;sup>14</sup> Three points for respiratory rate of approximately 50 breaths per minute; two points for moderate respiratory distress; one point for six litres of supplementary oxygen; and two points for heart rate of approximately 160bpm.

<sup>&</sup>lt;sup>15</sup> An antibiotic medication.

<sup>30</sup> November 2020

given his clinical findings and that he could access the report, which confirmed pneumonia, viewing the X-ray itself would not have changed his management plan.

42. At 12.15am, Master A's vital signs as documented in the notes by Dr C were recorded on the observations chart. The level of oxygen (two litres) was recorded in the box for "<2L/min" (which added no points to the PEWS), as opposed to the box for "2–10L/min" (which would have added one point to the PEWS). Paragraph 32 (above) sets out the observations that are required to calculate an accurate PEWS. Contrary to this requirement, Master A's blood pressure, temperature, and capillary refill time were not recorded. Based on the information recorded as above, his PEWS was calculated as 6.</p>

## Transfer to ward

- 43. CDHB stated that RN F and Dr C both recall a discussion with After Hours Nursing Coordinator RN E about whether Master A should be admitted to the ward, or to PHDU. CDHB said that given the improvements in Master A's oxygen saturation and respiratory rate since admission, they decided that Master A's clinical state indicated that he was suitable for transfer to the ward.
- 44. Dr C told HDC:

"I had anticipated that should [Master A] continue to deteriorate or have an elevated PEWS score, I would be notified, clinically review him and adjust my management plan pending findings of that review."

- 45. RN E told HDC that initially she was paged by RN F to help with Master A's care, and that RN F thought that Master A might need admission to the PHDU. RN E stated that she was in the treatment room, along with RN F and Dr C, for approximately 15 minutes. RN E further stated that what she saw of Master A's monitoring, work of breathing, and general disposition matched Dr C's and RN F's assessment that Master A did not need PHDU-level care. RN E said that Master A's condition seemed serious but stable, and responding to treatment.
- <sup>46.</sup> Dr C stated that shortly after midnight, on-call paediatric consultant Dr B rang for a general update on the paediatric patients, and specifically asked about Master A's condition, as she had been informed of Master A's arrival earlier. Dr B said that she was told that Master A had responded well to 2L of oxygen via nasal prongs, with recovery of oxygen saturation to 96%, and that he was mildly tachycardic but stable, afebrile, well hydrated, and well perfused. She stated that she was not involved in the decision to admit Master A to the ward, rather than the PHDU.
- 47. At 1am, RN F documented that Master A was transferred to the children's ward. She also noted at that time that Master A was grunting while breathing, but that he was settling.

## Care on ward

8

48. RN H provided nursing care on the ward for Master A between 1am and 7am. RN H told HDC that normally she works in the CAAU. She stated that she had been scheduled to work

HX

in CAAU on the afternoon of Day 4 but volunteered at short notice to cover the night shift on the ward on Days 3–4. RN H told HDC:

"In CAAU there is always a doctor there (and now there are two registrars that are always available), whereas in [the children's ward] the nursing staff manage the patients and the doctors review the patients as required, or are available to come to the ward if they are needed or called. [The children's ward] also requires the preparation of care plans, which are not required in CAAU because CAAU patients are only in there for a short time."

- 49. RN H said that she did not have any orientation for working on the children's ward, but she was familiar with the paediatric setting from CAAU, and all the tools, equipment, and observation charts were the same.
- <sup>50.</sup> RN H completed a care plan for Master A upon his arrival in the children's ward. The care plan noted that observations were to be completed every four hours or as required. At 1am, the observations chart was updated to record Master A's vital signs on arrival in the children's ward: respiratory rate approximately 46 breaths per minute; mild respiratory distress; oxygen saturation 97% on two litres of oxygen per minute; heart rate 160bpm; and capillary refill time less than two seconds. Master A's blood pressure and temperature were not documented. The level of oxygen was recorded in the box for "<2L/min". The PEWS was recorded as 5.
- 51. In relation to the absence of a blood pressure reading, RN H told HDC:

"[T]he usual practice at that time was that if the child was sleeping, a blood pressure reading was not necessary. The understanding was that it could do more harm to the child's recovery to wake and stress them, than it would to leave them sleeping. Also the stress of waking them up can give a blood pressure reading that is not accurate ..."

- 52. RN H acknowledged that she recorded the level of oxygen in the "<2L/min" box, as the previous nurse had done, instead of the 2–10L/min box. She stated: "This was not my usual practice, and I know this should have gone into the box above."
- 53. At 1.15am, RN H documented in the clinical notes that Master A was settled with mildly increased work of breathing. She also noted that Master A was receiving two litres of oxygen via nasal prongs and he was due to receive further IV antibiotics at 6am.

#### Blood test results

54. Master A's blood test results<sup>16</sup> became available at 1.30am and were viewed by Dr C at 1.33am. The results included high levels of urea (13.6mmol/L),<sup>17</sup> creatinine (84μmol/L),<sup>18</sup> and C-reactive protein (381mg/L),<sup>19</sup> and low white blood cells (1.1 x10<sup>9</sup>/L).<sup>20</sup> Dr C told HDC

30 November 2020



<sup>&</sup>lt;sup>16</sup> From the sample taken at the time of Dr C's first review at approximately 11.50pm on Day 3.

<sup>&</sup>lt;sup>17</sup> The normal range is 1.1–5.0mmol/L.

<sup>&</sup>lt;sup>18</sup> The normal range 20–60μmol/L.

<sup>&</sup>lt;sup>19</sup> The normal level is <5mg/L.

that the results demonstrated "neutropaenia,<sup>21</sup> mild thrombocytopaenia<sup>22</sup> and markedly elevated inflammatory markers<sup>23</sup>". Dr C stated:

"These were out of keeping with what I was expecting based on how I had clinically found [Master A] on admission and I wondered about the possibility of an underlying cause such as leukaemia which can cause low levels of neutrophils and platelets and would potentially warrant expansion of antimicrobial cover."

55. Dr C said that he telephoned Dr B to discuss this, and Dr B advised him that the results would be consistent with pneumonia, and therefore no changes to the management plan were required. Dr B told HDC that she asked how Master A was clinically, and was told that he remained stable on the ward. She stated:

"Sepsis was considered; however, there was no other information containing 'red flags' for developing sepsis — such as deterioration in level of consciousness, blood pressure, heart rate or temperature."

- <sup>56.</sup> Dr B said that she felt that Master A's low platelets and low white cells were in keeping with a severe infection. She does not recall discussing Master A's high urea and creatinine results, which she said may have alerted her further to the possibility of sepsis.
- 57. Dr C told HDC that he received no further calls about Master A for the rest of the night.

## **Overnight observations**

- 58. CDHB told HDC that following RN H's initial set of observations at 1am, observations were continued approximately every two hours.
- 59. At 3.20am, RN H recorded the following observations in the chart: respiratory rate approximately 55 breaths per minute; mild respiratory distress; oxygen saturation 95% on two litres of oxygen via nasal prongs; heart rate 158bpm; and capillary refill time less than two seconds. Master A's temperature and blood pressure were not recorded, and the oxygen level was recorded in the "<2L/min" box. The PEWS was recorded as 5. At the same time, RN H documented in the clinical notes that Master A was awake and unsettled, and that he continued to have mild to moderate increased work of breathing.
- 60. At 5.20am, RN H recorded the following observations in the chart: respiratory rate approximately 58 breaths per minute; mild respiratory distress; oxygen saturation 94% on two litres of oxygen via nasal prongs; heart rate 162bpm; and capillary refill time less than two seconds. Master A's temperature and blood pressure were not recorded, and the oxygen level was recorded in the "<2L/min" box. The PEWS was recorded as having increased to 6 owing to Master A's increased heart rate. CDHB told HDC that as a result of the increased PEWS, RN H increased the frequency of observations from two-hourly to hourly. However, RN H did not request a medical review or inform the nurse in charge of

<sup>&</sup>lt;sup>20</sup> The normal range is  $5.0-14.5 \times 10^9$ /L.

<sup>&</sup>lt;sup>21</sup> An abnormally low count of a type of white blood cell called neutrophils.

<sup>&</sup>lt;sup>22</sup> A condition that causes low levels of platelets (the cells that help blood to clot).

<sup>&</sup>lt;sup>23</sup> Inflammatory markers include C-reactive protein.

the ward. CDHB further stated that RN H did not seek registrar review because her clinical assessment was that Master A was stable and the registrar was aware of his condition.

- At 6am, RN H documented in the clinical notes that Master A continued to have mildly to moderately increased work of breathing, and that he had been given IV antibiotics.
- 62. At 6.15am, RN H recorded the following observations in the chart: respiratory rate approximately 55 breaths per minute; mild respiratory distress; oxygen saturation 92% on two litres of oxygen via nasal prongs; heart rate 142bpm; and capillary refill time less than two seconds. Master A's temperature and blood pressure were not recorded, and the oxygen level was recorded in the "<2L/min" box. The oxygen saturation was also incorrectly recorded in the 93–100% space (which added no points to the PEWS), rather than 89–92% space (which would have added one point to the PEWS). The PEWS was recorded as 5.</p>
- 63. RN H told HDC:

"I acknowledge that if I did not make these errors [recording the oxygen level in the <2L/min box for all observations, and recording the oxygen saturation in the 93–100% box at 6.15am], the PEWS would have been 6 instead of 5 for the observations at 0100hrs and 0320hrs, and 7 instead of 6/5 respectively for the observations at 0520hrs and 0615. [Master A's] overall presentation, although serious, appeared to be settled and stable and he did not appear to be deteriorating."

#### Handover to morning staff

- <sup>64.</sup> RN H handed over to RN J at approximately 7am. RN J told HDC that RN H gave verbal handover at the nurses' station. RN J said that bedside handover was being introduced at the time but was not occurring regularly between all shifts. RN J stated that she decided to assess Master A as her first priority owing to his oxygen requirement and high PEWS overnight.
- 65. At 7.30am, RN J undertook observations. She said that initially Master A was asleep but woke as she was taking his recordings. The chart shows that RN J recorded the following observations: respiratory rate 60 breaths per minute; moderate respiratory distress; oxygen saturation 90% on two litres of oxygen via nasal prongs; heart rate approximately 152bpm; and temperature 35.7°C. Master A's capillary refill time and blood pressure were not recorded, and the oxygen level was recorded in the "<2 L/min" box. The PEWS was recorded as 7.</p>
- 66. RN J told HDC that Master A was crying at the time, which can contribute to an increased heart rate and increased work of breathing. RN J said that she applied extra blankets in response to Master A's temperature of 35.7°C. She acknowledged that she did not obtain a BP reading, and stated:

30 November 2020



Names have been removed (except CDHB and the experts who advised on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

"The practice on the ward at the time was not to take blood pressure on a patient that was sleeping so as not to wake them and not to take blood pressure when a patient is upset as it provides an inaccurate reading."

- 67. RN J wrote retrospective notes at 11.15am that day. She noted that she changed Master A's nasal prongs to a paediatric-sized nasal cannula to fit Master A's nostrils better, and increased the oxygen to three litres per minute to raise Master A's oxygen saturation to more than 93%. RN J told HDC that increasing oxygen was "an intervention that nurses had the autonomy to do without being required to inform doctors immediately unless concerned that the patient was deteriorating".
- 68. RN J stated that at the time, she did not consider that Master A was having an acute sudden deterioration as his PEWS had fluctuated between 5 and 6 overnight. RN J said that another factor in her decision not to contact a doctor immediately was that it was the time of handover between night and morning doctors, and she expected that Master A would be reviewed in the morning ward rounds shortly. She commented:

"With more knowledge and understanding of the sepsis pathway and in hindsight knowing the outcome for [Master A], I now recognise that his ongoing tachycardia, tachypnoea, and signs of hypoxia, were markers for sepsis. The best course of action would have been for me to have called the medical team for a review based on his overall picture of being unwell and utilising the recommendations on the early warning score tool to enable the doctors to further evaluate his status."

- 69. RN J discussed Master A's condition with Charge Nurse Manager RN G at approximately 8am. CDHB told HDC: "[RN G] understood there was a plan for medical assessment and no specific instructions were given." RN J told HDC that upon reflection and with hindsight, she sees this as a missed opportunity for further questioning of Master A's care management. While acknowledging that her discussion with RN G was brief, RN J said that she did not receive a senior directive to request medical review or a critique of her decision to manage Master A at a nurse level.
- 70. At 8.10am, RN J recorded the following observations in the chart: respiratory rate 53 breaths per minute; moderate respiratory distress; oxygen saturation 93% on three litres of oxygen via nasal prongs; and heart rate approximately 145bpm. Master A's temperature, capillary refill time, and blood pressure were not recorded. The PEWS was recorded as 6. However, according to the chart's calculation algorithm, even without BP and capillary refill time recorded, this should have been 7.<sup>24</sup> Retrospectively, RN J documented that Master A was alert and asking for water, which his mother gave him.
- 71. RN J told HDC that Master A's PEWS appeared to be an improvement from the previous recordings at 7.30am and, for this reason, she did not consider that there was a need for urgent review by a doctor. She also commented:

<sup>&</sup>lt;sup>24</sup> Three points for respiratory rate of 53 breaths per minute; two points for moderate respiratory distress; one point for three litres of supplementary oxygen; and one point for heart rate of approximately 145bpm.



"[I]f the PEWS guideline was followed exactly for every documentation of observations for [Master A] then he would have qualified for a review at every hour of care overnight. This was not done. On the ward at the time, we understood there was room for interpretation of the patient's condition and nurse's clinical judgment could be used in addition to decide if that review is necessary. The PEWS guideline was used as a tool to support clinical assessment."

## Deterioration

- 72. In her retrospective notes, RN J documented that at 9.15am she was told to go on a break. She wrote that she handed over to RN I a request to undertake a further set of observations. RN J also documented that she informed the paediatric registrar of Master A's condition at approximately 9.15am, as the team had arrived for the morning ward round.
- 73. RN I documented retrospective notes at 11.50am that day. She wrote that upon entering Master A's room at 9.15am, Master A appeared a little distressed, his eyes were wide open and "bulging", and he was grunting while breathing. RN I noted that Master A's hands and feet were cool to touch and his abdomen was slightly distended. She had difficulty obtaining his oxygen saturation and heart rate readings, and went to get a new lead for the monitor.
- 74. Upon her return, RN I noted that Master A appeared a little calmer and his eyes were closed. She noted that with the monitor lead replaced, Master A's oxygen saturation was measured at 82–86%, but she still could not obtain a heart rate reading. RN I, with Master A's father's assistance, replaced Master A's nasal cannula with a mask delivering four litres of oxygen per minute, and Master A's oxygen saturation increased to 92%. RN I then left the room to find a replacement monitor, and asked another nurse to assist with setting up a humidified oxygen circuit for Master A. RN I also documented having asked the medical team, which included Dr B and registrar Dr D, to review Master A soon because of the difficulty in getting Master A's oxygen saturation up.
- 75. Dr D told HDC that RN I asked them to review Master A as they were heading into Room 1 of the children's ward (Master A was in Room 3). The team told RN I that Master A would be next. Dr D recalled that RN I also told them that she was setting up Master A with humidified oxygen, which the team agreed was a good idea.
- 76. Retrospectively, RN I documented that once she connected Master A to the new monitor, it showed his oxygen saturation as 82–86% and his heart rate as 199–211bpm. She wrote that she then went to Room 1 and requested a review of Master A, and Dr D attended immediately.
- 77. Dr D documented retrospective notes at 12.40pm that day. She noted that Master A was grunting while breathing and had mild subcostal recession but minimal other increased work of breathing. She noted that crackles were audible throughout his lungs. Master A's oxygen saturation was documented as 78% on five litres of oxygen, and Dr D noted that this improved to 100% when the oxygen level was increased to 15 litres via a mask. While



<sup>30</sup> November 2020

Dr D was present, Master A's heart rate decreased to approximately 75bpm. Dr D told HDC that she was worried that Master A was becoming fatigued with his respiratory effort, so she asked the nurse to arrange a bed and high flow oxygen in PHDU. Dr D stated: "At that point I remember thinking he was significantly unwell, but not peri-arrest."

- 78. However, Dr D's notes record that while initially Master A was responsive and looking around the room, he became non-responsive and his eyes deviated to the right and he stopped breathing. He also developed a spontaneous nose bleed as Dr B entered the room at approximately 9.35am. He was transferred to a treatment room, and a clinical emergency was called at 9.39am.
- 79. Tragically, despite resuscitation attempts that lasted 41 minutes, Master A passed away. Blood cultures subsequently grew Pneumococcus bacteria, which indicated that Master A had had sepsis.<sup>25</sup>

## Further information

Mr A

80. Mr A told HDC:

"Each day which passes by, is constant reminder of our Beautiful Boy. Every Year, every Birthday, every Christmas & every place we have visited with him in the country, will only carry a painful memory and remind us of what we have lost."

## CDHB

81. CDHB told HDC that it acknowledges Master A's parents' "distress at the loss of their loved son so suddenly, when they had done all they could in accessing medical care for him". CDHB further stated:

"On talking with the staff about [Master A] there is an understanding of him being 'everything' to his parents and they have continued to think about [Master A] and the care provided in the months following his death. We want to reassure [Mr & Mrs A] and their family that [Master A] was never seen as just another case by us."

82. CDHB commented that it appears that the ward culture at the time had a negative impact on nurses' compliance with PEWS. CDHB stated:

"CDHB believes that this clinical culture was the unintended consequence of an instruction on the PEWS observation chart that states 'PEWS is a tool and does not replace sound clinical judgment'. The full statement provides that if staff are concerned at any time they should seek medical review even if the score doesn't trigger that response. Unfortunately, it appears that at the time, nursing staff were under the general impression that, if in their clinical judgment the patient's condition was less concerning than the PEWS score suggested, they could elect not to follow the escalation pathway."

<sup>&</sup>lt;sup>25</sup> A systemic response typically to a serious, usually localised infection especially of bacterial origin. Usually, sepsis is marked by abnormal body temperature and white blood cell count, tachycardia, and tachypnoea.



Names have been removed (except CDHB and the experts who advised on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

83. CDHB further stated:

"CDHB is sorry that our policies and education did not prevent the development of this culture on the ward which compromised the quality of care. We take responsibility for their impact on the individual nurses' actions in caring for [Master A] and apologise for the shortcomings in the care we provided to him."

Serious Event Review

<sup>84.</sup> CDHB undertook a Serious Event Review (SER) into these events. One of the findings in the SER was that of the nine sets of observations entered into Master A's Child Observation Chart, none of the observation sets were fully accurate owing to plotting errors and miscalculation of the PEWS. The SER included the following table comparing the documented PEWS against the actual PEWS calculated in retrospect:

Time (hours)	2320	2325	0015	0200	0320	0520	0615	0730	0810
Documented Total PEWS	-	7	6	5	5	6	5	7	6
Actual Total PEWS	8	8	7	7	7	8	8	8	7

- 85. In addition, the SER found that the following were root causes of the events:
  - Non-recognition of sepsis: A lack of regular staff education on sepsis in children, and the low numbers of sepsis presentations to the Paediatric Department led to a lack of familiarity with the condition. There were also no clinical tools implemented to prompt staff to "think sepsis", which led to the condition not being considered at the initial medical assessment or subsequently, and influenced investigations, medical management, admission location, monitoring, and subsequent medical review. This led to Master A's deterioration not being recognised by clinical staff, and a lost opportunity to intervene and potentially change Master A's clinical course.
  - Interpretation and response to Master A's observations: An absence of audit activity/ oversight and reinforcement of the need to follow the PEWS management plan had resulted in, at times: a) a move away from expected nursing practice to complete a full set of observations; and b) nursing staff deviating from the PEWS management plan for children with respiratory conditions owing to these conditions frequently resulting in high PEW scores and not requiring a change in management on medical review.

## Policies and procedures

86. CDHB told HDC that at the time of events it had three key documents that provided guidance for nurses on observations: the Child Observation Chart; a policy and procedure manual known as "Volume Q"; and a CDHB-wide policy governing the use of PEWS. The latter policy requires a full set of observations, including BP, to be taken on admission. Volume Q provides that where a child is receiving oxygen therapy, their respiratory rate,

30 November 2020



colour, and work of breathing is to be monitored and recorded hourly. Volume Q also notes:

"Blood pressure recordings are not routinely done in paediatrics, however recordings should be taken in the following situations; on admission and as required; All seriously ill children; Children considered to have sepsis ..."

Changes made

- 87. CDHB told HDC that following these events it undertook the following:
  - Implementation of an electronic observation application across all paediatric wards, which automatically calculates the PEWS and drives completion of full sets of observations.
  - Development of a Paediatric Sepsis Screening and Action Tool and Sepsis in Children Hospital Health Pathway.
  - Provision of education on the recognition of sepsis for both nursing and medical staff.
  - Introduction of a new Nursing Observation and Monitoring policy that defines minimum monitoring and observation requirements.
  - Revision of the CDHB PEWS policy and publication of these updated materials on Hospital Health Pathways.
  - Introduction of an electronic documentation tool that incorporates multidisciplinary clinical documentation, risk assessment, and care planning.
- 88. In addition, the SER made the following recommendations for change:
  - Implementation of a comprehensive strategy to increase the ability of clinical staff to identify children with sepsis, including a new sepsis screening tool and ongoing staff education.
  - Amendment of the oxygen section of the Child Observation Chart to remove duplication of the number "2" in two categories, with the "0–2L/min" category changed to "0–1.9L/min".
  - Exploration of the introduction of a "safety huddle" at the beginning of each nursing shift to assess new team members' knowledge and skill and the need for oversight of their care, and identify the patients at most risk for deterioration.
  - Review of the feasibility of having an overnight Clinical Nurse Coordinator rostered to provide ongoing clinical oversight and support in paediatric areas.
  - Amendment of the PHDU admission e-Guidelines to state that where PEWS is 6 or higher, it is included in decisions about admission location.
  - Development of a new policy for Nursing Observations and Monitoring that uses terminology aligned with the Child Observation Chart and reinforces the PEWS requirements and the need to follow the PEWS management plan.

- Enhancement of the electronic observation application, which makes visible to clinicians the required actions for specific PEWS.
- Implementation of two paediatric registrars working overnight.
- Supply of new equipment, including mobile monitors that measure blood pressure, oxygen saturation, and heart rate, and new hardware for ward rounds to reduce the risk of decreased visibility of electronic observation charts.
- Education of paediatric medical staff in how to access and view off-site radiology reports and imaging.

#### Medical centre

89. The Medical Director of the medical centre told HDC:

"It is tragic when such a young life is lost and no words can ever be right. I am truly sorry that we missed an opportunity to get him in-hospital treatment sooner, and we are all deeply affected by what happened to him. ... Our thoughts and condolences will forever be with his family."

#### Urgent care clinic

- <sup>90.</sup> The urgent care clinic told HDC that the use of PEWS is unusual in primary care, but it considers it a useful tool for staff, especially in its unique observation unit. As part of its process of reflecting on the use of the PEWS in this case, the urgent care clinic made the following changes:
  - If a child has a PEWS of more than 6, the child cannot be admitted to the observation unit, and will instead be cared for in the acute area, where monitoring is easier.
  - "Grunting" has been added to the severe category for respiratory assessment.
  - A reminder has been added to take BP if a PEWS is more than 6.
  - It now includes Formal Early Warning Scores training for nurses and doctors.
  - It has developed an audit tool to measure the correct use of Early Warning Scores.
  - All nurses and doctors are now required to complete an online learning module on sepsis in adults and children.
  - It has developed new sepsis clinical guidelines.

#### Responses to provisional opinion

91. Mr and Mrs A, CDHB, the medical centre, and the urgent care clinic were all given the opportunity to respond to the relevant sections of my provisional opinion. Where relevant, their responses have been incorporated into this report. In addition, I note the following comments.

#### Mr and Mrs A

92. Mr and Mrs A remain deeply distressed by these events and very concerned about the care provided to Master A. However, Mr A also told HDC: "We see [CDHB] have made an



array of changes. For this we are grateful. We do not wish these circumstances on any other parent in the world."

CDHB

- 93. CDHB told HDC that it accepts the findings as set out in the provisional report. It further stated: "We are sincerely sorry for the shortcomings in our care of [Master A.]"
- 94. In addition, CDHB told HDC that capillary blood gases are not undertaken routinely in the PHDU. It said: "Capillary blood gases are arranged following a medical decision based on a patient's condition and the opinion that they will inform further management."

## Medical centre

<sup>95.</sup> The medical centre told HDC that it accepts the provisional decision and proposed course of action. It further stated that as part of its extensive debrief and incident reporting procedures, training has already been provided to clinical staff on the recognition and treatment of sepsis and respiratory distress in children. It said that given that sepsis can be so devastating and so difficult to identify in its early stages, it is happy to arrange further training for staff.

## Urgent care clinic

- <sup>96.</sup> The urgent care clinic told HDC: "[O]ur staff members who were involved in his care remain deeply affected by [Master A's] death and have asked that we express their ongoing condolences to [Master A's] parents."
- <sup>97.</sup> The urgent care clinic also said that in future it will ensure that staff are aware that a full set of vital signs and observations are to be made to enable the correct measurement of the PEWS.

# **Opinion: Canterbury District Health Board — breach**

## Introduction

- 98. District health boards are responsible for the operation of the clinical services they provide. In addition, they have a responsibility for the actions of their staff. It is incumbent on all DHBs to support their staff with systems that guide and support good decision-making and promote a culture of safety and critical thinking.
- <sup>99.</sup> Master A was a severely unwell young child, and the outcome for him and his family was tragic. Both Dr Simon Rowley, my paediatrician advisor, and RN Thomas Gorte, my paediatric nursing advisor, commented that there were cultural and systemic issues at play in this case. I agree with these comments. In my view, there were a number of failures by CDHB's staff and systems in the care provided to Master A. These failures are discussed in further detail below.

#### Nursing care

#### Care plan

- 100. When Master A was admitted to the children's ward after being transferred from CAAU, RN H undertook observations, calculated his PEWS to be 5, and completed a care plan. The care plan stated that observations were to be completed every four hours or as required. However, according to CDHB's Volume Q document, given that Master A was receiving oxygen therapy, he should have had hourly observations. Neither the care plan nor the PEWS management plan provided guidance as to timing of observations for children receiving oxygen therapy. For children with PEWS of 4–5, the PEWS management plan did not mandate a specific frequency of observations, but did require the formulation of a plan, including for the frequency of observations. RN H, who normally works in the CAAU and was working in the children's ward for the first time that night, told HDC that care plans are not used in the CAAU.
- 101. In any case, I note that RN H did take observations more frequently than every four hours. However, I am nonetheless critical that CDHB's guidance was not entirely clear. In my view, the PEWS management plan and care plan documents should have stated that hourly observations were required for children receiving oxygen therapy. Clear guidance is particularly important for staff such as RN H who do not usually complete care plans.

#### Use of Child Observation Chart and calculation of PEWS

- 102. A Child Observation Chart was commenced upon Master A's arrival in CAAU on Day 3. Observations were entered into the chart on nine occasions.<sup>26</sup> However, not once was Master A's BP measured and recorded on the chart. In addition, capillary refill time was recorded on only four occasions.<sup>27</sup> Both RN H and RN J stated that, at the time, the practice was not to wake a sleeping child for BP recordings.
- 103. There were also several errors made by nursing staff when entering recordings and calculating PEWS. For six of the nine sets of observations recorded when Master A was receiving two litres of oxygen,<sup>28</sup> the level of oxygen was recorded in the box for "<2L/min" (which added no points to the PEWS) as opposed to the box for "2–10L/min" (which would have added one point to the PEWS). In addition, at 6.15am on Day 4, the oxygen saturation was incorrectly recorded in the 93–100% space (which added no points to the PEWS), rather than the 89–92% space (which would have added one point to the PEWS). The PEWS was again miscalculated for the sets of observations taken at 11.25pm on Day 3 (the PEWS was recorded as 7 but should have been 8) and at 8.10am on Day 4 (the PEWS was recorded as 6 but should have been 7).</p>
- <sup>104.</sup> As a result of these errors, as noted by CDHB's SER, none of the nine observation sets were fully accurate. In addition, had the PEWS at 11.25pm on Day 3 been calculated correctly as



Names have been removed (except CDHB and the experts who advised on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

<sup>&</sup>lt;sup>26</sup> At 11.20pm and 11.25pm on Day 3, and at 12.15am, 1am, 3.20am, 5.20am, 6.25am, 7.30am, and 8.10am on Day 4.

<sup>&</sup>lt;sup>27</sup> By RN H at 1am, 3.20am, 5.20am, and 6.15am.

<sup>&</sup>lt;sup>28</sup> At 12.15am, 1am, 3.20am, 5.20am, 6.15am, and 7.30am on Day 4.

8, this would have triggered automatic transfer to PHDU in accordance with the PEWS management plan.

- 105. Having noted the above issues with the recording of observations and calculation of PEWS, RN Gorte advised: "The standard of care is unacceptable as it is essential to have an accurate PEWS which assists with determining the level of interventions required." RN Gorte considered "the numerically small but inaccurate documentation of the PEWS, the lack of at least one blood pressure reading and the lack of clinical reasoning to be a moderate departure from acceptable practice".
- 106. I accept RN Gorte's advice and I am critical of the nursing staff's omissions in using the chart and calculating PEWS. The PEWS is useful as a clinical tool only to the extent that full and accurate observations are recorded and care is taken in calculating the PEWS. It is concerning that this did not happen for any of the nine sets of observations. I note that several nurses took action in response to changes in Master A's PEWS, including increasing the frequency of certain observations or increasing the level of oxygen. However, despite recognising that Master A needed closer observation, they still did not adhere to the requirements of the PEWS. In my view, it is vitally important that full and accurate observations are completed, so as to better inform nurses' clinical decision-making and prompt appropriate escalation to medical staff.
- 107. I am also critical that the ward culture negatively influenced the nurses' practice in not obtaining BP readings. I acknowledge, as do both RN Gorte and Dr Rowley, that there may be difficulties in obtaining an accurate BP reading when a child is distressed, and that there is a reluctance to disturb an unwell sleeping child. However, a BP reading is vitally important in assessing the status of a child's circulatory system. In addition, I note that the PEWS management plan requires that a full set of observations, including BP, be taken when a child's PEWS is 4 or more. Master A's PEWS, even with the miscalculations, remained at a minimum of 5 the whole time he was at the hospital.

## Failures to recognise signs of deterioration and escalate care

- 108. At 5.20am, RN H calculated that Master A's PEWS had increased from 5 to 6 owing to an increase in Master A's heart rate. RN H increased the frequency of observations to hourly but did not request medical review or inform the nurse in charge of the ward. At 7.30am, RN J calculated that Master A's PEWS had increased from 5 to 7 owing to increased respiratory distress and decreased oxygen saturation. RN J did inform RN G but did not request medical review. RN J stated that she did not seek medical review because it was the time of night-to-morning medical handover, and she expected that Master A would be reviewed shortly during morning ward rounds. At 9.15am, before going on a break, RN J informed paediatric registrar Dr D of Master A's condition.
- 109. RN Gorte advised that in addition to the omissions by the nursing staff in recording observations and calculating Master A's PEWS (as discussed above):

"Of equal concern was the lack of recognition of overt signs of decompensation which might have been reinforced by the small reduction in PEWS. RNs are expected to



demonstrate clinical reasoning by looking at both the trends and sets of observations as opposed to just relying on a scoring system to determine courses of action ..."

110. RN Gorte commented that nursing staff failed to recognise that Master A "had been deteriorating with the increasing [respiratory rate], reducing [oxygen saturation], reduced respiratory effort and maintained tachycardia". He further stated:

"The timeliness of escalation and communication of the RN on night duty with the senior nurse and doctor on night duty was not acceptable which would have been based on incorrect PEWS calculations and the lack of recognition of the deteriorating child. In my opinion, the assessment and clinical decision-making were inadequate which had a knock-on effect on the nurse's timely communication."

- 111. Overall, RN Gorte considered that the nursing staff's failures to recognise the deterioration and escalate care to medical staff represented a moderate departure from accepted practice.
- 112. I accept RN Gorte's advice. In my view, the nursing staff's failure to recognise Master A's deterioration and seek appropriate medical review also represents a concerning failure to think critically about Master A's overall clinical picture. I note that these omissions also represent a failure to adhere to the PEWS management plan, which requires registrar review within 15 minutes for PEWS of 6–7.
- <sup>113.</sup> I note that CDHB believes that the clinical culture of not adhering to the PEWS management plan was the unintended consequence of the instruction on the observation chart that states: "PEWS is a tool and does not replace sound clinical judgment." The full instruction states that staff can seek medical review at any time, even if the PEWS is not high enough to trigger that response. However, CDHB commented that it appeared to have an effect different from that intended, in that nursing staff appeared to believe that they could choose not to follow the PEWS management plan if they were not concerned about a patient's condition. This culture of non-compliance with the PEWS management plan is concerning.
- 114. I acknowledge that Master A's condition appeared to be fairly stable overnight, with the PEWS remaining between 5 and 6. However, I note that the PEWS is used to recognise not just the signs of clinical deterioration, but also the patient at risk of deterioration. In my view, nursing staff should have been alert to Master A's relatively high PEWS, and had a low threshold for seeking medical review. In addition, I note that nursing staff unilaterally increased oxygen levels in response to Master A's decreasing oxygen saturation. I am concerned that this suggests a lack of recognition that decreasing oxygen saturation indicates cardio-pulmonary compromise, which would not be addressed by increasing oxygen levels alone.

## Decision to admit to ward

<sup>115.</sup> Master A arrived at the hospital's CAAU at approximately 11.20pm on Day 3, and a set of observations (excluding BP and capillary refill time) was completed shortly after his arrival.



He was reviewed by registrar Dr C at approximately midnight. Dr C's impression was leftsided pneumonia, and his plan was to keep Master A's oxygen saturation above 92% and commence IV antibiotics. Shortly after Dr C's review, he, RN F, and RN E discussed whether Master A should be admitted to the ward, or to the PHDU. Given the improvements in Master A's oxygen saturation and respiratory rate since admission, they decided that Master A was suitable for transfer to the ward.

- In Provide that it was appropriate to admit to the ward initially with ongoing PEWS monitoring, but said that it appears that the team did not recognise just how unwell Master A was in terms of developing septicaemia. Dr Rowley noted that the decision was made following discussion between Dr C, RN F, and RN E, and advised: "This is a clinical judgment rationalized at the time and to my way of thinking the important point is that the consultation about this occurred."
- 117. However, I note RN Gorte's concern about the initial placement of Master A in the ward rather than PHDU, because the PHDU is better equipped to manage potentially critically unwell patients. As RN Gorte mentioned, if Master A had been transferred to PHDU, other interventions may have occurred, such as continuous monitoring and capillary blood gas testing, and there would have been a higher staff-to-patient ratio.
- <sup>118.</sup> I acknowledge the differing opinions of my two advisors. In my view, it would have been preferable for Master A to have been admitted to PHDU, for the reasons listed by RN Gorte, although I acknowledge CDHB's comment that capillary blood gas testing is not routinely carried out in the PHDU unless indicated. However, I agree with Dr Rowley's comment that the important thing is that the discussion occurred. In addition, and as noted above, at the time of this decision, Master A's BP and capillary refill time had not been recorded, and therefore the PEWS was inaccurate. This is disappointing, as this information would have better informed the team's decision about admission.

## Medical care

## Consideration of sepsis

- 119. Master A's blood test results became available at 1.30am, and Dr C rang on-call consultant Dr B to discuss the results. Dr B stated that sepsis was considered during this telephone call, but "there was no other information containing 'red flags' for developing sepsis such as deterioration in level of consciousness, blood pressure, heart rate or temperature". However, at the point of Dr B's discussion with Dr C, Master A's BP had not been recorded. Dr B stated that she felt that Master A's low platelets and low white blood cells were in keeping with a severe infection. She does not recall discussing Master A's high urea and creatinine results, which she said may have alerted her further to the possibility of sepsis.
- 120. Dr Rowley advised that clinical factors were considered appropriately by the medical team but, in his view, not enough emphasis was given to the blood results, which indicated the extent of Master A's illness. He further advised:



"The big picture, which includes the blood results on admission pointing towards a septicaemic state might have indicated to the medical staff that the child was sicker than [he] first appeared. I note that the [SER] attributes the elevated heart rate and hypoxia to pneumonia, but if septicaemia and developing shock had been considered blood pressure monitoring and intravenous fluids would have been considered ... For me the most important lesson is not to assume the usual, (pneumonia without septicaemia) ..."

In Dr Rowley's view, the failure to give enough emphasis to Master A's blood results constituted a mild departure from standard practice. I accept Dr Rowley's advice. While Dr B said that sepsis was considered, I consider that it should have been explored more thoroughly, including obtaining a BP recording and taking into account all the blood test results. I am critical that the medical team failed to consider the overall clinical situation presented by Master A's symptoms and his blood results, and failed to challenge the assumption that Master A had pneumonia without septicaemia.

## Plan for further medical review

- 122. The Child Observation Chart included a PEWS management plan to be followed when a child's PEWS reached different levels. At levels 4–5 and above, a plan was to be formulated and documented, including a timeframe and criteria for review and frequency of observations. I note that when Dr C reviewed Master A, his PEWS was recorded as 7. As noted above, it was decided that Master A would be admitted to the children's ward. Dr C told HDC that he anticipated that should Master A continue to deteriorate or have an elevated PEWS score, he would be notified and asked to review him clinically. However, Dr C's documented plan at that stage did not include any criteria or timeframe for review.
- <sup>123.</sup> I am critical that Dr C did not clearly document his expectations around when further medical review should be requested, as is mandated by the PEWS management plan. In my view, in addition to the issues discussed at paragraph 113 above, this is further evidence of a concerning culture of non-compliance with the PEWS management plan by CDHB staff.

## Conclusion

- 124. A number of failures were made by CDHB and the staff who provided care for Master A on Days 3–4. Specifically:
  - Staff made multiple assumptions, including that Master A's illness was pneumonia without sepsis, that because his PEWS (as incorrectly calculated by staff) was relatively stable overnight, he was not deteriorating, and, when his observations indicated deterioration at 7.30am, that he would be seen promptly for medical review during the ward round.
  - The PEWS management plan and care plan documents did not state that observations were to be undertaken hourly for a child receiving oxygen therapy.
  - Nursing staff failed to obtain complete sets of observations, and made multiple errors in entering data into the chart and calculating the PEWS.



- Nursing staff failed to think critically about Master A's overall clinical picture and recognise the signs of deterioration and, as a result, failed to escalate Master A's care appropriately.
- Medical staff failed to consider the overall clinical situation presented by Master A's symptoms, signs, PEWS, and his blood results, and to explore the possibility of sepsis more thoroughly.
- There was a culture of non-compliance with the PEWS management plan by nursing and medical staff.
- <sup>125.</sup> Whilst I acknowledge that my experts have identified a series of mild and moderate departures from accepted practice, I consider that cumulatively they present a picture of substandard care. It is impossible to know whether the outcome would have been different if these errors had not occurred. However, I consider that the above failures resulted in a lack of recognition and response to Master A's serious illness and the emerging signs of his deterioration, and a lack of compliance with the PEWS management plan. Accordingly, I find that CDHB failed to provide services with reasonable care and skill, and breached Right 4(1) of the Code of Health and Disability Services Consumers' Rights (the Code).<sup>29</sup>

# **Opinion: Medical centre — adverse comment**

## Introduction

- 126. Master A and his mother first presented to the medical centre on the morning of Day 3. Master A's symptoms included grunting while breathing, lethargy, and tachycardia. He was seen by GP Dr K, who considered that Master A had a viral upper respiratory tract infection and was dehydrated. Dr K prescribed Pedialyte and Brufen for Master A, and also noted in his plan that Master A was to be brought back if he deteriorated.
- 127. Master A's mother took Master A back to the medical centre at 6.46pm. His vital signs were recorded once, upon his arrival, by the triage nurse. Master A was then seen by GP Dr M. Dr M noted that Master A had a mildly dry tongue, a mildly increased work of breathing, and crepitations. Dr M's impression was that Master A was mildly dehydrated with a viral wheeze, and her plan was to initiate observations and treatment at the medical centre. Master A was given salbutamol and Redipred, and Dr M requested that staff repeat observations every 30 minutes. Dr M told HDC that she intended to review Master A again in an hour's time.
- 128. Master A was observed in the medical centre until it closed at 8pm, but Dr M considered that his condition had not improved sufficiently for her to discharge him home safely. She

<sup>&</sup>lt;sup>29</sup> Right 4(1) states: "Every consumer has the right to have services provided with reasonable care and skill."



Names have been removed (except CDHB and the experts who advised on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

therefore rang the urgent care clinic and spoke with urgent care physician Dr L. The decision was made for Master A to be referred to the urgent care clinic.

#### Consideration of pneumonia in differential diagnosis

129. My in-house clinical advisor, GP Dr David Maplesden, considered that the care provided by Dr K during Master A's first presentation to the medical centre was reasonable. However, in respect of the second presentation, Dr Maplesden advised:

"I believe pneumonia should now have been included in the differential diagnosis given the auscultation findings and deterioration in vital signs ... although an initial trial of inhaled bronchodilator was not unreasonable provided response was to be closely monitored (which was the documented plan)."

130. Dr Maplesden was mildly critical that pneumonia was not included in the differential diagnosis. I accept this advice. I am critical that more thought was not given to the possibility of pneumonia at this point, given Master A's clinical presentation, and in particular that he was grunting while breathing.

#### Not undertaking further observations prior to transfer to urgent care clinic

131. Dr Maplesden noted that following the observations documented by the triage nurse, there is no reference in the clinical notes to further observations recorded prior to the decision to transfer Master A to the urgent care clinic. Dr Maplesden advised:

"I am mildly to moderately critical of this omission (either an omission of documentation or assessment). I would expect vital signs to have been repeated in addition to the lung auscultation recorded in [Dr M's] response to determine if it was safe for [Master A] to be observed out of hospital or whether acute paediatric referral would have been a more appropriate management decision. Given there had evidently been some subjective improvement, although limited, I am unable to predict whether repeated vital signs would or should necessarily have resulted in a change in management at this point."

132. However, Dr Maplesden considered that a mitigating factor is that further medical supervision was arranged, rather than Master A being sent home. I agree with Dr Maplesden that further observations should have been recorded while Master A was at the medical centre. Although, as noted by Dr Maplesden, it is not possible to determine whether further observations would have changed the plan for Master A's care, I am nonetheless critical that further observations were not recorded. This clinical information would have provided an objective picture of Master A's well-being at that point, and would have better informed the decision around whether to transfer Master A to hospital rather than to the urgent care clinic.

30 November 2020



Names have been removed (except CDHB and the experts who advised on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

# **Opinion: Urgent care clinic — adverse comment**

- <sup>133.</sup> On Day 3, Master A was transferred from the medical centre to the urgent care clinic, arriving at 8.45pm. On his arrival, the triage nurse recorded Master A's vital signs, including oxygen saturation of 100%. Dr L reviewed Master A at 9.05pm. She considered that Master A was more unwell than she had thought when she accepted his transfer from the medical centre. Dr L ordered a chest X-ray and asked the nurse to administer six puffs of salbutamol immediately to improve Master A's oxygen saturation. At 9.15pm, the nurse documented Master A's vital signs, including oxygen saturation of 89%. After Master A was given six puffs of salbutamol, his oxygen saturation increased to 92%.
- <sup>134.</sup> Master A was then taken for the chest X-ray, which was reported as showing possible right upper lobe and left lower lobe pneumonia. Following the X-ray, Master A was given oxygen (initially four litres per minute, then increased to six litres) via a mask. On six litres of oxygen, Master A's oxygen saturation increased from below 92% to 95–97%. Dr L then discussed Master A's case with the on-call paediatric registrar at the public hospital's CAAU, and the decision was made to transfer Master A there. Master A's vital signs were recorded again at 9.50pm.
- 135. Dr Maplesden considers that overall Dr L's management was consistent with accepted practice, and I accept Dr Maplesden's advice.
- 136. In doing so, I also note Dr Maplesden's comment that out of the three sets of observations recorded on the chart at the urgent care clinic, BP was recorded only once, and responsiveness not at all. Dr Maplesden commented:

"[I]f the PEWS score is to be used accurately, assessment of blood pressure and responsiveness is required to be recorded as without all components of the score being considered it cannot be regarded as a valid measurement."

137. I acknowledge that observations about Master A's responsiveness were documented in the clinical notes, but agree that it would have been ideal for this information to have been transcribed to the chart. I also acknowledge that the use of Child Observation Charts and PEWS is unusual in primary care. However, I agree with Dr Maplesden that full observations, including responsiveness and BP, are needed to calculate the PEWS accurately. I also note the changes the urgent care clinic has made to its PEWS chart as a result of these events, and I consider these to be appropriate.



## Recommendations

138. I recommend that CDHB:

- a) Provide a further written apology to Mr and Mrs A for the failures identified in this report. The apology is to be sent to HDC within three weeks of the date of this report, for forwarding to Mr and Mrs A.
- b) Provide evidence to HDC that all of the recommendations arising from its SER have been implemented and their impact evaluated, within three months of the date of this report.
- c) Provide training to paediatric nursing and medical staff on the recognition of a deteriorating child based on the management plan dictated by the PEWS and responding to the overall clinical picture. Evidence of this training is to be provided to HDC within six months of the date of this report.
- d) Provide training to paediatric nursing and medical staff on critical thinking and challenging assumptions. This should include:
  - i. discussions about the causes of decreasing oxygen saturations, including that decreasing oxygen saturations can indicate cardio-pulmonary compromise, which is not addressed by increasing oxygen flow per se; and
  - ii. challenging pre-existing diagnostic assumptions that could limit the intervention to administering oxygen only when other interventions are needed, and including in particular the need for prompt medical review.

Evidence of this training is to be provided to HDC within six months of the date of this report.

- 139. I recommend that the medical centre:
  - a) Provide a written apology to Mr and Mrs A for the issues identified in this report. The apology is to be sent to HDC within three weeks of the date of this report, for forwarding to Mr and Mrs A.
  - b) Provide further training to clinical staff on the recognition and treatment of sepsis in children, with reference to the clinical tools provided on www.sepsis.org.nz. Evidence of this training is to be provided to HDC within three months of the date of this report.
- 140. I recommend that the urgent care clinic:
  - a) Provide a written apology to Mr and Mrs A for the issues identified in this report. The apology is to be sent to HDC within three weeks of the date of this report, for forwarding to Mr and Mrs A.
  - b) Provide training to clinical staff on the recognition and treatment of sepsis in children, with reference to the clinical tools provided on www.sepsis.org.nz. Evidence of this training is to be provided to HDC within three months of the date of this report.



Names have been removed (except CDHB and the experts who advised on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

<sup>30</sup> November 2020

# Follow-up actions

- 141. A copy of this report will be sent to the Coroner.
- 142. A copy of this report with details identifying the parties removed, except CDHB and the experts who advised on this case, will be sent to the Health Quality & Safety Commission, the Nursing Council of New Zealand, the New Zealand Nurses Organisation, and the Royal Australasian College of Physicians (Paediatrics and Child Health Division), and placed on the Health and Disability Commissioner website, <u>www.hdc.org.nz</u>, for educational purposes.



# Appendix A: Independent advice to the Commissioner

The following clinical advice was obtained from paediatrician Dr Simon Rowley:

## "Re: Reference C18HDC02160

My full name is Robert Simon Hearn Rowley. I am a Registered medical practitioner and specialist Neonatal Paediatrician. My qualifications are MB ChB. FRACP. I am a Neonatal Paediatrician working at National Women's Health, Auckland City Hospital which includes clinical management of level 3 and level 2 infants in NICU. I have also practised as a general paediatrician in private practice here in Auckland for over 30 years. I am also the Chair of the Northern Region Paediatric Vocational Training Committee.

I have been asked to advise as to whether I believe that the care provided to [Master A] at the public hospital on [Days 3–4] was reasonable in the circumstances and to give my reasons.

I have had access to

- 1) The Letter of complaint ... and associated documents,
- 2) The Canterbury DHB response 3<sup>rd</sup> May 2019,
- 3) Canterbury DHB Empiric Antimicrobial Guidelines,
- 4) Clinical records from Canterbury DHB covering [Days 3–4],
- 5) Coroner-Authorised Autopsy Report.

I have read the Health and Disability Guidelines for Independent Advisors.

In preparing this report I have had detailed anonymous and confidential discussion with one of my Emergency Department colleagues and with a General paediatrician colleague — particularly about the use of the Paediatric Early Warning Scoring system.

## Clinical Case

On [Day 3] at 8.45 p.m. a sick 3 year old boy presenting to a local emergency department with pneumonia — bilateral lobar consolidation (right upper lobe and left lower lobe) on chest radiograph and an assumption that this was pneumococcal (subsequently confirmed on blood cultures the following day). At the time of assessment he had grunting respirations, a tachycardia — fast heart rate of 167/min, hypoxia — saturation of 89% improving to 97% on 6l/min oxygen (normal being over 97–100%), and was lethargic but easily rousable. After being treated with nebulized salbutamol, he was immediately transferred to [the public hospital] arriving at approximately 11.00 p.m. On arrival he was triaged (category 3 to be seen by Doctor within 30 minutes), transferred to the Children's Acute Assessment Unit and seen immediately by the nurse at 11.20 pm. She took his recordings, commenced oxygen for low saturation and called the Paediatric Registrar. He inserted an intravenous line, took blood for assessment, and high dose intravenous benzylpenicillin was



commenced appropriately. At this point it appears that everything had been assessed and acted on appropriately.

However, the blood analysis showed that the patient was exceptionally unwell with neutropenia (total WBC 1.1 (normal 5–14.5) and very low neutrophils and a left shift reported indicating severe infection/inflammation. He had exceptionally high inflammatory markers (CRP 381 — (normal less than 5 and most significant infections can get as high as 100 but seldom this high), and low platelets (132 — normal 150–500). In addition renal function was already compromised with elevated urea and creatinine. These results were discussed with the consultant paediatrician at that time (1.30 a.m.) and she was reassured by his reported clinical condition. It is possible that a blood lactate would have further alerted medical staff as to the severity of the illness had the blood gases been done. Blood cultures subsequently grew Streptococcus Pneumonia but that information was not available at the time of [Master A's] death. Retrospectively this patient did therefore have pneumonia with septicaemia which is a more severe clinical condition than pneumonia alone.

At this time his baseline paediatric early warning score (PEWS — see below) was 7 (capillary refill and BP not measured and they would have likely have increased the PEWS). The blood picture indicating severe systemic infection, i.e. probable septicaemia in the clinical context, plus a high EWS would have heightened awareness of the need for close monitoring as well as intravenous fluids. There was a discussion about whether transfer to a high dependency area was needed and this was decided against.

Overnight there were a number of observations made as part of the PEWS system. The next morning by 7.30 a.m. the EWS measurement (without considering blood pressure) had changed i.e. gone up from 5 to 7 — requiring registrar review within 15 minutes and consideration of PHDU. His oxygen support was increased, he had moderate respiratory distress. In addition he was hypothermic (his temperature was abnormally low). This score indicated the need for urgent review. At this point there may have been consideration of waiting until the Ward Round which was commencing within the next half hour but the team saw other babies first and two hours ensued without further review. Then 25 minutes before an acute emergency call went out, [Master A] deteriorated acutely with a rise in pulse rate, increased work of breathing and abdominal distension and then slowing of the heart rate. He then had a cardiorespiratory arrest. By this stage the Ward round team had just arrived.

Resuscitation occurred appropriately at 9.39 a.m. with a full emergency resuscitation team including paediatric anaesthetists. This included ventilation with oxygen, boluses of intravenous fluid and blood to support blood pressure and circulation, bicarbonate to correct acid levels in the blood and glucose to increase blood glucose and energy supplies. A blood chemistry analysis during the resuscitation confirmed severe metabolic acidosis, and deranged glucose and electrolytes not usually compatible with life. There was no response after 41 minutes of resuscitation, and [Master A]



unfortunately died. The resuscitation appears to have been conducted well and the decision not to continue after 41 minutes with minimal response appropriate.

A coroner-authorised autopsy found the direct cause of death to be severe, bi-lateral Pneumococcal Pneumonia. The cause of his sudden deterioration was not clearly demonstrated but an aspiration event, or dislodgment of bronchial plugs is thought possible. Other bacteria grown post-mortem were not thought to have been clinically significant.

## The Paediatric Early Warning Score (PEWS)

The PEWS is a scoring system developed to assist in helping nursing and medical staff recognize a patient who is extremely sick or clinically deteriorating. It includes an assessment of the heart rate, the breathing rate, the breathing efforts being made, the blood oxygen including the need for added oxygen, the skin perfusion, the blood pressure and the mental alertness of the patient. The temperature — high or low — is not usually part of the PEWS but adds to the picture, as does pain and nursing concern generally. Changing (rising) scores indicate the need for urgent review by senior staff and consideration of transfer to a high dependency or intensive care unit for closer surveillance and possible increased support. In the CDHB EWS system a score of 6–7 requires a registrar review within 15 minutes and consideration of PHDU.

Looking specifically at the PEWS (between 5–7 overnight and probably underestimated) on [Day 1] and [Day 2]

- 1) HR was coming down for the last 2 recordings
- 2) Capillary refill was still normal for some of the assessments although it was omitted on the 7.30 a.m. reading
- 3) No fever or hypothermia initially
- 4) Patient described as being lethargic but 'rousable', 'settled' and 'stable'
- 5) He had also been seen promptly and antibiotics initiated in good time
- 6) All these in the knowledge that the patient was being treated appropriately for pneumonia

<u>BUT</u> by 7.30 a.m.

- 7) His temperature had fallen to below normal
- 8) Increasing oxygen requirements were required to maintain blood oxygen levels
- 9) No BP measurements ever done and capillary refill not recorded each time
- 10) Mild to moderate respiratory distress incorrectly scored as mild
- 11) No escalation occurred such as being seen immediately by senior medical staff, and including being the first patient to be reviewed on Ward Round

The big picture, which includes the blood results on admission pointing towards a septicaemic state might have indicated to the medical staff that the child was sicker than first appeared. I note that the CDHB's report attributes the elevated heart rate and hypoxia to pneumonia, but if septicaemia and developing shock had been



considered blood pressure monitoring and intravenous fluids would have been considered.

PEWS are mainly for the nursing staff to alert medical staff to assess and take action. It appears that this did not really happen following the 7.30 a.m. score which indicated a need for urgent review. In addition, not having access to a blood pressure which would likely have been low and further elevated the EWS, may have alerted staff to the need for more urgent action (both immediate consultant review, and early transfer to PHDU with supportive fluid management).

#### Expert Advice

- 1. All appropriate tests were done. Not all assessments were complete (blood pressure never measured as part of the EWS). Not a huge departure from standard practice but possibly enough to make a difference.
- 2. Clinical factors were appropriately considered but I don't believe enough emphasis given to the blood results indicating how sick the child was. Not a huge departure from standards and the increase in awareness of degree of how unwell he was would be covered by other careful and fully done assessments. The registrar did discuss these results at the time with his consultant. Some would argue that the evaluation of these blood results indicating probable septicaemia is a value judgment and not all would agree with my emphasis.
- 3. The level of observation was appropriate had the assessments been accurately done. This is the point at which I believe peer review should be critical the EWS are clear in their objectives and practice, and were not complete. However children this unwell are fortunately seldom encountered and for most children a less detailed EWS would have sufficed. A frequent criticism of the EWS is that to measure a blood pressure involves waking up an already tired and exhausted, unwell, child. On the other hand had the blood pressure been low, elevating the PEWS it might have alerted staff to impending collapse.

One has to put into perspective the fact that the original clinical presentation is not uncommon and usually after a night of antibiotics, supportive nursing care, and other therapy including oxygen, most children are well on the road to recovery. The culture in many children's wards is to sometimes avoid taking the blood pressure as part of the PEWS as it disrupts the child in need of rest. In addition, at times during the night, [Master A] was awake and asking for water, which might have suggested that he was recovering and been falsely reassuring about his progress. It therefore may have appeared that the child was recovering but when the PEWS was done by 7.30 a.m. he had in fact deteriorated. It is understandable that knowing that the morning Ward Round was imminent meant that rather than interrupting handover to have him seen immediately there was delay in immediate assessment. For these reasons I do not think that there has been a major departure from practice, but there are definitely deficiencies relating to PEWS scoring which should be, and I understand, have been addressed.



- 4. Appropriate treatment pathways were followed.
- 5. Pneumonia guidelines were followed. The very late extension of gram negative antibiotic cover (cefotaxime) for the septicaemia during resuscitation was probably unnecessary but a reasonable thought.

## Other matters

A) Questions have been asked about accessing radiographs from other units after hours. The radiology report was sufficient in this setting and having access to view the radiograph would not have changed management.

B) Similarly, having to look for another lead for the pulse oximeter is not an uncommon occurrence and a few minutes delay in getting a reading would not have affected long term management.

<u>Summary</u>: This is a sad case of an extremely unwell three year old with pneumonia presenting to a local ED who had timely referral and assessment to a tertiary hospital where appropriate treatment commenced rapidly. It was perhaps not recognized just how unwell he was in terms of developing septicaemia and although appropriate ongoing assessment in the form of PEWS were instituted they were not as accurate and detailed as they should have been. His deterioration to the point of an irrecoverable cardiac arrest was relatively sudden raising the possibility that even had he been transferred to a PHDU it may not have been able to make a difference.

There are lessons to be learned from this tragic case which admittedly took everyone by surprise. For me the most important lesson is not to assume the usual, (pneumonia without septicaemia), and secondly to use the tools we have (PEWS) as they are intended.

An opinion from a member of the senior clinical nursing establishment might like to comment about the use of the PEWS including taking blood pressure, as the PEWS is a predominantly nursing tool.

Yours sincerely,

Simon Rowley MBChB, FRACP Consultant Paediatrician, Newborn Services Chair, Paediatric Vocational Training Committee Auckland and Northern Region"

The following further advice was obtained from Dr Rowley:

"With respect to your question regarding my Expert Advice. (ref C18HDC02160)

I would regard the departures from standard practice to be mild."

30 November 2020



The following further advice was obtained from Dr Rowley:

## "Re: Reference C18HDC02160

My full name is Robert Simon Hearn Rowley. I am a Registered medical practitioner and specialist Neonatal Paediatrician. My qualifications are MB ChB. FRACP. I am a Neonatal Paediatrician working at National Women's Health, Auckland City Hospital which includes clinical management of level 3 and level 2 infants in NICU. I have also practised as a general paediatrician in private practice here in Auckland for over 30 years. I am also the Chair of the Northern Region Paediatric Vocational Training Committee.

You have received my report from 1<sup>st</sup> August 2019 in which I have listed the material I have had access to and my statement that I have read the Health and Disability Guidelines for Independent Advisors.

I have been asked to comment further on this case — in particular — the appropriateness of placing and keeping [Master A] in the general paediatric care unit at [the public hospital], in light of his condition.

As mentioned in my report summary I don't believe that the team recognized just how unwell [Master A] was in terms of developing septicaemia.

Even so it was appropriate to initially send him to the ward with ongoing PEWS monitoring and through the night his condition appeared to be stable — indeed he was sitting on his mother's lap asking for water at one stage. This would have given them a possibly false reassurance about his condition.

The blood pressure measurement as part of the PEWS is sometimes omitted and it is just possible that had they done this at 0730 on the morning he died they would have realized that he was really deteriorating and he would have been seen immediately and transferred to the paediatric high dependency unit rather than waiting his turn on the ward round two hours later.

I believe this departure from standard practice to be mild in the first instance and mild at the time of the 0730 am PEWS when there may still have been time to rescue the situation, because at this point there were senior medical and nursing staff already on the floor.

Yours sincerely,

Simon Rowley MBChB, FRACP Consultant Paediatrician, Newborn Services Chair, Paediatric Vocational Training Committee Auckland and Northern Region"

HX

The following further advice was obtained from Dr Rowley:

## "Re: Reference 18HDC02160

My full name is Robert Simon Hearn Rowley. I am a Registered Medical Practitioner and Specialist Neonatal Paediatrician. My qualifications are MB ChB. FRACP. I am a Neonatal Paediatrician working at National Women's Health, Auckland City Hospital which includes clinical management of level 3 and level 2 infants in NICU. I have also practised as a General Paediatrician in private practice here in Auckland for over 30 years. I am also the Chair of the Northern Region Paediatric Vocational Training Committee.

You had asked for further expert advice following provision of further information including:

- 1) Canterbury DHB letter of response 6 December 2019 with enclosures and
- 2) Canterbury DHB's Serious Event Report

I have already commented on the clinical case in my initial report (1 August 2019) and added further comments (12 August 2019).

In my initial report summary I raised two important lessons to be learned 1) recognising septicaemia from uncomplicated pneumonia and 2) using the PEWS score as intended. I suggested that an opinion from senior nursing personnel about the use of the PEWS might add some perspective to my opinion that the PEWS recordings were not accurate or used as intended. There are a number of opinions from the senior nursing staff which do clarify the use of the PEWS scores at that time and these have helped inform practice improvements.

Regarding consideration of how ill [Master A] was and could he have septicaemia more likely indicating need to transfer to a higher level of care — [Dr C], [RN F], and Clinical Nurse Coordinator [RN E] together discussed where [Master A] should best be nursed — the children's ward or the High Dependency Unit and made a decision to transfer to ward care. This is a clinical judgment rationalized at the time and to my way of thinking the important point is that the consultation about this occurred. By the time the blood results returned at 01:30am approx. indicating an illness of more severity than expected, he was showing signs of settling. Even so, there was a further discussion between the Registrar and Consultant. At that time the question was asked by [Dr B] about clinical stability on the ward, and according to [Dr B's] report, sepsis was considered at that time i.e. the possibility of sepsis was adequately considered even if the conclusion was inaccurate. The Serious Event Review also emphasizes the non-recognition of sepsis as a root cause.

In my reading of the nursing statements it appears that there has been criticism of not completing the PEWS scores on at least two occasions, but on both these occasions there was a decision to phone the Registrar because of clinical concern anyway.



36

Therefore the need to complete the score was deemed unnecessary. I accept these points and appreciate the intent of the nursing staff to efficiently inform someone about the state of the child regardless of the PEWS score. ([RN F] [stated:] 'I was part way through these observations and initial assessment when I saw [Dr C], the on duty Registrar, nearby and I was able to get his attention and request an immediate medical review ... I did this because I could see that [Master A] was unwell, even though I had not completed PEWS calculation or initial assessment.') I am to believe from earlier review of the notes that the PEWS score was high enough to indicate calling the Medical Officer at 07:30am and that this did happen. (Unfortunately there is no Nursing statement regarding this from [RN J] who according to [the] Charge Nurse Manager for that morning, [RN G], was to have asked the Doctors to review [Master A].)

Generally the handover time (07:30am in [Master A's] case) is a dangerous time for a patient to deteriorate. In this situation because the medical staff were rounding on the ward it was deemed acceptable to wait until they arrived at his bedside to investigate the fact that his PEWS had risen. ([RN J] did not escalate because although she was concerned, she expected the medical team to be on the ward shortly.) This was an incorrect assumption and did not take into consideration the time taken, and the sequence of patients on the ward round. This perceived lack of urgency is also noted by the Serious Event Review and again illustrates that more education about the use of the PEWS scores is needed.

The Canterbury DHB has clearly taken [Master A's] death seriously and has undertaken a number of steps to ensure that this does not happen again. These are outlined in detail in the Serious Event Review. In particular:

- 1) Implementing a comprehensive local strategy to increase the ability of clinical staff to identify sepsis (by July 2020).
- 2) Amending the PEWS guideline to make it clear when the medical officer is notified (completed).
- 3) Introducing a safety huddle at the beginning of each shift which includes assessing nursing staff skills as well as identifying higher risk patients (by April 2020). The hospital will also look at increasing the senior nursing staff complement on overnight and introducing electronic patient track observation charting.

All the nursing and medical reports indicate to me a high degree of commitment to the profession, to excellence, and detail in caring for their patients. The recognized systems flaws, the education about PEWS scores, the recent improvements in practice, all suggest that [Master A's] death has been appropriately reflected upon. I am struck by the sincerity and compassion in the reports, all of which consider deeply how traumatic [Master A's] death has been for his family as well as the effect it has had on their own personal nursing and medical practice.

In terms of the expert advice requested — I do not wish to change the two important messages from my initial reports i.e. failure to recognize sepsis (Septicaemia), and misuse of the PEWS scores as they were intended.

My initial assessment that there was a departure from standard practice thought to be mild still holds but I do not believe that any one individual is at fault and that the events that unfolded that day included a series of minor judgment errors and systems faults. The explanations given by all parties are in accord and the departure from accepted practice has been acknowledged and to a certain extent justified. The approach by the Canterbury DHB accepts the criticism and has put policy improvements in place to ensure that this does not happen again. I am therefore satisfied that the Canterbury DHB has adequately embarked on necessary improvements and policy updates. I am also of the opinion that there need be no further action regarding the involvement of the individual medical and nursing staff in this tragic case.

Yours sincerely,

Simon Rowley MBChB, FRACP Consultant Paediatrician, Newborn Services Chair, Paediatric Vocational Training Committee Auckland and Northern Region"



# Appendix B: Independent advice to the Commissioner

The following clinical advice was obtained from paediatric nurse RN Thomas Gorte:

"Thank you for the request for me to provide expert opinion and clinical advice in relation to the care provided to the child at [the public hospital]. The period of care being reviewed is from 2320hrs on [Day 3] to 0810 on [Day 4]. I have no personal or professional conflict of interest. I have read and agreed to follow the Commissioner's Guidelines for Independent Advisors. The majority of my advice is regarding the nursing care provided to the child. I have also inserted some information supported by evidenced-based literature regarding current knowledge surrounding chest infections, Paediatric Early Warning Scores (PEWS) and blood pressures (BP) in children.

I qualified as a Registered Sick Children's Nurse from Great Ormond Street Hospital in London in 1993. I have practised within various paediatric clinical settings in London, New Zealand and Barbados. I have also been employed in tertiary education since 2000 as a Senior Professional Clinician and acting Director of Undergraduate Nursing programme at Massey University for several years. I am currently employed within the hospital setting as a Nurse Educator within the Children Service. I have a Masters in Nursing and I am also a qualified Health Service Auditor.

I reviewed the following documentation for the original expert opinion:

- clinical records from CDHB from [Day 3] onwards;
- the letter of complaint and associated documents;
- CDHB clinical guidelines for pneumonia at the time of treatment; and, the
- CDHB response dated 3 May 2019.

I received additional information in January 2020 to which I have added further comments:

- CDHB response written by ... dated 6 December 2019
- Statement from [RN F] dated 25 November 2019
- Statement from [RN E] dated 25 November 2019
- Statement from RN H] dated 27 November 2019
- Statement from [RN G] dated 22 November 2019
- Statement from [RN I] dated 25 November 2019

I have only provided comment on the care provided by CDHB as that was what had been requested by the office of the Commissioner.

I have referred to CDHB policies and guidelines as well as other evidenced-based information to support my perspectives. A short reference list is provided at the end.



# Adequacy of Observations by Paediatric Nursing Staff and Accuracy of Paediatric Early Warning Score (PEWS) as determined by the Nursing Staff

The first set of observations recorded on the PEWS chart was at 2320hrs on [Day 3]: respiratory rate (RR) of 50–52 (PEWS: 2), moderate respiratory distress (PEWS: 2), peripheral oxygen saturation (SpO2) of 86–88% in room air (PEWS: 2), heart rate (HR) of 164–166 (PEWS: 2) and no blood pressure (BP). No PEWS score was documented. The calculated PEWS score would have been at least 8 even with exclusion of a blood pressure.

The next set of observation at 2325hrs are undertaken in a timely manner following the application of oxygen. However, no SpO2 or blood pressure were taken, so the reduction of the PEWS from 8 to 7 is not accurate. From 0015hr to 0730hrs, the night RN (RN H) incorrectly inserts the 2L of oxygen within the PEWS row of zero instead of one. At 0615hrs, the SpO2 of 92% was inserted into the incorrect row of PEWS 0 instead of 1. In addition, the RR increases from about 44 to about 58 with a reduction in SpO2 from 0015hrs to 0615hrs. The respiratory effort was recorded as changing from moderate to mild during this time frame. The child remains tachycardic at 158 to 162 beats/minute (bpm) until 0615hr when the HR reduced to 142 bpm.

Similarly, the morning RN [RN J]) calculated a PEWS score of 7 instead of 8 for the observations undertaken at 0730hrs. She states that she increased the low flow oxygen to 3L/min which she rechecked at 0810hrs. A recalculation of the PEWS should have occurred more promptly following the intervention. No blood pressure measurements were obtained. The temperature of the child was only recorded at 2325hrs and then at 0730hrs, the latter of which was 35.7°C, which was below the normal range of 36.0 to 37.5. A central capillary refill time was not recorded at 0730hrs or 0810 hrs.

An increased respiratory rate with a reduced SpO2 with a reduction in respiratory effort suggests that the child is tiring and no longer compensating. The reduction of heart rate adds to this disturbing picture of respiratory decompensation. The exclusion of blood pressure readings adds to the inaccuracy of the PEWS. The lack of obtaining blood pressure measurements in children is related to BPs being seen as 'the last or late sign' and the difficulty with accuracy as children often become upset during this intervention (Jensen, Aagard, Olsesen & Kirkegaard, 2017). The score of 4 or more should have prompted the RNs to undertake a full PEWS score which includes the acquisition of a BP (CDHB, n.d.; [the medical centre], 2019).

Whilst the child was apyrexial at about midnight, the child was admitted with an acute infection with signs of respiratory distress and tachycardia. Thus, it would have been prudent to undertake at least four hourly temperatures to ascertain if the current antibiotic regime was working and to provide a more comprehensive vital sign picture. The father of the child reported that at about 6 o'clock in the morning, the child had cold hands which he stated was not normal. No temperature was recorded by the RN who spoke with the father at this point. The 35.7°C at 0730hrs was not on its own



40

alarming but the RN needed to consider the capillary perfusion considering the child had an infection. In addition, hypothermia with an associated tachycardia and hypotension are signs of bacteraemia or sepsis (Drewry, Fuller, Skrupky & Hotchkiss, 2015).

The standard of care is unacceptable as it is essential to have an accurate PEWS which assists with determining the level of interventions required. Of equal concern was the lack of recognition of overt signs of decompensation which might have been reinforced by the small reduction in PEWS. RNs are expected to demonstrate clinical reasoning by looking at both the trends and sets of observations as opposed to just relying on a scoring system to determine courses of action (Chapman & Maconochie, 2019). This lack of detection might have been compounded by the tiredness experienced by nurses coming to the end of night duty (Gómez-García et al., 2016; Maltese et al., 2016).

I deem the numerically small but inaccurate documentation of the PEWS, the lack of at least one blood pressure reading and the lack of clinical reasoning to be a moderate departure from acceptable practice. Under Competency 2.3 and 2.6 of the Nursing Council of New Zealand (NCNZ), RNs are expected to ensure documentation is accurate and are expected to competently evaluate the effectiveness of treatment regimes.

## PEWS Management Pathways and Escalation of Concerns to Medical Staff

The PEWS management plan recommends at least half hourly observations and transfer to the paediatric HDU is indicated for a PEWS of 8 or higher (CDHB, n.d.). At 2320hrs on [Day 3], the patient had a PEWS score of 8 but was transferred to a general paediatric unit, [the children's ward], instead of to the Paediatric HDU. In addition, care of the patient should have been escalated to registrar level who would also discuss the case with the on-call paediatrician.

The frequency of observations were half hourly to hourly whilst the recorded PEWS scores were six(6) to seven(7) which was in line with the PEWS management plan guidelines. After 0100hrs, the score reduced to five (5) whereby the time to undertake a repeat and record full observations was extended to two-hourly until 0520hrs when the PEWS increased to 6. [RN H] repeated a set of observations within the next hour which was timely. However, there is no evidence that the RN caring for the patient had escalated concerns to the nurse in charge or to the on-call registrar for review within 15 minutes.

The inaccuracy of the documentation of some of the observations (such as the 2L of oxygen) led to the knock-on effect of having a reduced PEWS score below 6 which might have caused the RN to extend the time interval between observations. In addition, the lack of a blood pressure reading meant that a full set of observations and complete PEWS had not occurred.

30 November 2020

The issue within the care provided was that the PEWS score had (incorrectly) reduced from the time the patient was seen by the registrar at about midnight to about 0615hrs which might have been interpreted as general improvement. Thus, [RN H] did not ask the registrar to formally review the patient. The RN also did not recognise that the child had been deteriorating with the increasing RR, reducing SpO2, reduced respiratory effort and maintained tachycardia as discussed earlier.

I deem that the lack of escalation of concern to the registrar was unacceptable and a moderate departure from expected practice.

## Adequacy of Communication between the Nursing Staff and the Clinical Team

One of the tools utilised by RNs to provided consistent and up-to-date care is the plan of care. The plan of care developed by the RN on night duty was not reflective of the level of illness of the child as the PEWS frequency was recommended to be fourhourly or as needed (PRN). In addition, PRN was inserted into three of subsections (PEWS, BP, Weight/Bloods) within the monitoring and observations. Whilst all indicators for increasing or reducing the frequency of interventions cannot be documented, the provision of such a broad parameter does not provide adequate guidance or support for other RNs using the care plan.

As stated earlier, there is no evidence within the clinical notes or observation charts of escalation by the nurse caring for the patient on the night duty to senior nurses or doctors.

[RN J], the nurse on morning duty, documented that she had informed the senior nurse of the increased oxygen requirements of the patient which is validated by the clinical documentation by [RN I]. However, the time of review of the patient by [RN I] was at 0915hrs which was nearly an hour after the observations at 0810hrs which had a PEWS score of 6. [RN I] documented that the patient was on 2L/min as opposed to 3L/min. [RN I] also described the child as having subcostal recession, bulging eyes and grunting breathing which are in line with severe respiratory effort. She requested a review by the senior doctors in a timely manner.

The timeliness of escalation and communication of the RN on night duty with the senior nurse and doctor on night duty was not acceptable which would have been based on incorrect PEWS calculations and the lack of recognition of the deteriorating child. In my opinion, the assessment and clinical decision-making were inadequate which had a knock-on effect on the nurse's timely communication.

## **Other matters**

The PEWS management plan suggests that for a PEWS of 8 or higher, recommended interventions include the undertaking of at least half hourly observations and the need to transfer to the paediatric high dependency unit (HDU). Whilst there has been a significant focus on the errors within the PEWS recordings and inadequate escalation, of significant concern was the initial placement of this patient on a general



paediatric unit instead of the paediatric HDU. If the patient had been transferred to a high dependency setting, other interventions would have occurred, such as the undertaking of continuous monitoring, obtaining capillary blood gases which might have shown early signs of respiratory compromise or metabolic acidosis secondary to sepsis, and a higher staff to client ratio to manage potentially critically unwell clients. The clinicians who were responsible for deciding the appropriate placement of this client are also in breach of providing services of an appropriate standard that would meet the needs of the child.

# Responsibilities (Reviewed based on the additional information and perspectives provided)

## [RN F]

At 2320hrs and 2325hrs, the PEWS are at least 7 but incomplete as no blood pressure reading recorded. The RN undertook timely intervention with the application of oxygen. However, the PEWS Management Plan clearly states that a PEWS of greater than 3 means that a full PEWS score is to be calculated which required the undertaking of a BP as part of the vital signs. I agree that the request by [RN F] for the medical team to review the patient was very timely which could have impacted on her ability to obtain a BP as part of the full set of observations. On review of the documentation, I note that whilst the child had been admitted with potential pneumonia, the primary assessment which included 'respiratory system findings' had not been completed. However, the RN had undertaken a respiratory assessment stating that the child had adventitious breath sounds on auscultation. As I had incorrectly assumed that [RN F] had completed the Child Health Care Plan with four (4) hourly PRN inserted within the PEWS frequency, I had pulled both the lack of blood pressure plus the inadequate care planning together to formulate my perspective.

I have read [RN F's] statement and appreciate that she feels heavily criticised for the care that she had provided. I wish to reiterate that her timely referral to the medical team is noted and good practice. Whilst [RN F] is correct that the PEWS does not replace clinical judgement, it is important to recognise that a PEWS score might strengthen and inform one's clinical judgement. In addition, whilst continuous monitoring was appropriate, timely documentation (the oxygen saturation and BP) is a critical aspect of care especially as significant interventions, namely the administration of 6L of oxygen, had been initiated. At 0015 the PEWS score had been incorrectly calculated due to the incorrect placement of the 2L. In addition, if a BP had not been completed here to avoid upsetting the patient, this should have been noted on the observation chart.

As I have removed the responsibility of the care planning document from [RN F], I think that the lack of blood pressure recording along with the incorrect documentation were only a mild departure from acceptable practice, particularly due to the timely referral that the RN had initiated.





## [RN H]

[RN H] increased the frequency of observations when the PEWS was greater than 5. However, she did not complete a full PEWS as she had not obtained any blood pressures at the beginning or during the shift as required. The incorrect documentation of the SpO2 at 0615hr further provided an incorrect PEWS of 5. The care plan that [RN H] constructed suggested four (4) hourly observations as needed which is not appropriate for a patient who is both acutely oxygen dependent and has a significantly concerning PEWS score of 5–7.

I have read the statement by [RN H] and appreciate the challenges faced by working night duty. I also appreciate the strong influence of working cultures which in this case influenced the decision to not attempt to obtain a blood pressure reading. However, as a registered nurse, one is required to practise based on best practice not social norms. These lack of interventions, unclear care planning and incorrect documentation are moderate departures from acceptable nursing practice.

## [RN J]

[RN J] had recognised that the patient had deteriorated and had alerted the senior nurse on duty. However, the observations undertaken were incomplete as no blood pressure or capillary refill had been completed. In addition, the decrease in temperature had not been highlighted and might not have been recognised as another sign of deterioration. The lack of obtaining a BP and capillary refill for a full PEWS is a moderate departure from acceptable practice.

## **Clinical Setting**

In my expert opinion, whilst I think that the RNs identified previously needed to be more thorough in obtaining the observations, the clinical culture was negatively influential in some of the aspects of care. I would ask the following questions:

Considering that three different RNs had not undertaken blood pressures, is there a culture within the unit or wider organisation that blood pressure readings in children are not essential?

I noted that there was a focus on the fact that the RNs had not undertaken blood pressures. Does the responsibility of comprehensive assessments which include obtaining a full PEWS only lie with the registered nurse?

## Recommendations

## **Blood pressure monitoring**

Education surrounding the importance of blood pressure monitoring needs to occur. The organisation needs to undertake regular audits to ascertain if practice change has occurred and institute additional training and coaching as needed.

## PEWS

Further departmental education is needed regarding the correct completion of PEWS as both the RNs and doctors had not identified the errors within the chart. The



organisation needs to undertake regular audits to ascertain if practice change has occurred and institute additional training and coaching as needed.

## Recognition of the deteriorating patient

The RNs need education regarding recognition of the deteriorating child based on the clinical picture instead of solely looking at the PEWS as a definitive clinical decision-making tool.

## Care planning

The nursing care plan must support the nursing team to provide consistent, measurable, high quality care. Care planning within the unit needs to be better developed and strongly linked to the assessment tools incorporated into care.

## Guideline: Nursing Observation and Monitoring - Paediatrics

The above guideline is thorough and provides clear direction regarding the need to initiate different observations dependent on the clinical picture of the client. The time periods between the proposed observations are clear. Of significant note are the criteria surrounding the need to undertake a blood pressure which is not solely dependent on a working diagnosis but also on PEWS scores of greater than 3 and unexplained tachycardia and bradycardia. As stated earlier, education, auditing and clinical practice review will need to support the implementation and compliance of the proposed observations within the Nursing Observation and Monitoring in Paediatric guideline.

From reading the responses from the various health professionals involved in the care of [Master A] plus the nurse manager and other senior staff, there is a strong sense that this unfortunate event has not been taken lightly and has been heartfelt. Initiatives such as documentation changes, staff training and greater collaboration within the interdisciplinary team are strongly evident.

I am very saddened for the family's loss of their young boy, [Master A]. I also feel sorry for the registered nurses and doctors who were part of this unfortunate event as their own grief at the loss of this young boy is very evident.

## References

Canterbury DHB (n.d.). Nursing observations and monitoring — Paediatrics. Child Health Procedure. Ref: PPCH16 (2311053)

Drewry, A., Fuller, B., MSCI, Skrupky, L. & Hotchkiss, R. (2015). The presence of hypothermia within 24 hours of sepsis diagnosis predicts persistent lymphopenia. Critical Care Medicine, 43(6), 1165–1169. Doi: 10.1097/CCM.0000000000940

Gómez-García, T. et al. (2016). Nurses' sleep quality, work environment and quality of care in the Spanish National Health System: Observational study among different shifts. BMJ Open, 6:e012073, doi:10.1136/bmjopen-2016-012073.



Jensen, C., Aagaard, H., Olesen, H. & Kirkegaard, H. (2017). A multicentre, randomised intervention study of the Paediatric Early Warning Score: study protocol for a randomised controlled trial. Trials, 18(267), DOI 10.1186/s13063-017-2011-7

Lambert V, Matthews A, MacDonell R, & Fitzsimons, J. (2017). Paediatric early warning systems for detecting and responding to clinical deterioration in children: A systematic review. BMJ Open, 7:e014497, doi: 10.1136/bmjopen-2016-014497

Maltese, F. et al. (2016). Night shift decreases cognitive performance of ICU physicians. Intensive Care Medicine, 42(3), 393–400.

Royal Children's Hospital Melbourne (2019). Observation and continuous monitoring. [the medical centre]H Clinical Practice Guidelines. Retrieved from https://www.rch.org.au/rchcpg/hospital\_clinical\_guideline\_index/Observation\_and\_c ontinuous\_monitoring/

Royal Children's Hospital Melbourne (2016). Assessment of severity of respiratory conditions. RCH Clinical Practice Guidelines. Retrieved from https://www.rch.org.au/clinicalguide/guideline\_index/Pneumonia/

Signature:

Date: 26 May 2020

Thomas Gorte RN BSc MN"



# Appendix C: In-house advice to the Commissioner

The following clinical advice was obtained from GP Dr David Maplesden:

"1. Thank you for providing this file for advice. To the best of my knowledge I have no conflict of interest in providing this advice. I have reviewed the available information: complaint from [Mr A]; various Coronial documentation including provider statements; responses from [Dr K] and [Dr M] of [the medical centre]; [medical centre] GP notes; response from [Dr L] of [the urgent care clinic]; clinical notes [urgent care clinic]; Canterbury DHB response and ([public hospital]) clinical notes; [the ambulance service] Patient Report Form. [Mr A] complains about the management of his three-year old son, [Master A], by GPs and [the public hospital] clinicians on [Day 3] and [Day 4]. [Master A] was seen at [the medical centre] twice on [Day 3] with fever, lethargy and cough. He was eventually sent to [the urgent care clinic] for observation on the evening of [Day 3] where a chest X-ray was undertaken which showed bilateral pneumonia. He was then transferred to [the public hospital] where he was managed in the assessment unit and pediatric ward, receiving IV penicillin (no fluid supplementation) and oxygen. On the morning of [Day 4] [Master A's] condition deteriorated rapidly and he suffered a cardiorespiratory arrest. Sadly, [Master A] could not be resuscitated. Cause of death (postmortem performed) was felt to be sepsis complicating community acquired pneumococcal pneumonia.

2. [Master A] was born [date of birth]. He had issues with recurrent tonsillitis from about 18 months of age but this resolved following a prolonged course of antibiotics at the direction of an ENT surgeon in [2017]. He was seen by a paediatrician regarding speech and eating issues but otherwise kept in good health. He was up to date with scheduled childhood vaccinations.

Comment: There were no features in [Master A's] past medical history placing him at increased risk of developing complicated lower respiratory tract infection or sepsis.

3. According to the statement from [Master A's] mother, [Mrs A] to NZ Police [Master A] became unwell in the early hours of [Day 1] with subjective fever (temperature not measured) and flushing. [Mrs A] administered him ibuprofen and he appeared to improve following this. There were no further concerns regarding [Master A's] wellbeing until about 1300hrs on [Day 2] when he appeared unusually lethargic and sleepy although not obviously febrile. He ate a small dinner and vomited after another dose of ibuprofen administered about 1830hrs. [Master A] had a restless night and [Mrs A] took him to [the medical centre] about 1030hrs on [Day 3].

Comment: [Mrs A's] recollection of events does not appear immediately concerning that [Master A] might have a severe underlying illness although I note the history obtained at [the medical centre] (see below) contained additional relevant detail.



4. [The medical centre's] nurse triage notes at 1133hrs on [Day 3] include: Unwell with fever and cough for the last 4 days. Increasing lethargy over the last 24 hours. OA grunting resps ... temp 36.9, rr 28, O2 94–95%, pr 178, wt 12.7.

Comment: An adequate primary care nursing triage was performed and documented. Best practice might have been to comment on [Master A's] alertness. The history obtained would be a common presentation in primary care. The presence of grunting resps and markedly elevated pulse rate were potential symptoms of concern (see Appendix 1), but the respiratory rate and temperature were reassuringly within normal limits and oxygen saturation on room air were not immediately concerning.

5. [Dr K] reviewed [Master A] at 1152hrs noting: *came with fever, coughs, not eating much, been very lethargic, grunting noise, non-asthmatic, non-smoking household. 0/E afeb, obs stable, tachycardic, pt appeared tired, hs dual, chest is clear, throat is erythematous, ear drums are clear Imp: viral urti with dehydration.* [Dr K] states in his response that he did not observe any increased work of breathing associated with [Master A's] intermittent grunting and he was reassured by the normal respiratory rate and oxygenation, and absence of abnormal auscultation findings. He states he felt [Master A's] reduced fluid intake had led to a degree of dehydration and elevated pulse secondary to this. Management plan was for antipyretics (ibuprofen), encourage oral intake with electrolyte solution, watch and wait, come back if worse.

Comment: Taking into account the triage nurse recordings, [Master A's] assessment was adequate as was the accompanying documentation. However, best practice would have been to include comment on responsiveness, and if dehydration was suspected assessment of capillary return and tissue turgor might have been included. A presentation such as [Master A's] is relatively common in primary care and I believe many of my colleagues would have been reassured by [Master A's] normal respiratory rate, clear lung fields, absence of increased work of breathing/respiratory distress and adequate oxygenation, and would have managed him as [Dr K] did. The presence of an inflamed throat was suggestive of viral upper respiratory infection (URTI) which would be commonly accompanied by intermittent fever and transient irritability and decrease in food and fluid intake. Tachycardia can be associated with dehydration and fever although the degree of tachycardia in [Master A's] case might have raised additional concern of significant underlying illness but more so if there were additional concerning features such as elevated respiratory rate, high fever, decreased peripheral perfusion or marked lethargy. Without the benefit of hindsight, I think [Dr K's] management of [Master A] on [Day 3] was reasonable, noting particularly that adequate safety-netting advice was provided, and subsequently heeded by [Mrs A].

6. According to [Mrs A's] statement, [Master A's] condition remained relatively unchanged through the afternoon of [Day 3]. He was sleepy and not interested in food and fluids but did take his medication. He was sleepy until about 1800hrs. As [Master A] was not improving [Mrs A] contacted [the telephone health information service] and was advised to take [Master A] for GP review.

30 November 2020



7. [Master A] returned to [the medical centre] and was triaged by a practice nurse at 1848hrs. Notes include: Seen here earlier in day — since then has been sleeping all day. Poor food intake, taking oral rehydration. Heavy breathing present in triage, low pitched grunt. Last dose ibuprofen 1730 Lethargic in triage but verbal. Vital signs were: temp 36.2, pulse 162, O2 sats 92% RA, resps 47.

Comment: An adequate triage assessment was undertaken and documented. The presence of grunting respirations associated with reduced oxygen saturation, tachypnea and marked tachycardia were concerning symptoms. However, [Master A] evidently remained verbally responsive.

8. [Master A] was reviewed by [Dr M] at 1901hrs. She noted the triage findings and: *mild dry tongue, mild iwob* [increased work of breathing], *prolong exp phase creps, hs dual with no added sound, abdn snt* [soft, non-tender] *nil mass nil organomegaly, bsbptove* [bowel sounds positive], *ear blocked now with wax, throat swollen red.* [Dr M's] recorded impression was *mild dehydration, viral wheeze* which she elaborates in her response as *viral upper/lower respiratory infection with wheeze.* [Dr M] prescribed salbutamol via spacer (given at 1925hrs) and oral prednisone (Redipred — given 1928hrs) with repeat observations at 30 minutes and GP review at 60 minutes. Oral rehydration solution was to be offered every 10 minutes.

Comment: Assessment, when combined with triage nurse observations, was adequate. [Master A's] vital signs had deteriorated somewhat since the morning assessment (now tachypnea and hypoxia with more prominent tachycardia and some increased work of breathing) and he now had abnormal auscultation findings (crepitations rather than audible wheeze). He remained afebrile but had been administered regular ibuprofen in the interim. He was verbally responsive. I believe pneumonia should now have been included in the differential diagnosis given the auscultation findings and deterioration in vital signs (see Appendix 3), although an initial trial of inhaled bronchodilator was not unreasonable provided response was to be closely monitored (which was the documented plan). I am mildly critical pneumonia was apparently not considered in the differential diagnosis.

9. In her response, [Dr M] states that [Master A] was observed until the surgery's scheduled closing time (2000hrs). *He had gone back to sleep after being given the medication earlier and then woken up with heavy breathing. When I re-examined him prior to our closing time he was sleeping again with an ongoing mild increased work of breathing. He had an ongoing prolonged expiratory phase with crepitations on auscultation ... At that time, my impression was that there was not enough improvement in his condition to be able to safely discharge him home ... At the time I did not feel that [Master A] was unwell enough to require hospital admission. [Dr M] felt [Master A] required further observation and inhaled salbutamol and referred him to [the urgent care clinic] for observation and further management (phone handover and written referral). This facility has a dedicated observation unit which GPs can refer to. Her referral letter included details of the consultations to date and: <i>thank you for your input for this 3yr old boy with mild dehydration and viral wheeze. He had* 

pedialyte 5ml and 6 puff salbutamol via spacer and prednisone. Small improvement. Benefit for further observation at 24hr unit.

Comment: There is no reference in the clinical notes to further observations recorded prior to the decision to transfer [Master A] to [the urgent care clinic] for observation and I am mildly to moderately critical of this omission (either an omission of documentation or assessment). I would expect vital signs to have been repeated in addition to the lung auscultation recorded in [Dr M's] response to determine if it was safe for [Master A] to be observed out of hospital or whether acute pediatric referral would have been a more appropriate management decision. Given there had evidently been some subjective improvement, although limited, I am unable to predict whether repeated vital signs would or should necessarily have resulted in a change in management at this point. The Appendices included at the conclusion of this report could support [Master A] being at intermediate to high risk of serious illness including sepsis if his vital signs had remained unchanged or deteriorated further. A mitigating factor is that further medical supervision was arranged, albeit out of hospital, rather than [Master A] being sent home.

10. [Master A] was taken to [the urgent care clinic] where he was triaged by a nurse at 2045hrs. Notes include: *child eye opens but looks tired, happy to lie on bed — not crying or making noise. Parent has given approx 40ml of pedialyte since 1200hrs plus some extra water. T 36.3, P 167, rr 40, no IWOB but occasional ?mild grunt, sats 100% — transferred to obs unit ... Pt easily woken for transfer .... [Dr L] examined [Master A] about 2105hrs. She states in her response she recalls [Master A] talking to her and smiling but she was concerned that he was tachypnoeic with expiratory grunting. She was surprised at his admission O2 saturation (of 100% — confirmed by the triage nurse at the time following repositioning of the probe) and rechecked this obtaining a measurement of 88% on room air. This was rechecked and was accurate. [Dr L] noted absence of any expiratory wheeze but presence of inspiratory crepitations at the left lower lung. [Dr L] states she felt [Master A] was more unwell than conveyed in the transfer telephone call, and pneumonia was a more likely diagnosis than viral wheeze. However, she advised further inhaled salbutamol to determine [Master A's] response to this while she arranged an urgent chest X-ray.* 

Comment: [Dr L's] findings appear to have been documented after [Master A] returned from X-ray but are consistent with her response. [Dr L] acknowledges a documentation omission with respect to the O2 sat 88% reading, but noting the supporting nursing documentation and management plan I think this is of minor concern. I think it was reasonable to trial salbutamol immediately to assess [Master A's] response, but it might have been prudent to defer chest X-ray until the response was known as a failure to improve his oxygenation and overall clinical status following administration of salbutamol might have been best managed by immediate hospital admission via ambulance rather than deferring admission for chest X-ray to be performed (the result was not going to alter management i.e. if [Master A's] O2 saturation remained  $\leq$  92% he required hospital admission irrespective of his diagnosis). However, I acknowledge chest X-ray was going to be required at some



stage of [Master A's] assessment in or out of hospital, and [Master A's] saturation improved with use of supplementary oxygen.

11. The observation nurse assessed [Master A] at 2115 hrs prior to administration of salbutamol noting: *Pt grunting but nil IWOB of note.* No nasal flaring or *TT* [tracheal tug], nil seesaw breathing or tripoding. Skin warm, pink and dry. *Pt placed in high Fowler's position. Given 6 puffs ventolin via spacer at 2120hrs. t 36.2, pr 167, rr 40, spO2 89% RA, PEWS 8. 2125hrs — pt taken for chest X-ray. SpO2 up to 92% post-inhaler. 2150hrs — Pt commenced on oxygen 4L O2 took SpO2 to 92%, now on 6L via mask and maintaining 95–97%.* Chest X-ray showed bilateral pneumonia (right upper lobe and left lower lobe). [Ambulance service] records show a call was made at 2221 hrs and paramedics arrived at 2231hrs, departing for [the public hospital] at 2251hrs. Paramedic notes include: *Pt very lethargic but rouseable. Skin warm and dry. Grunting and increased work of breathing. Accessory muscle use. Nil nasal flaring. O2 required to maintain saturation. Bilateral crackles on auscultation. Mum states vomited yesterday, not today. Observations (2250hrs) were: GCS 15, pulse 170, resps 50, O2 sats 90% on oxygen, temp 36.1.* 

Comment: Following the chest X-ray [Dr L] confirmed [Master A's] suspected pneumonia diagnosis and arranged urgent specialist assessment with ambulance transport arranged to [the public hospital] as was clinically indicated. [Master A's] oxygen saturation had improved on supplementary oxygen and his vital signs remained stable. I think [Master A's] management by [Dr L] was consistent with accepted practice. I note the PEWS score is used at the 24hr Surgery and [Master A's] score was 8 at 2115hrs and although not totalled at 2150hrs I have estimated his score then to be at least 6. I have two observations in this regard: if the PEWS score is to be used accurately, assessment of blood pressure and responsiveness is required to be recorded as without all components of the score being considered it cannot be regarded as a valid measurement — blood pressure was not recorded at all on the PEWS chart and responsiveness was recorded in only one of the three observation sets. The second point is that if the PEWS score is ≥6 (as it was at 2045hrs, 2115hrs and 2150hrs) it is recommended the patient have observations every 15 minutes or be placed on a monitor. There are no observations recorded for [Master A] from 2150hrs until paramedic records at 2250hrs. [Master A] may have been on a monitor<sup>1</sup> but if not there might be some concern raised at the standard of observations over this period."

<sup>&</sup>lt;sup>1</sup> It has been confirmed that an oxygen probe was attached to monitor Master A's oxygen saturation.

