

Care provided to mother and baby

1. On 10 June 2022, this Office received a complaint from Ms A about the care provided to both her and her baby, [Baby A], by Hato Hone St John Ambulance Services (St John) and Health New Zealand | Te Whatu Ora – Counties Manukau (Health NZ). The complaint concerns the delay in transportation by St John to Middlemore Hospital¹ and the neonatal care provided at Middlemore Hospital. Ms A also raised concerns about poor communication from staff after Baby A's birth.

Background

2. In April 2022, Ms A (at 41 weeks, 3 days' gestation) had a seizure at home and was transported to Middlemore Hospital by St John. St John staff coded the incident as a red response, indicating an immediate threat to life. An ambulance crewed by a paramedic and an emergency medical technician (EMT) was dispatched with sirens and lights at 8.04pm. A single vehicle with an intensive care paramedic and a single-crewed first response unit with an EMT were both sent a short time later.
3. When the ambulance staff arrived at Ms A's home, she was noted to be alert and conscious with ongoing rigors (shivering). The ambulance staff completed an assessment, and Ms A was given a Glasgow Coma Scale (GCS) score of 15, which indicates an individual who is fully alert, aware, and oriented. Her vital signs were taken at 8.40pm (heart rate 105bpm (high), blood pressure 150/96 (high), blood sugar 7.9 (high), and a temperature of 38.6°C (high)). A three-lead electrocardiograph, which records the heart's activity, indicated sinus tachycardia (fast heart rate). She was documented as having an ongoing headache, dizziness, and vomiting. It was recorded that Ms A was not in active labour but had been having contractions for several hours. The status was recorded as 3 (unlikely threat to life). Staff administered paracetamol, and the ambulance left for Middlemore Birthing and Assessment unit at 8.56pm.
4. Ambulance staff contacted Ms A's midwife to discuss Ms A's condition. Ms A's midwife documented that she was contacted by ambulance staff at 8.35pm to inform her that Ms A had experienced a seizure. She then contacted the Senior Medical Officer (SMO) at Middlemore Hospital, who was unavailable, so she contacted the clinical charge midwife to advise that Ms A needed to be transported to Middlemore Hospital. Ms A's midwife then contacted ambulance staff to advise them Ms A needed to be transported to Middlemore Hospital as soon as possible and that the clinical charge midwife had been informed.
5. In response to the provisional opinion, St John told the Health and Disability Commissioner (HDC) that ambulance staff did consider pre-eclampsia as a potential diagnosis and that

¹ Formerly operated by Counties Manukau District Health Board. On 1 July 2022, the Pae Ora (Healthy Futures) Act 2022 came into force, which disestablished all district health boards. Their functions and liabilities were merged into Health New Zealand | Te Whatu Ora. All references in this report to Counties Manukau Health Board now refer to Health NZ – Counties Manukau.

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand | Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

ambulance staff later recalled that this diagnosis was discussed with Ms A's midwife. However, there is no clinical documentation recording that pre-eclampsia was considered or discussed with Ms A's midwife.

6. Vital signs were taken during transport at 9.00pm (152/103), 9.18pm (150/100), and 9.36pm (159/111), and a partial set of observations was taken at 9.51pm. At 9.51pm, Ms A had a generalised seizure that lasted approximately three minutes. The ambulance stopped so ambulance staff could manage Ms A's airway. Middlemore Hospital was advised of the change in Ms A's condition, and ambulance staff decided to transport Ms A to the Emergency Department (ED), arriving there at 10.02pm. The patient code on arrival was status 2 (potential threat to life).

Middlemore Hospital

7. On arrival, Ms A was assessed; the working diagnosis was eclampsia and/or infection, and the priority was to stabilise Ms A then transfer her to the Birthing and Assessment unit. After this transfer, Ms A's blood results indicated severe pre-eclampsia, which is pregnancy-related high blood pressure that can affect both the mother and the unborn baby. She received further monitoring and treatment to stabilise her before undergoing an emergency Caesarean section.
8. Baby A was delivered at 1.04am and required assistance with breathing. The APGAR is a scoring system used to assess newborns, and Baby A's APGAR scores were considered moderately abnormal. He was transferred to the Neonatal Intensive Care Unit (NICU). Baby A required continuous positive airway support and was noted to have poor tone. The differential diagnosis at the time was sepsis, an intracranial bleed, or effects of the general anaesthetic. After Baby A's birth, Ms A was transferred to the intensive care unit because she had HELLP syndrome (haemolysis, elevated liver enzymes, and low platelet count), which is a complication of pregnancy.

Blood glucose testing

9. Baby A's blood sample results, returned at 1.50am, identified a blood glucose level of 3.1mmol/L (the normal range is 2.6–7mmol/L). A further blood sample at 2.48am showed a blood glucose level of 0.6mmol/L, which indicated severe hypoglycaemia, a condition where blood sugar (glucose) levels are lower than the standard range. Baby A was started on a glucose infusion. Further blood sample results were taken at 3am (0.3), 3.30am (1.2), 5.12am (1.9), 6am (3.4), and 8.30am (4.8).

Cooling

10. At 3.13am, the Resident Medical Officer (RMO) and SMO discussed whether Baby A met the criteria for therapeutic hypothermic cooling management.² Health NZ told HDC that staff did consider this; however, the Sarnat scoring tool³ and Baby A's clinical presentation up to this point indicated that he did not have moderate to severe (stage 2 or 3) encephalopathy (disease, damage or malfunction of the brain), which would have been a clear indication to

² An intervention to decrease adverse neuro-developmental outcomes after a baby or fetus has reduced oxygen or blood flow in the perinatal period, which can cause a brain injury called hypoxic ischaemic encephalopathy (HIE).

³ The Sarnat score is used to assess the severity of NE

start this therapy. It was also considered that therapeutic hypothermia may have limited benefit or may even have been harmful to Baby A if he had neonatal sepsis, which was still being considered.

11. Further assessments were carried out at 5am (by a nurse practitioner) and 5.38am (by the RMO and discussed with the SMO). Baby A was noted to be neurologically improving but still hypoglycaemic (1.9). Baby A received caffeine for apnoea (temporary cessation of breathing), and the glucose infusion was increased. It was documented that an aEEG to monitor his brain function would not be performed at this stage.
12. Health NZ told HDC that another SMO reviewed Baby A at 6am with a view to initiating therapeutic hypothermia therapy if needed. At 8am, there was a discussion with the incoming SMO, and a decision was made to commence therapeutic hypothermia, despite the uncertainty of its benefit. Health NZ stated that this therapy should ideally be provided within six hours from birth, if a baby meets the criteria,⁴ and it was still within the appropriate timeframe of six to twelve hours after birth to commence this therapy. However, there is no documentation of either of these discussions in the clinical notes, and Health NZ told HDC that handover for medical staff occurred at 8am.
13. Given the concerns about Baby A's neurological function and seizures, an aEEG was commenced at 9am when Baby A was eight hours old.
14. At 10am (nine hours of age), the SMO wrote a retrospective note indicating that Baby A had neonatal encephalopathy⁵ (NE) and that a decision to provide therapeutic hypothermia therapy had been made at 8am when Baby A was seven hours of age, as discussed above. Therapeutic hypothermia therapy commenced at 11am, when Baby A was approximately ten hours old, but Ms A later told HDC that the cooling equipment was not working properly.
15. Baby A remained in the NICU until 27 April. As a result of the brain injury Baby A sustained, he requires ongoing support and care, and Ms A is concerned that the brain damage Baby A has suffered was worsened by delays in his care.

ACC advice

16. ACC obtained external clinical advice from a neonatal paediatrician, Dr B. Dr B advised that criteria for therapeutic hypothermia based on the ICE study in Australia and New Zealand⁶ had been met within the first six hours of life. Dr B accepted that the criteria for cooling are a guide only and that the overall decision to offer therapeutic hypothermia should be based on a collective range of antenatal and perinatal features. However, in his opinion, the degree of encephalopathy was underestimated in this case, and therapeutic hypothermia should have commenced earlier.

⁴ Neonatal Unit Guideline: Hypothermia (Body cooling) for Acute Neonatal Encephalopathy.

⁵ Disturbed neurological function within the first week after birth in an infant born from 35 weeks' gestation. Symptoms include difficulty initiating and maintaining respiration, depression of tone and reflexes, subnormal level of consciousness, and often seizures.

⁶ Mehta, S., Joshi, A., Bajuk, B., et al. (2017). Eligibility criteria for therapeutic hypothermia: From trials to clinical practice. *Journal of Paediatrics and Child Health*. 53(3):295–300. doi: 10.1111/jpc.13378.

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand | Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

Response from Ms A and family

17. Ms A and her family told HDC that it is their view that multiple systemic failings and delays compromised the standard of care provided to Ms A and Baby A. Specifically, they stated that “Taken together, the failures identified reflect a broader pattern of delayed assessment, insufficient diagnostic investigation, and delayed intervention. The cumulative effect of these failures delayed the diagnosis and treatment of neonatal encephalopathy and hypoxic injury during the recognised therapeutic window, resulting in severe brain injury to Baby A and should therefore be considered as more than a ‘mild departure’.”

St John response

18. St John told HDC that an audit was conducted after the incident. The audit findings concluded that ambulance staff failed to recognise the severity of Ms A’s symptoms and should have treated her as a status 2, as opposed to a status 3, patient. The initial 111 call was also reviewed, and it was determined that this was appropriately triaged and prioritised as a RED response. St John considered that lights and sirens could have been activated, which may have reduced the overall travel time to Middlemore Hospital by ten minutes.
19. St John told HDC that it acknowledges the complexity of pregnancy and birth incidents and is actively providing education and guidance to enable staff to provide safe clinical care.
20. In response to the provisional opinion, St John told HDC that clinical decision-making occurred in conjunction with Ms A’s midwife regarding both the differential diagnosis and the most appropriate destination for ongoing care and that the care provided by ambulance staff was reasonable in the circumstances. St John also advised that roadworks and weather had an impact on transport times.

Health NZ response

21. Health NZ told HDC that the diagnosis and management of hypoxic ischaemic encephalopathy (HIE) is challenging and that therapeutic hypothermia therapy is not a benign intervention so would not be commenced without good evidence to do so. The best tools available to help determine whether to apply cooling are a combination of the infant’s history, initial blood gas, ideally cord gas, their progressive examination findings, and Sarnat scoring over six hours.
22. Health NZ told HDC that hypoglycaemia management can also be challenging and was severe in Baby A’s case, with a blood sugar level of 0.6 mmol/L recorded. However, Health NZ accepted that the frequency of the monitoring of his blood glucose levels was inadequate. Health NZ also accepted that documentation at the 6am SMO review was inadequate.
23. Health NZ apologised that communication with Ms A did not meet her expectations. Health NZ recognise the importance of clear and compassionate communication and keeping families informed and remain committed to strengthening communication for families in similar situations.
24. In terms of staffing levels, Health NZ told HDC that staffing in the NICU remains similar to the levels at the time of these events in 2022.

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand | Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person’s actual name.

Independent clinical advice

25. Independent clinical advice was provided by Extended Care Paramedic, Ms Laura Jefferies (Appendix A), who noted the following departures from the accepted standard of care in relation to St John:
 - a. The standard of care regarding status codes and mode of transport – moderate departure;
 - b. The standard of care regarding recognition of vital signs – severe departure.
26. In addition, independent clinical advice was provided by SMO and neonatal paediatrician Associate Professor Dr Liza Edmonds (Appendix B), who noted the following departures from the accepted standard of care in relation to Health NZ:
 - a. The standard of care regarding the initial decision to defer cooling – mild departure;
 - b. The standard of care regarding the timeliness of commencing an EEG – mild departure;
 - c. The standard of care regarding blood glucose level testing – mild departure;
 - d. The standard of care regarding communication with family – mild departure.
27. Dr Edmonds concluded that there were no departures from the accepted standard in relation to the following areas:
 - a. Initial resuscitation and transfer to the NICU;
 - b. The timing of commencing cooling treatment;
 - c. Seizure management.

Opinion – Hato Hone St John Ambulances Services and Health New Zealand | Te Whatu Ora – Counties Manukau

28. I have several concerns about the care provided to Ms A by St John and the care provided to Baby A by Health NZ, and I have set out the reasoning for my decisions below.

St John – breach

29. St John undertook a review of the care provided to Ms A and acknowledged that ambulance staff failed to recognise the severity of her condition and that she should have been treated as status 2 (potential threat to life) rather than status 3 (unlikely to be a threat to life). It also acknowledged that the ambulance lights and sirens could have been activated, with a potential reduction in overall transport time of approximately ten minutes. In a further response, St John told HDC that the care provided to Ms A was reasonable in the circumstances.
30. My advisor, Ms Jefferies, agreed that the status codes and mode of transport should be regarded as a moderate departure from accepted standards. However, I also note Ms Jefferies's comment that the use of lights and sirens would have made for an unstable environment for potential intervention and patient management in the back of the vehicle.

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand | Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

31. Ms Jefferies noted that ambulance staff did not recognise Ms A's concerning vital signs, particularly her high blood pressure, throughout the transport time, and no treatment was initiated or discussed regarding this. The fact that the status code 3 was initially given indicated that Ms A's blood pressure was not identified as a concerning feature within her vital signs. Ms Jefferies considered this omission to have been a severe departure from the accepted standard of care and referenced St John's national clinical practice guidelines, which indicate that, given Ms A's blood pressure, a clinical discussion with her lead maternity carer (LMC) would have been appropriate to arrange for urgent assessment and to discuss the potential diagnosis of pre-eclampsia and whether the use of magnesium to prevent eclampsia was warranted.
32. I acknowledge St John's response and accept that there was a discussion between ambulance staff and Ms A's midwife about Ms A's condition. However, there is no documentation to suggest that pre-eclampsia was considered as a diagnosis or that this was discussed with Ms A's midwife. I also note St John's own audit findings, which concluded that ambulance staff failed to recognise the severity of Ms A's condition and that this is evident in the status 3 code that was initially assigned and only changed to a status 2 after Ms A's second seizure, which occurred in the ambulance.
33. I accept Ms Jefferies's advice, noting that Ms A's blood pressure was within concerning levels from the beginning of her interaction with St John staff, and I remain critical that ambulance staff failed to consider a diagnosis of pre-eclampsia and should have urgently escalated to Ms A's LMC. I note that a number of St John personnel were involved in this incident, with an ambulance crewed by a paramedic and an EMT initially dispatched and an intensive care paramedic and a single-crewed first response unit with an EMT both sent a short time later. For this reason, I am not holding any one individual to account and instead consider St John was responsible for the shortcomings in Ms A's emergency transfer.

Conclusion

34. I consider that St John failed to recognise the severity of Ms A's condition. Accordingly, I find that St John breached Right 4(1)⁷ of the Code of Health and Disability Services Consumers' Rights (the Code).

Health NZ – breach

Decision to defer cooling

35. Dr Edmonds noted that Baby A's initial NICU admission note from the RMO did not include NE as a consideration. It appears that the emergence of Baby A's NE was not recognised until he was approximately nine hours old, at which point a decision was made to initiate therapeutic hypothermia.
36. Dr Edmonds stated that, in Baby A's first hours of life, the decisions on his care were likely based on information the RMO conveyed to senior members of the team over the phone during the night. She notes that it can be challenging for junior staff to convey complex

⁷ Right 4(1) states: 'Every consumer has the right to have services provided with reasonable care and skill.'

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand | Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

information in these circumstances, especially when the SMO is not available within the hospital to directly review the patient themselves.

37. Although I have considered the advice Dr B provided to ACC, I note that it concerns whether the treatment caused an injury, whereas the advice that Dr Edmonds provided to HDC is concerned with what clinicians knew when they were providing care with this report focusing on the standard of care provided at the time, so – although I am cognisant of Dr B’s position – I have relied on Dr Edmonds’s advice when it comes to determining the level of departure from the accepted standard.
38. Therefore, I accept Dr Edmonds’s advice that the delay in commencing therapeutic hypothermia was a mild departure from the accepted standard of care, noting that there were multiple contributing factors to the decisions taken at the time and that the emergence of NE often only becomes apparent retrospectively. Dr Edmonds noted that, once the decision to commence cooling was made, an elective intubation was required, and although this may have slightly delayed cooling, it was reasonable to wait until intubation was complete to ensure that Baby A had a stable and secure airway during the cooling procedure.

aEEG

39. Dr Edmonds also considers that the timing of commencing an aEEG for Baby A represents a mild departure from the accepted standard of care. The nursing notes indicate that an aEEG was commenced at 9am, when Baby A was eight hours old. Dr Edmonds noted that earlier implementation of an aEEG would potentially have identified a pattern consistent with NE and provided more information for the management decisions that were made.
40. I accept this advice and I am concerned that there were delays in commencing an aEEG.

Blood glucose level testing

41. Dr Edmonds also notes that Baby A had persistent early hypoglycaemia, and blood glucose level testing appears to have been suboptimal, which potentially contributed to the timeframe of more than four hours to correct this issue.
42. Dr Edmonds advised that hypoglycaemia can itself contribute to brain injury; in combination with NE, it was less than ideal to have the hypoglycaemia occur for the length of time that it did. Dr Edmonds concluded that this was a mild departure from accepted standards.
43. I accept this advice. Although I acknowledge the escalation in response to hypoglycaemia, I accept that the blood glucose level testing was suboptimal, which potentially contributed to the prolonged period of hypoglycaemia.

Communication with family

44. Dr Edmonds advised that, although there was documentation of detailed communication between staff and Baby A’s family, it did not meet the family’s needs, and she considered this to be a mild departure from the accepted standard of care.

45. Health NZ have acknowledged the importance of clear and compassionate communication and keeping families informed, and I encourage Health NZ to reflect on Dr Edmonds's advice regarding communication and supporting whānau in difficult circumstances.

Conclusion

46. It is evident that Baby A's presentation was complex, and although it is disappointing to note the missed opportunities to escalate his care at an earlier stage, I also acknowledge that many factors contributed to this situation. I am mindful of the remarks Ms A and her family have made in this respect, and I agree. In the circumstances, I consider that, cumulatively, the identification of multiple mild departures from accepted standards of care amount to a breach of Right 4(1) of the Code.
47. I also accept Dr Edmonds's comment that improved NICU senior staff levels could allow for the emergence of NE to be identified earlier.
48. Health NZ accept this finding and my recommendations set out below.

Documentation – educative comment

49. Dr Edmonds identified shortcomings in the documentation of SMO reviews, and Health NZ have accepted that this was inadequate.
50. I take this opportunity to remind staff of the importance of keeping accurate and thorough documentation.

Changes made since events

St John

51. St John told HDC that recent training provided to staff includes out-of-hospital births and complications, pregnancy and birth, antenatal complications, and birth emergencies, along with the importance of comprehensive documentation.
52. St John also stated that a new section on pre-eclampsia has been included in the clinical practice guidelines.

Health NZ

53. Health NZ advised that it has made the following changes:
- In 2023, a new HIE guideline was implemented that includes a clear flowchart and steps to follow, including hourly examinations and documented Sarnat scoring. The guideline also includes commencing aEEG monitoring early if there is any suspicion of HIE or seizure activity, with regular assessments of the aEEG. This will identify infants requiring therapeutic cooling in a timelier manner and provide junior staff with a clear method of assessing them and providing descriptions that can be used to discuss over the telephone with an SMO. If there is any uncertainty about whether a patient requires cooling, Health NZ is advocating for senior staff to attend and examine the patient in person;
 - Education for new staff is given on the HIE and hypoglycaemia guidelines;

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand | Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

- It has implemented a formal template for assessing aEEGs that is incorporated into patient charts and is required to be completed every 24 hours;
- A quality improvement project is in development to look at different treatment strategies to reduce the duration taken to correct low blood sugar levels;
- It is in the process of procuring two new cooling systems;
- The Neonatal care team has confirmed that the simplified Sarnat criteria are routinely used as part of the clinical assessment for all infants with HIE;
- Expectations concerning documentation standards for SMOs have been reinforced within the service;
- Staff in the neonatal unit are engaged in clinical practice improvement involving regular monthly multidisciplinary scenario-based training for both medical and nursing staff to support timely recognition, escalation, and management of high-risk neonatal scenarios, including therapeutic hypothermia;
- Communication with parents and whānau, including responsiveness to parental concerns and feedback, is incorporated into HIE education, EEG education, and broader NICU clinical education programmes and remains an ongoing area of focus to support families during complex neonatal care.

Recommendations

St John

54. I recommend that St John:

- Provide a formal written apology to Ms A for the breach of Right 4(1) identified in this report. The apology is to be sent to HDC, for forwarding to Ms A, within three weeks of the date of this report;
- Prepare and present an anonymised case study based on these events for the wider education of St John staff. The case study should detail the actions taken and decisions made by staff, the results of these actions/decisions, and the appropriate course that should have been taken. Evidence confirming the content and delivery of the presentation, and to whom it has been presented and when, is to be provided to HDC within six months of the date of this report;
- Provide training to staff on the following:
 - The importance of documenting all interactions, including what the patient complained of and the treatment they received, along with treatments/diagnosis that were considered but not commenced. This is to ensure that the documentation accurately records the scene and can be used to facilitate any future follow-up care;
 - The importance of assessing the full clinical picture as set out in the advice from Ms Jefferies and to remind staff of the importance of assessing other diagnoses and concerns;
- Evidence confirming the content and delivery of the training, and to whom it has been presented and when, is to be provided to HDC within six months of the date of this report.

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand | Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

Health NZ – Counties Manukau

55. I recommend that Health NZ – Counties Manukau:
- a. Provide a formal written apology for the breach of Right 4(1) identified in this report. The apology is to be sent to HDC, for forwarding to Ms A and her family, within three weeks of the date of this report;
 - b. Prepare and present an anonymised case study based on these events for the wider education of staff in the NICU at Middlemore Hospital. The case study should detail the actions taken and decisions made by staff, the results of these actions/decisions, and the appropriate course that should have been taken. Evidence confirming the content and delivery of the presentation, and to whom it has been presented and when, is to be provided to HDC within six months of the date of this report.
 - c. Provide an update on the procurement of new cooling systems within three months of the date of this report;
 - d. Provide an update on the quality improvement undertaken to reduce the duration taken to correct low blood sugar levels within three months of the date of this report.
56. I note Dr Edmonds’s recommendation for improved NICU senior staff levels and that Health NZ advised that staffing levels are unchanged since these events in 2022. These are matters better addressed by Health New Zealand (national office) and the Ministry of Health | Manatū Hauora, and I intend to send a copy of the final report to Health NZ and the Ministry of Health | Manatū Hauora for consideration of the staffing issues raised by Dr Edmonds.

Follow-up actions

57. A copy of this report with details identifying the parties removed, except Hato Hone St John, Middlemore Hospital, Health NZ – Counties Manukau, and the expert advisors, will be sent to the Ministry of Health | Manatū Hauora and placed on the Health and Disability Commissioner website, www.hdc.org.nz, for educational purposes.

Appendix A: Independent clinical advice to the Commissioner

The following independent advice was obtained from Extended Care Paramedic (ECP), Ms Laura Jefferies:

'I have been asked to provide an opinion to the Commissioner on case number C22HDC01427. I have read and agree to follow the Commissioner's Guidelines for Independent Advisors, and I am not aware of any conflicts of interest associated with this case.

I am an ECP, with a twelve-year history as an Emergency Ambulance Paramedic. I practice at ECP level, across the community response car environment and the emergency ambulances in the Wellington Region. My skill set includes assessment, provisional diagnosis, and treatment. My ECP practice level encompasses the ability to assess and treat people in the community, avoiding the need for hospital attendance in certain health complaints.

I have been called upon by the Commissioner to provide expert advice as a paramedic on the care provided by Hato Hone St John to Ms [A], [in] April 2022, in [...], Auckland.

I have been asked by the Commissioner specifically to provide comments on the following points:

1. The Hato Hone audit has determined that the ambulance personnel failed to recognise the severity of Ms [A]'s condition and should have treated her as a status 2 rather than a status 3. Please quantify the significance of this departure from standards (with reference to the scale of departures on the next page), along with details of the factors you have taken into consideration.
2. Please provide any recommendations for improvements with a focus on improving care in the future.
3. Any other comments you wish to make.

In relation to these points above, I have been specifically asked to answer the questions below.

- 1. What is the standard of care/accepted practice?**
- 2. Has there been a departure from the standard of care or accepted practice? If so, please identify how the care departs from standards or accepted practice, and the extent of that departure (mild departure, moderate departure, or severe departure)?**
- 3. How would the care be viewed by your peers?**

The documents that were provided to me by the Commissioner include:

1. Letter of complaint dated 10 June 2022 (redacted)
2. Hato Hone St John's response dated 8 August 2022
3. Ambulance care summary provided by Hato Hone St John for the interaction between Ms [A] and the ambulance personnel. Job number: 0830 on [...] April 2022

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand | Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

Factual summary

At 19:59 on [...] April 2022, Mr [A] made a phone call to 111, requesting an ambulance for Ms [A] as she was not conscious, shaking, and the left-hand side of her face was drooping.

At this time, [Ms A] was 41 and 3 days' gestation of pregnancy and had been in latent labour (first stage) for the past 24 hours. She had recently returned from a midwife appointment where no concerns were highlighted as to the health of [Ms A] or her unborn child at the time.

The incident was coded as a RED response by the call taker utilising PROQA (the automated triage system), which indicates immediately life threatening, and an ambulance was dispatched with lights and sirens at 20:04. This ambulance was crewed by a paramedic and an emergency medical technician (EMT).

A single-crewed intensive care paramedic was also dispatched at 20:16.

A single-crewed first response unit (FRU) was also dispatched at 20:26, crewed by an EMT.

The first ambulance located the [...] address at 20:26, approximately 27 minutes after the phone call was received on the 111 system. The FRU unit located at 20:29. The single-crewed Intensive Care Paramedic unit located at 20:37.

On arrival to the scene, as per the patient report documentation provided, [Ms A] was described to be in the recovery position, alert and conscious with ongoing rigors (shaking). It was reported by Mr [A] to the paramedics that they had returned home from a midwife appointment when [Ms A] was seen to begin shaking, with her eyes rolled back and her jaw clamped shut for approximately 30–60 seconds.

[Ms A] reported to staff that she felt unwell prior to this collapse but was able to recall events prior and post. She was reported to be awake during the shaking episode that prompted the emergency call but non-verbal throughout the episode and appeared drowsy following the seizure activity. The paramedic spoke with Ms [A]'s Lead Maternity Carer (LMC) to inform her of Ms [A]'s condition.

The ambulance personnel completed an assessment, including a set of vital signs, which is documented at 20:40 to be a GCS15, heart rate 105bpm, blood pressure 150/96, blood sugar of 7.9, and temperature of 38.6°C. They documented that she had been experiencing an ongoing headache with some dizziness and vomiting.

Paracetamol was administered at 20:55. The ambulance has departed her [home] address at 20:55 with the intention of transporting to Middlemore Birthing and Assessment unit, as discussed with the LMC.

Whilst transporting, a further set of baselines (vital signs) has been completed at 21:00, 21:18, and 21:36 and a partial set of vital signs at 21:51.

At 21:55, [Ms A] has been witnessed by ambulance personnel to have a tonic clonic seizure (generalised seizure), lasting approximately 3 minutes. Her airway was managed throughout the event with a jaw thrust and oxygen via a bag valve mask, and a radio call (R40) was made to Middlemore hospital to advise of the change in patient condition.

The decision was made by ambulance personnel to now transport the patient to the Emergency Department instead of the birthing unit, due to the change in patient condition.

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand | Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

The midwife was noted of this change in patient condition and destination. The ambulance arrived at Middlemore hospital at 22:02.

The patient was recorded on the patient documentation to be a status 3 (unlikely threat to life) at scene and then a status 2 (potential threat to life) as the final patient status code on arrival to hospital.

The patient was handed over to the care of the Emergency Department on arrival to hospital. Noted that the midwife spoke with the resus team via cell phone post arrival at hospital.

I have been asked by the Commissioner to provide an opinion on the below:

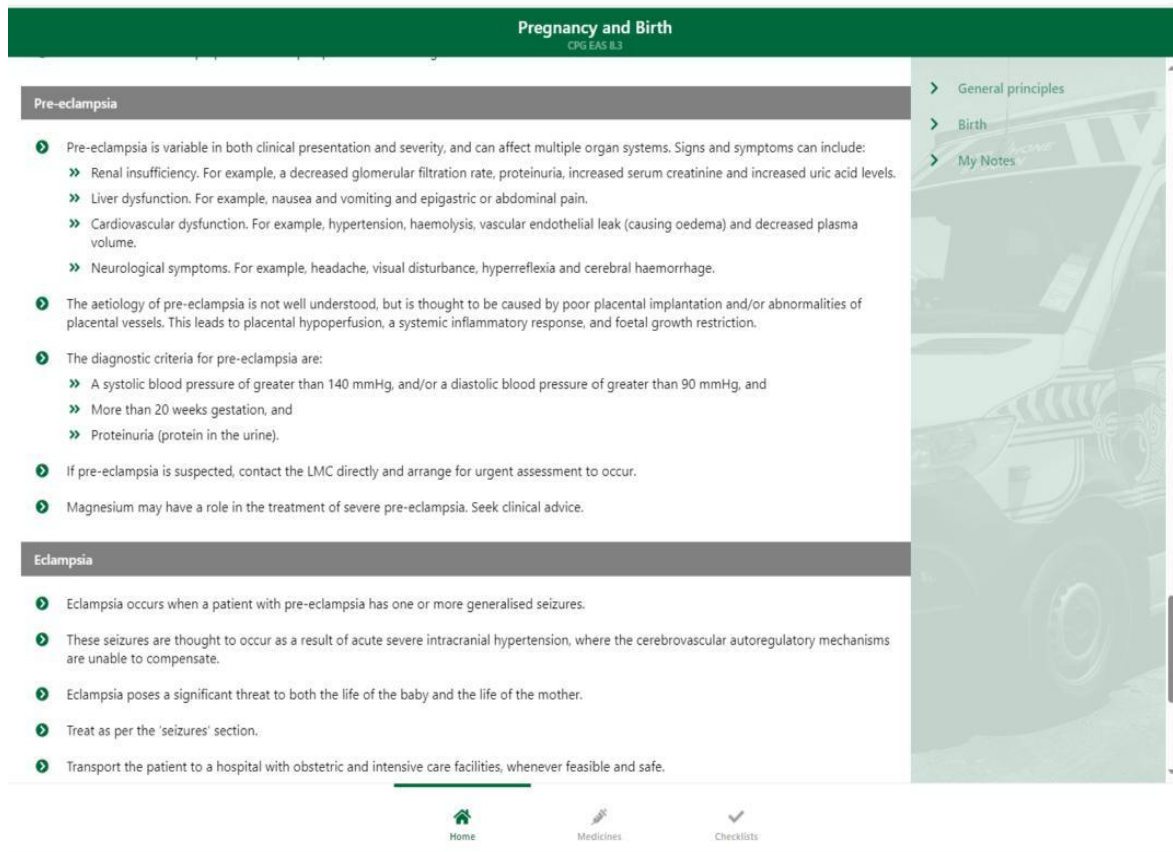
1. What is the standard of care/accepted practice?

Paramedics are defined by the Kaunihera Manapou (Paramedic council) as “registered health practitioners who use their clinical knowledge, skills, and judgment to provide healthcare services primarily in the provision of urgent and/or emergency assessment, diagnosis and treatment of patients, including the provision of clinical advice, referral and, where required, transport” (Scope of practice, paramediccouncil.org.nz).

In this case, the paramedics who attended [Ms A] are employed by Hato Hone St John New Zealand. This means their clinical treatment is governed by the national clinical practice guidelines. These guidelines stipulate standards for triage, documentation, transfer, and handover processes. The guidelines also include procedures and medication dosing for the most seen medical complaints and diagnoses by ambulance personnel. They are written by a clinical group, including the medical directors for the two main ambulance services in New Zealand. This standard incorporates guidance surrounding status codes; however, the mode/speed of transportation are decisions made by the clinicians at the time, taking into consideration patient safety and comfort versus time saving for critical intervention at hospital.

The clinical practice guidelines surrounding pregnancy and birth (8.3) include subsections on pre-eclampsia and eclampsia, including how to diagnose these conditions and what treatment should occur if identified. A copy of this is included below and will be commented on further in the next question.

The accepted practice for a pregnant/labouring woman is dependent on the medical circumstances but includes a thorough assessment of the presenting complaint and vital signs, followed by a conversation with the LMC in conjunction with the patient to determine goals of care and therefore transportation destination. Depending on the patient wishes and the LMC concerns, this can result in either remaining at home with LMC visiting and taking over care or transportation to hospital/birthing facilities with LMC in attendance or met there shortly after.



Pregnancy and Birth
CPG EAS 8.3

Pre-eclampsia

- 1 Pre-eclampsia is variable in both clinical presentation and severity, and can affect multiple organ systems. Signs and symptoms can include:
 - » Renal insufficiency. For example, a decreased glomerular filtration rate, proteinuria, increased serum creatinine and increased uric acid levels.
 - » Liver dysfunction. For example, nausea and vomiting and epigastric or abdominal pain.
 - » Cardiovascular dysfunction. For example, hypertension, haemolysis, vascular endothelial leak (causing oedema) and decreased plasma volume.
 - » Neurological symptoms. For example, headache, visual disturbance, hyperreflexia and cerebral haemorrhage.
- 2 The aetiology of pre-eclampsia is not well understood, but is thought to be caused by poor placental implantation and/or abnormalities of placental vessels. This leads to placental hypoperfusion, a systemic inflammatory response, and foetal growth restriction.
- 3 The diagnostic criteria for pre-eclampsia are:
 - » A systolic blood pressure of greater than 140 mmHg, and/or a diastolic blood pressure of greater than 90 mmHg, and
 - » More than 20 weeks gestation, and
 - » Proteinuria (protein in the urine).
- 4 If pre-eclampsia is suspected, contact the LMC directly and arrange for urgent assessment to occur.
- 5 Magnesium may have a role in the treatment of severe pre-eclampsia. Seek clinical advice.

Eclampsia

- 1 Eclampsia occurs when a patient with pre-eclampsia has one or more generalised seizures.
- 2 These seizures are thought to occur as a result of acute severe intracranial hypertension, where the cerebrovascular autoregulatory mechanisms are unable to compensate.
- 3 Eclampsia poses a significant threat to both the life of the baby and the life of the mother.
- 4 Treat as per the 'seizures' section.
- 5 Transport the patient to a hospital with obstetric and intensive care facilities, whenever feasible and safe.

Home Medicines Checklists

Within the national clinical practice guidelines, there are no set standards or procedures surrounding transporting under lights with any clinical complaint/diagnosis. And it is often not the most appropriate way to transport a patient unless there are extenuating circumstances, e.g. traffic, major road delays, immediate surgical need with large geographical demand for transportation.

2. Has there been a departure from the standard of care or accepted practice? If so, please identify how the care departs from standards or accepted practice, and the extent of that departure (mild departure, moderate departure, or severe departure)?

In my opinion, there has been a severe departure of care from accepted practice. As discussed above, the patient was not recognised to have concerning vital signs throughout the transport time and no treatment was initiated or discussed for these vital signs. This treatment regimen is within the Intensive Care Paramedic scope of practice, who did co-locate on scene but likely did not transport with the crew. There are other options for the transporting crew to consult with the clinical desk (a paramedic within the communications centre environment) if unsure about treatment or whether a request for a higher qualified paramedic was appropriate.

The treatment regimen is outlined in the National Clinical Procedures: CPG EAS 8.3 Pregnancy and Birth. The section that applied to [Ms A] was that of pre-eclampsia (highlighted above). It is described as affecting multiple organ systems, but the diagnostic criteria include a systolic blood pressure >140mmHg and/or a diastolic of >90mmHg and more than 20 weeks' gestation and proteinuria (protein in the urine).

The guideline states that, if pre-eclampsia is suspected, the LMC should be contacted directly for urgent assessment.

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand | Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

Magnesium may have a role in the treatment of severe pre-eclampsia to prevent eclampsia and seizure and the guidelines state to seek further clinical advice on whether to initiate this treatment.

Eclampsia is further described when a patient with pre-eclampsia has one or more generalised seizures. These seizures occur because of acute severe hypertension. They pose a significant risk to baby and mother, should be treated as per the CPG seizure section and with transport to a hospital with obstetric and intensive care facilities where feasible and safe to occur.

In reviewing the patient documentation, shaking is reported prior to ambulance arrival; however, it is difficult to ascertain whether this was rigors due to fever or seizure activity. But, noted on the vital sign acquisition with first interaction with [Ms A] and subsequent vital signs, her blood pressure was in the pre-eclamptic levels and continued to rise.

Time	Blood pressure
20:40	150/96
21:00	152/103
21:18	150/100
21:36	159/111

The status codes within the ambulance service are a subjective tool to quantify a patient's level of unwellness and do not necessarily determine the speed at which transportation will occur. Status codes are described within the National Clinical Procedures (1:10 status codes) as a numerical estimate of the patient's clinical condition; they are qualitative and require clinical judgement. They are allocated to a patient after considering the nature of the illness or injuries, the vital signs, and the potential threat to life. In the above case, I believe the status 3 code initially was given as the blood pressure was not identified as a concerning feature within the patient's vital signs. The treatment given was around the mild fever of 38.6°C the patient was displaying, and I believe that the shaking prior to ambulance arrival was diagnosed as rigors due to this fever versus seizure activity. The perception by the public surrounding lights and sirens is that there is a large amount of time saving; however, as stated by Hato Hone St John, this would have only saved ten minutes, and, conversely, it would have made for an unstable environment in the back of the vehicle for potential intervention and patient management.

I don't believe driving under lights and sirens with this patient, given the small amount of time saving, would have made a significant difference in outcome for Ms [A]. I believe the concerning factor in this case is the identification and then initiation of treatments. Further conversations with the LMC/intensive care paramedic surrounding the vital signs, primarily the blood pressure, whilst transporting at normal road speed would have been appropriate. The status codes and mode of transport I believe can be classified as a moderate departure

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand | Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

from accepted practice; however, as stated above, the greater departure from standard of care is the identification of the potential medical risk for [Ms A] and her unborn child.

3. How would the care be viewed by your peers.

The level of care provided would be viewed by my peers as below standard. I don't believe magnesium necessarily would have been administered for this patient; however, I believe a clinical discussion surrounding its role and diagnosis with the patient and other clinicians should have occurred. From the patient documentation provided, the treatment given, and the status code, I do not believe that the blood pressure and diagnosis of pre-eclampsia was considered by these attending clinicians.

The blood pressure was within concerning levels from the beginning of the patient interaction, and it appears unclear from the patient documentation how much of an understanding was gained from the husband's recollection of what occurred prior to ambulance arrival. A greater understanding of what prompted the 111 call and what the prior episode looked like could have assisted with potential diagnosis. It is often difficult to ascertain diagnoses from bystanders' descriptions, especially with seizures that cause psychological stress for those witnessing; however, delving deeper with questioning and creating a picture can often be of benefit.

4. Please provide any recommendations for improvements with a focus on improving care in the future.

My recommendation for improvement would be to provide further education within the obstetric patient population for the wider paramedic group. This could include identification of clinical concerns in this population group and a reminder of the guidelines that are accessible to all. Whether it be within their level of scope to intervene but also identification to know to call for further assistance or clinical advice.

I also believe that education [is needed] surrounding looking at the whole clinical picture and not getting tunnel vision with one vital sign or one description of an event to then determine a treatment and transportation plan. For example, from the patient documentation provided, it appears that the clinicians attending believed the "shaking" prompting the call to emergency services was due to rigors and fever versus seizure, adding in the mild fever of 38.6°C reiterated this diagnosis for them and therefore the blood pressure was not considered for any other potential diagnosis. As paramedics, it can be easy to become tunnel visioned with information we are given or presented by bystanders and therefore forget other potential diagnoses and concerns. This could easily be incorporated into an online learning piece/discussion with one of the Hato Hone St John medical directors.

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

The only other matter that I think needs to be highlighted is the importance of patient documentation for paramedics. I believe this is an area of our practice that needs continual highlighting of its importance. My recommendation for improvement would be to provide some online training surrounding the patient report forms, to encourage staff to document all interactions, and to remind them that this documentation is the chance to paint the picture of the scene and patient interaction for any future follow-up.

It is important that the documentation not only includes what the patient complained of and what treatment they received but also highlights the treatments/diagnosis that were

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand | Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

considered but not begun. This case in question for example, potentially the paramedics did consider pre-eclampsia, or they did consider the use of magnesium, but with nothing noted, the assumption is made that it was never taken into consideration.

Signature:

A handwritten signature in black ink, appearing to be 'Liam' followed by a stylized surname, with a horizontal line and two vertical strokes at the end.

Date: 29/06/2024

C22HDC01427'

Appendix B: Independent clinical advice to the Commissioner

The following independent advice was obtained from Associate Professor, Dr Liza Edmonds:

Complaint:	[Ms A] & [Baby A] / Health New Zealand Te Whatu Ora – Counties Manukau (Middlemore Hospital)
Our ref:	C22HDC01427
Independent advisor:	Dr Liza Edmonds

I have been asked to provide clinical advice to HDC on case number C22HDC01427. I have read and agree to follow HDC's Guidelines for Independent Advisors.

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

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

Qualifications, training and experience relevant to the area of expertise involved:	My name is Associate Professor Dr Liza Edmonds. I have worked as a senior medical officer for more than 10 years in Aotearoa New Zealand. My qualifications include FRACP, MMed, Dip O&G (dist), Dip Child Health (dist), MBChB, BSc. I am the current chair of the National Mortality Committee and work as an SMO for Te Whatu Ora Wairarapa, Southern and Te Tātai Hauora o Hine, Victoria University.
Documents provided by HDC:	1. Letter of complaint dated 10 June 2022 2. Middlemore Hospital's response dated 7 October 2022 3. Clinical records from Middlemore Hospital
Referral instructions from HDC:	Middlemore Hospital 1. Was [Baby A]'s initial resuscitation and transfer to the neonatal intensive care unit undertaken in a timely and appropriate manner? 2. Was the initial decision to defer cooling appropriate to the clinical scenario presented and consistent with accepted practice? 3. Once a decision was made to commence cooling, was the procedure commenced in a timely fashion consistent with accepted standards? 4. Was the identification and management of [Baby A]'s possible seizure activity while in the neonatal intensive care unit consistent with accepted practice, including whether there was timely and appropriate EEG monitoring?

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand | Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

	5. Any additional comments?
--	-----------------------------

Factual summary of clinical care provided complaint

Brief summary of clinical events:	Complaint summary: The complaint from Baby [A]’s whānau is that his NE was not recognised early enough and that it took a significant period of time to cool him. It is felt that because of this delay he was not able to recover as much as was possible and that communication between the ED and the NICU was poor. The whānau also felt that the abnormal activity they observed was not listened to and that he had seizures at the time of discharge home. Communication was identified as an issue by the whānau. Provider response summary: A full summary of the medical notes and involvement were provided by the team in chronological order. It was largely in keeping with the clinical records provided. Differences were noted below in the response to specific questions. It was thought that he did not meet the criteria for therapeutic hypothermia based on Sarnat scoring (see notes later) and that the initial working diagnosis was that of sepsis. Once he was assessed as meeting criteria before therapeutic hypothermia was started, elective intubation was carried out to support him. He was then commenced on EEG monitoring. Other more wider differentials were outlined by the team, including the possibility of Shiga encephalopathy, and discussed with both neurology and infectious disease teams. His care of his belly button was also outlined and noted that there was no documentation about its assessment and documentation within the NNU [neonatal unit] notes. The formal EEG was noted to be abnormal with no evidence of electrographical seizures and in keeping with the paediatric neurology opinion as well. Communication was responded to by the team and, based on their clinical documentation, it was felt that the team had had open and honest communication. Clinical note summary: [...]/4/2022: [Ms A] arrived in the operating theatre at 0032hrs with delivery at 0104 hrs (30mins after arrival in theatre). The C-section was completed under a general anaesthetic. Of note, [Ms A] arrived at the hospital ED at 2202hrs with delivery 3hrs after her initial arrival in ED. It was noted that she had been unwell with a gastroenteritis illness prior to delivery and also a seizure in the
-----------------------------------	--

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand / Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person’s actual name.

	community, thought to be related to PET [preeclampsia] and HELLP syndrome. 0104: The birth was attended by a neonatal team (neonatal nurse practitioner, nurse, and RMO). [Baby A] was born at 0104 and was transferred to NICU from theatre immediately after birth. He was 41⁴/40 gestational age. His APGARs were 5¹, 6⁵, 7¹⁰. He had a heart rate >100bpm throughout. He did not require CPR, he was given inflation breaths and then ventilation breaths until he established breathing at 7 minutes of life. He then required cPAP with weaning oxygen from 60% to 21% and was transferred to NICU on cPAP. He was noted to be floppy with poor muscle tone and activity. 0120: cord gas had a pH 7.05, BE -13, and lactate of 17. He also had FBC taken at 0120 with elevated wbc [white blood count] and low platelets (this would have come back later on). 0150: repeat gas with pH7.15, BE -12, BGL 3.1, wbc 33.7, and platelets 145. RMO contacted SMO? again with these bloods (need to clarify). 0240: UVC [umbilical venous catheter] placed as difficult IV access. BGL 0.6. Dextrose commenced. Lactate 12.3 0300: started on glucose infusion 0313: (2hrs of life) SMO RMO discussed with SMO?HIE and criteria for cooling. Felt not for cooling currently as did not meet criteria. 0500: NP abnormal neurology noted associated with apnoea and desaturation. Thought to be neurologically improving. BGL 1.9. 0538: RMO updated SMO. Thought neurologically improving (same as NP noted), apnoea managed with stimulation and caffeine. 0600: (5hrs of life) BGL 3.4 normal range. 0600: another SMO came into the unit (?was 1st SMO physically present). Evidence of possible seizures (lip smacking), and second SMO took over care. No documentation of this within the clinical notes provided. 0900: (7hrs of life) 3rd SMO decision to provide hypothermia, Sarnat score was stage 2. 1040: Elective intubation stabilisation prior to cooling.
--	--

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand | Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

	1100: (10hrs of life) therapeutic hypothermia was initiated. At no time did [Baby A] have hyperthermia – prior to cooling had normothermia. Did baby [A]’s stool grow shigella? Or the placenta? Shigella enteropathy unable to be established, unable to exclude and toxin can cross the placenta. Consulted microbiologist and checked test not available in Australasia. Raised nucleated red cells – clinical event 24hrs prior to birth. ?cause aEEG started (see below for details) – abnormal, low voltage, seizures (neurologist review pm? Time) No burst suppression (usually seen in HIE) [...]/4/2022 1230: anticonvulsants phenobarbitone commenced and then given second dose on 7/4/2022 0005. Ongoing seizures and given phenytoin and midazolam on 8/4/2022. Evidence of multi-organ involvement associated with NE in summary below: • PPHN [persistent pulmonary hypertension of the newborn] • Hypotension (requiring inotropes to support blood pressure) • Thrombocytopenia • Renal impairment • Liver derangement • Clotting abnormalities • Hyponatraemia • Hypokalaemia • Hypocalcaemia • Possible sepsis Neuroimaging and EEG included: • 8/4/2022, 0840: USS [ultrasound scan] head cerebral oedema • 13/4/2022 (day 7), 1446: MRI [magnetic resonance imaging] head HIE and bilateral injury and right parietal haemorrhage consistent with hypoxic event • Abnormal neurology ongoing and discharge home on ng [nasogastric] feeds • 21/4/2022: EEG formal – low voltage no seizures
--	---

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand | Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person’s actual name.

	12/5/2022: EEG formal – diffuse cerebral abnormalities, no electrographic seizures Extensive documentation of communication with the whānau within the clinical notes.
--	---

Question 1: Was [Baby A]’s initial resuscitation and transfer to the neonatal intensive care unit undertaken in a timely and appropriate manner?	
List any sources of information reviewed other than the documents provided by HDC	[Baby A]’s medical records, provider’s response.
Advisor’s opinion	[Baby A] appeared to have received resuscitation in keeping with the New Zealand Resuscitation Council (NZRC) guidelines. There is documentation that he received inflation breaths and then IPPV (positive pressure breaths) until he took his first breaths at 7 minutes of age. Given that his mother received a general anaesthetic (GA) for her surgical birth, it could be postulated that the GA contributed to his delay in taking his first breath, although in retrospect it is recognised that his hypoxic brain injury would have also contributed. He was given immediate inflation and ventilation breaths until he established his own breathing, which was timely and appropriate. He was then maintained on cPAP (continuous positive airway pressure) to support his breathing during this transfer to NICU. His birth is documented as being attended by both medical and nursing staff, indicating that a team was involved in his care. This would be in keeping with expected standards for emergency deliveries. [Baby A] was then transferred to the NICU directly and immediately from the theatre of his birth. It is documented that he received cPAP and also oxygen (which is titrated down to room air quickly). This is in keeping with expected practice and a reflection in that the team recognised that he needed a higher level of care and monitoring than could be provided in theatre or the postnatal ward.
What was the standard of care/accepted practice at the time of events? Please refer to relevant standards/material.	The standard of practice for initial resuscitation is the New Zealand Resuscitation Council New Born Life Support (NLS) guidelines (https://www.resus.org.nz). These guidelines are viewed in keeping with

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand | Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person’s actual name.

	International Liaison Committee on Resuscitation (ILCOR) as part of NZRC standards.
Was there a departure from the standard of care or accepted practice? • No departure; • Mild departure; • Moderate departure; or • Severe departure.	No departure.
How would the care provided be viewed by your peers? Please reference the views of any peers who were consulted.	I think that the care provided would be viewed by peers as being in keeping with expected standards.
Please outline any factors that may limit your assessment of the events.	I have been unable to see or confirm that those attending his resuscitation or birth have attended and are up to date with their NLS certification, although I would expect that this would have occurred as part of standard orientation and maintaining standards for those attending births.
Recommendations for improvement that may help to prevent a similar occurrence in future.	That those who are attending high-risk births or emergency deliveries all attend an NLS training course in keeping with NZRC standards and that these skills are maintained with regular updates. That when designing new health systems that consideration takes into account timely transfer to NICU for unwell neonates from main operating theatres and other outlying areas (such as Emergency Departments).

Question 2: Was the initial decision to defer cooling appropriate to the clinical scenario presented and consistent with accepted practice?

List any sources of information reviewed other than the documents provided by HDC	[Baby A]'s medical records, provider's response.
Advisor's opinion	The initial admission note from the RMO did not have NE in the differential diagnosis or factors considered for [Baby A]. The SMO was contacted at 0313 (2hrs of life), and the documentation was that [Baby A] did not meet the criteria for therapeutic hypothermia at this

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand | Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

	stage. It is unclear the details of the kōrero or if the background was outlined to the SMO, for example, mum had been unwell with gastroenteritis symptoms 3 days prior, she had a seizure in the community, PET and HELLIP was thought to be occurring, that meconium was present at birth, that [Baby A] needed 7 minutes of ventilation until establishing breathing, that the lactate was 12.3 at 2 hrs of life, [Baby A] had signs of abnormal neurology (although no 1-hr simplified Sarnat scoring was recorded), and significant hypoglycaemia (BGL 0.6) was present along with challenges obtaining venous access. It is challenging for junior medical staff to communicate and the Senior Medical Officer (SMO) to receive complex information, especially when the SMO is not available within the hospital to directly review [Baby A] themselves. The use of cognitive aids, such as the Simplified Sarnat Scoring sheet, can assist with the communication between colleagues with different levels of experience. At 0538 (4hrs of age), the SMO was contacted by the RMO to discuss that [Baby A] had developed apnoeas and desaturation that responded to stimulation and were brief. It was thought that his neurology had improved, although no Sarnat score was given. The hypoglycaemia was still persistent at this stage (BGL 1.9). [Baby A] received caffeine for apnoeas, had his glucose infusion increased and a decision not for aEEG (BRAINZ) at this stage (see below). The experience of the RMO conveying the information to the SMO is not clear in the documentation, and the identification of abnormal neurology requires clinical experience. It could be postulated that these apnoea and desaturation episodes were manifestations of seizures, although no aEEG data was available to clarify if these were electrographic seizures. In the provider response, at 0600 another SMO was reported to review him and assess him with a view to initiating treatment if needed. There is no documentation of this assessment within the notes provided. At 1000 (9hrs of life), the SMO who had been guiding care overnight has placed a retrospective note
--	---

	indicating that [Baby A] had NE and a decision to provide therapeutic hypothermia was made. NE is an emerging brain injury that develops over time as the effects of the brain insult progresses. Delays in recognition of NE and implementation of therapeutic hypothermia have long been recognised, and an infographic was developed in 2022 in an effort to increase the early recognition. However, in 2024, a report from the same committee reported that ~20% of infants with NE did not receive therapeutic hypothermia despite being stage 2 or 3. It would appear on review of notes that the emergence of [Baby A]’s NE was not recognised by the team until approximately 9hrs of life. These decisions were likely based on the information conveyed to the senior members of the team over the phone during the night. It is unclear to me whether, if the SMO was provided with all the information and if they had examined [Baby A] with their extensive experience, his abnormal neurology would have been recognised earlier and therapeutic hypothermia initiated earlier. Once the NE was recognised, a decision to provide therapeutic hypothermia was made. Ideally, therapeutic hypothermia is initiated in the first 6 hours of life, although there is some evidence of benefit of cooling up to 24hrs of birth. [Baby A] did receive therapeutic hypothermia within the time period, although not in the ideal timing of <6 hours.
What was the standard of care/accepted practice at the time of events? Please refer to relevant standards/material.	The standard of care for an infant such as [Baby A] is provided by the NE national guideline published in 2019. Neonatal Encephalopathy Consensus Statement from the Newborn Clinical Network (2019). (https://starship.org.nz/guidelines/neonatal-encephalopathy-consensus-statement-from-the-newborn-clinical/). Simplified Sarnat Criteria (Sarnat criteria.pdf). 15th Annual Report of the Perinatal Maternal Mortality Review Committee 2022. https://www.hqsc.govt.nz/assets/Our-work/Mortality-review-

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand | Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person’s actual name.

	committee/PMMRC/Publications-resources/15thPMMRC-report-final.pdf). 16 th Annual Report of the Perinatal Maternal Mortality Review Committee 2024. (hqsc.govt.nz)
Was there a departure from the standard of care or accepted practice? • No departure; • Mild departure; • Moderate departure; or • Severe departure.	Mild departure. No simplified Sarnat scoring as per the national Neonatal Encephalopathy Consensus Statement, potentially contributing to delayed recognition of NE affecting [Baby A] and potentially contributing to his delay in decision to commence therapeutic hypothermia (at 9hrs of life).
How would the care provided be viewed by your peers? Please reference the views of any peers who were consulted.	The care provided I believe would be viewed by peers as contributed to by many factors, and it is often only retrospectively that NE emergence becomes apparent.
Please outline any factors that may limit your assessment of the events.	It may be that the Simplified Sarnat Criteria document was used and not included in the document bundle.
Recommendations for improvement that may help to prevent a similar occurrence in future.	That the Simplified Sarnat Criteria Document is used in considering any infant who might be affected by NE as part of routine clinical care. That the infographic provided by the 15th PMMRC [Perinatal and Maternal Mortality Review Committee] report be used and placed prominently to prompt consideration of NE in infants such as [Baby A]. That improved NICU senior staff levels be advocated for so that the emergence of NE might be identified earlier with clinical examinations by senior medical staff with the skills to recognise the abnormal neurology accompanying NE, which maybe subtle. That all SMO reviews are documented within the medical record.

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand | Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

Question 3: Once a decision was made to commence cooling, was the procedure commenced in a timely fashion consistent with accepted standards?	
List any sources of information reviewed other than the documents provided by HDC	[Baby A]'s medical notes, provider's response.
Advisor's opinion	The decision to commence cooling was made at 1000 by the attending SMO. A decision was made to elective intubate (provide ventilator support for his breathing) prior to the commencement of cooling as there were concerns about his breathing, secretions, and apnoea that were first noted at 0538. It is reasonable to delay cooling until [Baby A] had a stable and secure airway given the potential other complications related to therapeutic hypothermia. By 1100 he was intubated and ventilated and cooling was commenced (at 10hrs of life). I note that the elective intubation required three attempts to place the ETT tube given the copious secretions present. While the time from decision to cooling being commenced (1 hour) might appear to be a significant time lag, I am not surprised. Elective intubations, including the preparation and checking of medications to ensure that [Baby A] was as stable as the team could make him prior to the intubation, does take time. This would be in keeping with current standards to provide stability for the infant during the procedure. One of the challenges of caring for infants affected by NE is the multi-organ involvement and emergence of the brain injury over time. [Baby A] had evidence of multi-organ involvement, and keeping him stable prior to commencing hypothermia appeared to be the team's focus. I note that, in reviewing the notes, at no time did [Baby A] have hyperthermia, as this can contribute to brain injury. His temperatures prior to commencing hypothermia were normothermic, which is in keeping with current standards.
What was the standard of care/accepted practice at the time of events? Please refer to relevant standards/material.	The standard of care is provided by documents such as the Starship guideline for intubation. Intubation – premedication for intubation in neonate. Starship guidelines

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand | Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

	(https://www.starship.org.nz/guidelines/intubation-premedication-for-intubation-in-neonate/).
Was there a departure from the standard of care or accepted practice? • No departure; • Mild departure; • Moderate departure; or • Severe departure.	No departure.
How would the care provided be viewed by your peers? Please reference the views of any peers who were consulted.	I think that the care provided would be viewed by peers as being in keeping with expected standards.
Please outline any factors that may limit your assessment of the events.	I do not have any access to staffing ratios at the time of [Baby A] being prepared for intubation and hypothermia. It is difficult to then comment on whether or not this may have contributed to the timeliness of his intubation and if this might have been able to have been more prompt.
Recommendations for improvement that may help to prevent a similar occurrence in future.	Ensuring that there are adequate staffing ratios to ensure that procedures, such as elective intubation and its preparation, can be optimised within the NICU. That as part of Clinical Practice Improvement (CPI) practices, time from clinical decision to implementation of treatment (such as therapeutic hypothermia) be considered for quality improvement practices to optimise the timely care provided. Ongoing support for CPI quality improvement practices nationally will contribute to optimising and improving high-quality evidence-based care.

Question 4. Was the identification and management of [Baby A]’s possible seizure activity while in the neonatal intensive care unit consistent with accepted practice, including whether there was timely and appropriate EEG monitoring?

List any sources of information reviewed other than the documents provided by HDC	[Baby A]’s medical notes, provider’s response.
Advisor’s opinion	It is somewhat challenging to identify from the clinical notes the time of the aEEG being commenced and

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand | Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person’s actual name.

	consistent documentation of the electrical activity seen on the aEEG. However, on the nursing observation chart in the comment section, it is noted that aEEG ([...]) was commenced at 0900 (8hrs of life). This continued continuously until 13/4/2022. A formal EEG on 21/4/2022 (report noted severely abnormal EEG with low amplitude). Within the notes, it was documented by a nurse practitioner that at 1040 there was possible clinical seizure activity seen, although there was no electrical seizure activity seen on the EEG. It was at this time that the elective intubation was being instigated and therapeutic hypothermia after this. At 1230 in the clinical notes it was noted that the aEEG showed a burst suppression pattern, and seizure medication of phenobarbitone was given. At 0005 on 7/4/2022, electrographic seizures were noted and a second dose of phenobarbitone was given. On 8/4/2022, seizures were noted (although the time on the clinical note was not documented) and phenytoin and midazolam was commenced. Resolution of seizures documented on the discharge plan on 10/4/2022. Of note, blood levels of phenobarbitone and phenytoin were taken as part of monitoring. The sequence and use of medications is in keeping with expected seizure management. Of note, therapeutic hypothermia also has an antiseizure effect, which he was receiving prior to antiseizure medications.
What was the standard of care/accepted practice at the time of events? Please refer to relevant standards/material.	The standard of care for seizures and NE care for infants such as [Baby A] is provided by the NE national guideline published in 2019 and the Starship seizure management in the neonate guideline. Neonatal Encephalopathy Consensus Statement from the Newborn Clinical Network (2019). (https://starship.org.nz/guidelines/neonatal-encephalopathy-consensus-statement-from-the-newborn-clinical/). Seizures – management in the neonate. (https://starship.org.nz/guidelines/seizures-management-in-the-neonate/)

Was there a departure from the standard of care or accepted practice? • No departure; • Mild departure; • Moderate departure; or • Severe departure.	For seizure management – No departure. EEG commencement – Mild departure. An earlier implementation of EEG would have potentially identified the burst suppression pattern seen (when commenced) consistent with NE and provided more information for the treating team and the management decisions made.
How would the care provided be viewed by your peers? Please reference the views of any peers who were consulted.	The care provided would be viewed by peers as seizure management as expected. The delay of EEG commencement needs to be considered in the context of recognition of NE, as discussed earlier.
Please outline any factors that may limit your assessment of the events.	There may be other records of the aEEG or electronic copies of the EEG patterns that have not been provided. Many aEEG machines do have the capability to capture EEG information and also for screenshots to be taken of the information, and this may be available but not available to myself.
Recommendations for improvement that may help to prevent a similar occurrence in future.	That aEEG be used early in cases such as [Baby A]’s as part of the overall neurological assessment for potential NE and neonatal seizures. That there is improved documentation of aEEG findings within the notes and within the nursing observations to document and identify neonatal seizures affecting babies such as [Baby A]. Early identification of seizures via EEG is important to initial early seizure treatment. A national digital strategy to store EEG data would also be helpful to support the documentation of this important clinical information (as we do with blood results as an example).

Question 5: Any additional comments?

List any sources of information reviewed other than the documents provided by HDC:	[Baby A]’s medical notes, whānau complaint, and provider’s responses.
Advisor’s opinion:	[Baby A] had persistent early hypoglycaemia that took more than 4hrs to correct. This was likely contributed to by his condition at birth, low energy reserves, and

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand | Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person’s actual name.

	challenging IV access delaying the commencement of dextrose fluids. Once this was recognised, dextrose was initiated and uptitrated to attempt to correct the hypoglycaemia. His initial BGL at admission at 0105 was 3.1, then at 0300 it was 0.3, at 0330 it was 1.2, at 0512 it was 1.9, at 0600 it was 3.4, and at 0830 it was 4.8. Of note there was a 2-hour gap between the 1.2 and 1.9 readings. Hypoglycaemia in itself can contribute to brain injury and, in combination with NE, it was less than ideal to have the duration of hypoglycaemia that occurred. Communication has been highlighted by the whānau as an area of difficulty. Given the complexity of the care both for [Baby A] and māmā, and the information that needed to be conveyed, the whānau felt that they were not informed to a level that they felt was enough. It highlights that medical professionals, while with good intent at the time, need to be aware that communication may be suboptimal, as has occurred in [Baby A]’s case from the whānau perspective. There is recent literature around this that might support the teams in their future communication and in supporting whānau in these difficult circumstances (Guttmann KF, et al. 2024).
What was the standard of care/accepted practice at the time of events? Please refer to relevant standards/material.	The standard of care for hypoglycaemia is the Starship guideline, Hypoglycaemia in the neonate. (https://starship.org.nz/guidelines/hypoglycaemia-in-the-neonate/). Guttmann KF, et al. Parent perspectives on communication quality in the Neonatal Intensive Care Unit. <i>Adv Neonatal Care</i> 2024; 24(4):382-388.
Was there a departure from the standard of care or accepted practice? • No departure; • Mild departure; • Moderate departure; or • Severe departure.	Mild departure – For BGL. Although there was escalation in response to the hypoglycaemia, there appeared to have been suboptimal BGL testing, potentially contributing to the prolonged period of hypoglycaemia. Mild departure – for communication. Even though the documentation from the provider included detailed communication, from a parental perspective it did not meet their needs.

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand | Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person’s actual name.

How would the care provided be viewed by your peers? Please reference the views of any peers who were consulted.	I think that the care provided would be viewed by peers as being less than ideal with the delayed BGL testing, although it is difficult to comment without knowing the NICU acuity and staffing at the time.
Please outline any factors that may limit your assessment of the events.	There may be other BGL readings that I was not aware of in the notes, and perhaps they were checked more frequently than was apparent. There is no documentation of the parental perspective of communication in the clinical notes.
Recommendations for improvement that may help to prevent a similar occurrence in future.	That junior medical staff are made aware of the use of oral dextrose gel should venous access be a challenge in the context of hypoglycaemia and it be available to be used while venous access is being obtained. That NICUs are staffed to meet the needs of infants such as [Baby A] to ensure that tests such as BGL can occur in a timely manner given the level of intensity that NE infants need in their care. That NICUs consider how they might incorporate parental feedback into communication in all aspects of complex care.
By signing this report, I agree to HDC correcting any formatting, spelling, or grammar issues on the proviso that the substance of the report and any quoted material remains unchanged.	
Signature: 	
Name: Associate Professor Liza Edmonds	
Date of Advice: 8 December 2024	

Names have been removed (except Hato Hone St John, Middlemore Hospital, Health New Zealand | Te Whatu Ora – Counties Manukau and the expert advisors on this case) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.