HEALTH & DISABILITY COMMISSIONER
TE TOIHAU HAUORA, HAUĀTANGA

Hip spica immobilisation and postoperative care of paediatric patient

Executive summary

1. This report concerns the care provided to Master A, aged six years at the time, by Health New Zealand | Te Whatu Ora – Waikato (Health NZ) between 22 October 2021 and 8 June 2022.

2. Master A underwent elective bilateral hip surgery in May 2022. During the operation, a decision was made to apply a full hip spica cast. In the days that followed, Master A developed significant swelling, ongoing pain, and, later, respiratory symptoms. Over several days, his condition worsened. He developed septic shock and multiorgan failure, requiring admission to the intensive care unit (ICU) and transfer to a specialist paediatric hospital. After the cast was removed in the ICU, extensive skin injury was identified. Sadly, Master A passed away in December 2025 from a separate medical event. I note that this report does not consider the circumstances surrounding Master A's passing.

3. This investigation focuses on the coordination of care and senior oversight, recognition and escalation of clinical deterioration, and monitoring of the hip spica cast.

4. I find that Health NZ did not provide services of reasonable care and skill to Master A and therefore breached Right 4(1) of the Code of Health and Disability Services Consumers' Rights (the Code). I also make adverse comment regarding the adequacy of preoperative discussions about the use of a hip spica cast.

Recommendations

5. In light of my findings, my recommendations are that Health NZ:

- Provide a written apology to Master A's parents for the deficiencies identified. The apology is to be sent to the Health and Disability Commissioner (HDC) within three weeks of the date of this report for forwarding to the family.
- Develop and implement a written guideline clarifying responsibility for overall clinical oversight of medically complex paediatric inpatients where multiple services are involved, including arrangements when a lead consultant is unavailable. Health NZ is to provide HDC with a copy of the guideline and confirmation of dissemination to relevant staff within three months of the date of this report.
- Review current practice regarding escalation of paediatric inpatients where cumulative clinical concern exists despite paediatric early warning system (PEWS) scores not meeting trigger thresholds and provide HDC with a summary of any changes made as a result of that review within three months of the date of this report.
- Review current practice regarding inspection of skin integrity when immobilisation devices such as hip spica casts are partially removed and confirm to HDC within three

months of the date of this report what steps have been taken to reinforce expectations in this regard.

- Confirm to HDC within three months of the date of this report what education has been undertaken in relation to informed consent discussions for significant changes to postoperative management, including documentation standards.

Background

6. On 30 September 2022, HDC received a complaint from Mrs A about the care her son, Master A (six years old at the time), received from Health NZ. Mrs A complained about aspects of Master A's care relating to elective bilateral hip surgery, including the decision to apply a full hip spica cast;[1] the adequacy of informed consent; the management of pain, swelling, and fluid balance; the response to clinical deterioration; the missed significant skin injury; and the coordination and oversight of care for a child with several comorbidities and high medical needs. Mrs A considers that these issues contributed to Master A developing septic shock and multiorgan failure, necessitating admission to the ICU and transfer to a specialist paediatric hospital.

7. Master A had a complex medical background, including cerebral palsy, a movement disorder, epilepsy (seizures), a visual impairment, and global developmental delay, and was on a ketogenic diet.[2] Mrs A described Master A as generally 'well' before surgery, attending school full time and participating in family and community activities.

Summary of events

Pre-surgery

8. X-rays taken on 13 January 2021 to assess Master A's hips showed that both of his hip bones were sitting properly in their sockets. However, X-rays taken on 22 September 2021 showed that his right hip had started to slip partly out of the joint (a condition called hip subluxation – a partial or incomplete dislocation of the hip joint), and Master A was referred to orthopaedic surgeon Dr B, a senior medical officer (SMO) at Waikato Hospital, for review.

9. Health NZ told HDC that Dr B first saw Master A and his father on 22 October 2021. However, Health NZ did not provide any preoperative clinical notes or records of any discussions or consultations with Dr B to HDC and provided information about the content of the preoperative consultation discussions retrospectively to HDC.

10. Health NZ said that, during a consultation, Dr B explained the treatment options, including surgery to realign both thigh bones and possibly make adjustments to the right hip socket and muscles to help keep the joint stable. Health NZ said that Dr B also discussed the proposed surgery and postoperative pain management and positioning, including that pain relief after surgery would likely include an epidural and that Dr B's plan was to use a hip-support pillow (a wedge or abduction pillow) for several hours each day for the first six weeks, then at night for up to 12 weeks). Health NZ said that Dr B explained that, if the bone

[1] A specialised orthopaedic cast, often made of plaster or fiberglass, that covers the torso and one or both legs to immobilise the hip and femur.

[2] A high-fat, moderate-protein, and very low carbohydrate eating plan designed to induce nutritional ketosis where the body burns fat for fuel instead of glucose.

fixation was strong enough, Master A would not need a hip cast (also called a hip spica cast), although Dr B cannot recall whether he used that specific term at the time.

11. Health NZ told HDC that the risks of the surgery were discussed, including infection, damage to nerves or blood vessels, bones not healing properly, the failure of fixation, the hip problem returning in the future, and the possibility of further procedures. It noted that Master A might need metal plates or screws that could require removal later.

12. Health NZ told HDC that Dr B spoke with Master A's paediatrician, Dr C, after the initial consultation to get his view as Master A did not have a single clear diagnosis and his long-term outlook was uncertain. The discussion concluded in agreement that surgery could be the best option if the family was comfortable with it. The goal of the surgery would be to prevent the hip from slipping further and becoming painful in the future. Details of this discussion are not documented; however, postoperative email correspondence from Dr C indicates that Dr B consulted Dr C and followed his advice in relation to proceeding with the operation as well as postoperative medical care.

13. Health NZ said that Dr B had a follow-up phone consultation with Master A's father on 11 February 2022, in which he reviewed Master A's surgical plan, recommending an extended antibiotic course and strict postoperative care. Dr B reiterated during the phone consultation that Master A would require a hip-support pillow for six weeks full time and overnight for three months, and advised no weight-bearing for six weeks, and a hospital stay of five to seven days. No documented details of this phone consultation were provided to HDC.

14. Following the call, on the operative booking form, Dr B requested that the surgery be scheduled to occur within three to four months to prevent worsening of the hip. Dr B also documented on the operative booking form that, should the bones not be held securely enough after the surgery, then a hip spica cast would need to be used. Health NZ told HDC that Dr B said that he cannot recall whether he discussed that possibility with Master A's father again during the phone conversation on 11 February 2022.

15. Health NZ said that pelvic X-rays taken on 29 April 2022 showed further displacement of the right hip and that Dr B considered that open reduction and possible spica immobilisation were now more likely, although he still considered the original plan feasible.

16. On the day of the surgery, 24 May 2022, Dr B updated the surgical consent form by adding '+/-' (meaning with or without) to list all potential procedures. Health NZ told HDC that this was explained to Master A's parents, although it is not evidenced on the consent form. The updated potential procedures included the original operation as well as possible extra steps, such as open reduction (surgical realignment of the bone by an incision) and the use of a hip spica cast. Although Dr B said he cannot recall the exact details of the discussion with the family, he is clear that his view at the time was that the original plan (to use a hip support pillow, not a hip spica) was still the most likely outcome. Dr B said it is his standard practice to use '+/-' when he is unsure whether an additional minor procedure is required to correct the deformity.

17. Mrs A told HDC that Dr B explained the planned procedure and advised that Master A's postoperative recovery would require the continuous use of a pillow (wedge) to support his hip and leg positioning. She notes in her complaint to HDC that, although the possibility of a hip spica cast was mentioned, it was discussed only vaguely and presented as highly unlikely to be used. She also said she had raised concerns in earlier discussions with Dr B about the use of a hip spica and was assured it was unlikely to be used. She further reports that neither the risks associated with a hip spica cast nor any possible alternatives were discussed with the family at any stage and that Waikato Hospital's response to HDC did not include the concerns she raised during the admission.

18. The intraoperative record states that Dr B performed surgery on both hips to realign the upper thigh bones, reshaped the right hip socket, carried out an imaging test of the hip joint during surgery, and applied a hip spica cast at the end of the procedure.

19. Health NZ told HDC that it became clear as the surgery progressed that the hip was not sitting properly in the socket and was still unstable. Health NZ told HDC that Dr B opened the hip joint (a procedure called a capsulotomy) to check whether something inside was preventing it from sitting correctly. Waikato Hospital said that, at that point, Dr B realised that a hip spica cast would be needed and went ahead with it without consulting the family as, in his view, this possibility had already been covered in the consent process. The hip spica cast was used to keep the hip completely still so the joint could heal properly and to reduce the chance of it dislocating.

20. Waikato Hospital said that Dr B phoned the parents after the surgery to explain the outcome and to let them know that a hip spica cast had been used. According to Health NZ, Dr B said that they did not raise any concerns about the hip spica cast at that time. This phone conversation was not documented in the clinical notes.

21. Mrs A told HDC that the family were shocked when Master A was brought out of surgery in a full hip spica cast, explaining that there had been no communication during the operation regarding any change in plans to use the hip spica cast. She said the call from Dr B was brief and focused on Master A's immediate postoperative status and wellbeing and that the use of the hip spica cast only registered with her upon seeing Master A.

<u>Post-surgery: 25 May to 8 June 2022</u>

22. Health NZ told HDC that, during ward rounds, the family raised practical concerns about the impact of the hip spica cast on daily care – such as using a wheelchair, finding a suitable bed, and managing transfers given Master A's weight. Health NZ said that these practical issues were addressed with support from the social work and occupational therapy teams, who arranged the necessary equipment. Documentation of parental concerns in the clinical records is limited; however, the involvement of physiotherapy and occupational therapists is well documented. Mrs A told HDC that she raised concerns that the cast was too heavy for Master A and, later, that the cast became extremely tight because of swelling.

23. Health NZ told HDC that pain management was overseen by the Paediatric Anaesthesia and Pain Service (PAPS), including for the duration of the epidural. Clinical notes document daily attendance by the PAPS SMO.

24. The clinical notes state that Dr B reviewed Master A on 25 May 2022. Master A had experienced several seizures overnight, and these were treated by the Paediatric Medicine team. Blood tests showed low haemoglobin, and a transfusion was arranged. Dr C reviewed Master A and adjusted his ketogenic diet.

25. Health NZ said that swelling became increasingly evident between 26 and 28 May 2022. Nursing documentation and orthopaedic registrar notes describe significant scrotal swelling. Master A's parents state that both the scrotum and the penis were markedly swollen and tense.

26. The clinical notes show that, at 11.15am on 28 May 2022, the paediatric surgery consultant, Dr D, arranged an ultrasound of the testicles.

27. The clinical notes show that, at 12.30pm the same day, an orthopaedic registrar reviewed the cast and documented that there was adequate space and that it did not appear tight. Master A's parents told HDC that their recollection was that the orthopaedic registrar appeared to be junior and seemed uncertain about how much clearance should be present between the cast and the skin. However, the clinical notes contain no indication that the orthopaedic registrar was uncertain about the clearance required.

28. The clinical notes show that the paediatric SMO, Dr F, assessed the swelling as fluid retention after the surgery and prescribed diuretics, also at 12.30pm. The ultrasound results became available later in the afternoon and did not show any abnormalities. At 2.30pm, Dr D noted that no further review or treatment by paediatric surgery was required at that time.

29. Subsequent clinical documentation on 28 May 2022 records partial improvement in the swelling. Master A's parents told HDC that, during this period, they raised concerns with nursing staff and medical teams that Master A appeared to be in significant pain with visible fluid retention and that he was unusually restless.

30. Also on 28 May 2022, the epidural was removed and oral morphine commenced under orthopaedic direction. Master A's parents told HDC that his pain only decreased after morphine was administered and increased when the morphine wore off and that they were of the view that Waikato Hospital was not actively investigating the cause of his ongoing pain.

31. Clinical notes show that Master A developed a cough from 29 May 2022. A paediatric medicine registrar documented chest sounds consistent with postoperative lung changes and arranged physiotherapy. Oxygen levels were recorded as satisfactory. Master A's parents told HDC that Master A appeared increasingly lethargic and less responsive during this time.

32. On 1 June 2022, Dr B tested positive for COVID-19 and began isolating at home. Health NZ told HDC that Dr B continued to provide orthopaedic input remotely via telephone and to review results electronically. There is no record of a formal transfer of overall orthopaedic responsibility to another consultant during this time. Master A's parents state that they felt that no single senior clinician appeared to be overseeing Master A's care. Mrs A told HDC

that she disagreed with Health NZ's view that Dr B was able to appropriately make medical decisions from home while unwell with COVID-19.

33. Clinical notes reflect that orthopaedic registrars and paediatric medicine registrars reviewed Master A daily between 30 May and 2 June 2022. Health NZ told HDC that the swelling was documented as gradually improving but Master A's heart rate remained intermittently elevated. The clinical record reflects that no paediatric medicine consultant review took place between 29 May and 2 June. Health NZ has acknowledged the absence of senior paediatric review during this period.

34. On 2 June 2022, a paediatric medicine registrar recorded a low-grade fever and rising inflammatory markers during a ward round. The clinical record reflects parental concerns raised in relation to pain management and that the orthopaedic team had advised the parents that the swelling was expected and normal for up to two weeks. The paediatric team increased morphine doses, considering the pain to be post-surgical. About two and a half hours later, a registered nurse (RN) recorded the PEWS scores as low to moderate and that the scores did not reach the threshold for escalation under hospital protocol. Master A's parents told HDC that they were concerned that his overall condition was worsening despite the recorded PEWS scores.

35. On 3 June 2022, documented inflammatory markers rose further. A paediatric medicine registrar arranged a chest X-ray and urine testing. Later in the day, the orthopaedic house surgeon reviewed the chest X-ray and discussed this with the paediatric medicine registrar. A clinical record of this review states 'NAD' (no abnormalities detected). An MRI was planned for the following morning to exclude infection related to the epidural.

36. Health NZ said that, on the morning of 4 June 2022, Master A became acutely unwell. The clinical notes record that, after a seizure that lasted three to four seconds, Master A was having difficulty breathing, had low oxygen levels and a fast heart rate, and was coughing severely. A paediatric medicine house officer documented fever, reduced responsiveness, respiratory distress, and evidence of sepsis. The clinical notes state that Mrs A reported that Master A's eyes appeared sunken and that his responsiveness had decreased. The chest X-ray from the previous day was noted as showing potential signs of infection. Intravenous (IV) antibiotics were commenced following discussion with paediatric medicine consultant, Dr E. Mrs A told HDC that they were not told that there was evidence of sepsis on 4 June 2022.

37. An MRI was arranged for that day and, to enable scanning, the orthopaedic registrar removed the anterior (front-facing) portion of the spica cast under general anaesthetic. The anterior wounds were inspected and recorded as clean, but the back and buttocks were not examined. The MRI excluded infection around the spine but demonstrated pneumonia.

38. On 5 June 2022, Master A remained unwell and his inflammatory markers rose further. His parents state that they believed he had been deteriorating for several days and that escalation did not occur soon enough.

39. Nursing documentation from 8.20am on 6 June 2022 showed a rising PEWS score, reaching 7, which Waikato Hospital said prompted escalation to the paediatric medicine registrar, in

accordance with hospital protocol. The clinical records show that the nurse coordinator and registrar were notified at 9am and a paediatric registrar reviewed Master A at 9.05am. At 9.20am, paediatric SMO Dr G completed a ward round. The clinical records state that Master A's father said during this ward round that Master A had improved over the preceding 24–48 hours. Mrs A told HDC that the clinical records contradict Master A's parents' observations of his worsening condition and their increasing parental distress about it.

40. The registrar noted that Master A developed a nappy rash with small, firm, raised bumps around the cast on his buttocks but that there was no active discharge or signs of obvious infection, although the skin appeared inflamed and irritated. An antibiotic was commenced because of the possibility of a skin infection, and a cast change was planned for the next day.

41. An RN review at 11.15am noted increasing fever, fast heart rate, increased oxygen requirement, and reduced urine output. Health NZ told HDC that the RN attempted for 30 minutes to contact the orthopaedic registrar. When contact was made, the RN was advised to contact the paediatric registrar, who then advised the RN to continue with the existing plan. The RN then contacted another paediatric registrar, who agreed to review Master A. This information is not recorded in the clinical records provided to HDC.

42. The Paediatric Medicine team arrived at 1.40pm to review Master A and establish a plan. He was diagnosed with pneumonia, his infection markers were noted as rising despite antibiotics, and there were concerns about a more difficult infection or a collection of fluid in the chest. Accordingly, a surgical review was requested. Physiotherapy had reviewed Master A at 10.10am and were called back at 2.45pm.

43. Health NZ told HDC that, over the course of the afternoon of 6 June 2022, Master A's condition deteriorated further, which is reflected in the PEWS chart and the clinical records. At 3.20pm, a medical emergency call was made when his breathing and circulation became unstable. At that stage, Master A was critically unwell with progressive failure of multiple organs, and ICU staff discussed medication support and further care options with the specialist paediatric hospital. Health NZ said that a transfer to the specialist paediatric hospital was not possible because of Master A's condition.

44. Mrs A told HDC she considered that Master A's PEWS score did not accurately reflect his clinical state, that required escalation steps were not followed, and that the Paediatric Acute Response Service (the hospital rapid response team) should have been involved earlier in Master A's care.

45. After admission to the ICU, to assist with respiratory management, the orthopaedics team fully removed the hip spica cast. Extensive skin injury was identified over the back, buttocks, and thighs, including blistering and areas of damaged skin. Heel pressure injuries were also documented. Mrs A told HDC that the option of removing the cast was not discussed until Master A was in the ICU and that the skin breakdown affecting his back, buttocks, and thighs should have been identified earlier.

46. On 8 June 2022, Master A was transferred by air ambulance to the specialist paediatric hospital for ongoing specialist intensive care.

Expert advice and provider response

47. Independent clinical advice was obtained from consultant orthopaedic surgeon Dr John Dunbar (see **Appendix A**), and consultant paediatrician Dr John Garrett (see **Appendix B**).

Orthopaedic expert advice and HNZ response

48. Dr Dunbar advised that the decision during surgery to apply a hip spica cast was clinically reasonable given the need for open reduction and concern regarding postoperative hip stability. However, he identified a moderate departure from accepted practice in relation to informed consent. Dr Dunbar advised that the change from the anticipated postoperative positioning to a full hip spica cast represented a material change that warranted a more detailed discussion of risks, alternatives, and practical implications, particularly in the context of Master A's complex medical needs.

49. Dr Dunbar also identified moderate departures in relation to cast management and skin care. He advised that, the removal of the hip spica cast to allow MRI imaging on 4 June 2022 represented an opportunity for a full inspection of Master A's skin, including his back and buttocks and that the failure to do so meant care fell below accepted standards. Dr Dunbar further advised that, once early signs of rash and skin compromise were identified in the days following surgery, more urgent reassessment of the cast, including consideration of modification or removal, was required.

50. Dr Dunbar identified the absence of consistent orthopaedic consultant oversight during a period of clinical deterioration as a contributing factor to the above failures. He advised that, given Master A's medical complexity and worsening condition, alternative consultant oversight should have been arranged when the primary surgeon was unavailable onsite because of COVID-19.

51. In relation to the management of Master A's pain and swelling, Dr Dunbar identified mild departures from accepted practice and noted that the persistence of pain, scrotal oedema, and parental concern warranted earlier senior reassessment and escalation.

52. Dr B responded to Dr Dunbar's advice. He accepted the criticism relating to the failure to inspect Master A's skin when the cast was removed for the MRI. However, he noted that concerns about skin integrity had not been raised before the MRI, which was undertaken under time pressure because of the need for general anaesthesia in a deteriorating child.

53. Dr B advised that if he had been made aware of skin concerns earlier, he would have requested inspection or removal of the cast. He also referred to operational constraints, including weekend staffing and the availability of specialist plaster personnel.

54. In relation to consultant oversight, Dr B acknowledged that alternative consultant involvement could have occurred and advised that, since the events in question, he now routinely seeks paediatric input for complex postoperative cases. He accepted that clearer shared-care arrangements would have been appropriate.

55. Dr B maintained that consent discussions occurred over multiple consultations and that the possibility of hip spica cast immobilisation had been covered. He did not consider that further preoperative discussion was required.

Paediatric expert advice

56. Dr Garrett advised on the paediatric aspects of Master A's care. He identified concerns regarding coordination of care and oversight for a child with complex medical needs. Dr Garrett advised that there was no clearly documented plan identifying which service held overall responsibility for monitoring Master A's condition and responding to his deterioration following surgery.

57. Dr Garrett identified a severe departure from accepted practice in relation to the recognition and escalation of Master A's clinical deterioration between 1 June and 5 June 2022. He advised that Master A's evolving clinical picture — including persistent pain, tachycardia (fast heart rate), rising inflammatory markers, increasing lethargy, and repeated parental concern — should have prompted earlier senior medical review and escalation, even in the absence of sustained PEWS scores.

58. Dr Garrett also identified a moderate departure regarding fluid management and monitoring, including the development of significant generalised oedema and scrotal swelling. Although some aspects of Master A's clinical management were consistent with accepted practice, Dr Garrett considered that earlier senior paediatric involvement was warranted.

59. Dr Garrett also advised that there was a delay in recognising sepsis and initiating antibiotic therapy and that earlier consideration of sepsis – including earlier investigation of potential sources such as skin injury – may have reduced the severity of Master A's deterioration.

60. Waikato Hospital chose not to comment on Dr Garrett's advice.

Response to provisional opinion

61. Mrs A responded to the provisional opinion. She stated that her concerns about Master A's hip spica cast were not limited to its weight and awkwardness. She was concerned about Master A's inability to regulate his body temperature, move his upper body, and breathe effectively. She was also concerned about Master A's mental health while being confined and discomfort because of his size (as a large 6.5-year-old) with his body parts pressing against the cast causing discomfort. Mrs A said she made these concerns known to Dr B and other medical professionals, but they were not acknowledged or discussed with the family. Mrs A remarked that Dr B had a very dismissive, arrogant attitude towards her and her husband that made him extremely unapproachable.

Analysis

Postoperative care: Health NZ — breach

62. Health NZ is responsible for providing services in accordance with the Code. Right 4(1) of the Code states that every consumer has the right to have services provided with reasonable care and skill. In finding Health NZ breached Right 4(1), I have relied on the expert advice provided by Dr Dunbar and Dr Garrett.

63. Following surgery, Master A's care involved multiple services. In that context, clear coordination and senior oversight were required. However, there was no clearly documented plan identifying which service held overall responsibility for monitoring Master A's condition and for responding to his deterioration. In addition, no formal transfer of care

to a lead consultant occurred when Dr B commenced COVID-19 isolation on 1 June 2022. Dr B continued to act as the lead consultant remotely, but there was no documented allocation of an alternative in-person consultant during a period when Master A's condition was evolving and later deteriorating.

64. Between 29 May and 3 June 2022, there was no documented paediatric medicine consultant review, and Health NZ accepted that this did not occur. During that period, Master A's condition did not improve. In those circumstances, clearer shared-care arrangements and consistent senior oversight were required.

65. Although PEWS scores did not reach escalation thresholds until 6 June 2022, Dr Garrett advised that Master A's overall clinical picture warranted earlier senior reassessment. Escalation occurred once thresholds were met, but reliance on scoring alone did not adequately reflect the cumulative concerns about Master A's condition that had developed.

66. On Saturday, 4 June 2022, the hip spica cast was partially removed to allow MRI imaging. The anterior wounds were inspected, but the back and buttocks were not examined. Dr B advised that no skin concerns had been raised at that time and noted that the scan occurred over a weekend when specialist plaster staff were limited. However, Dr Dunbar advised that partial removal of the cast presented an opportunity to undertake a full skin inspection. In the context of a medically complex and deteriorating child without on-site senior oversight, and with the support of clinical advice, I consider that this should have occurred.

Finding

67. Taken together, the absence of clear allocation of overall responsibility for Master A's care, the lack of consistent senior review, the delay in escalation based on the broader clinical picture, and the failure to inspect the skin when the cast was partially removed meant that Master A did not receive services of reasonable care and skill. For these reasons, I find that Waikato Hospital breached Right 4(1) of the Code.

Informed consent: Health NZ — adverse comment

68. I acknowledge that Dr B has stated he mentioned the possibility of a hip spica cast to Master A's parents and that he has documented this discussion, and I note that Mrs A acknowledged that Dr B had mentioned the cast as a possible outcome in preoperative discussions. However, based on the responses provided to HDC and documented discussions with Master A's parents, including on the day of surgery when the surgical consent form was updated, it seems likely that Dr B communicated that the original plan remained the most likely surgical plan and outcome. I also note that Dr B did not provide HDC with his clinic notes. As a result, there is limited documentation available to confirm the detail or extent of the preoperative discussions about hip spica casting.

69. I am critical that the likelihood of requiring a hip spica cast appears to have been under-emphasised preoperatively and that its associated risks, alternatives, and practical implications – including increased care needs, additional equipment requirements, and skin integrity risks – were not discussed in sufficient detail with Master A's parents. Although evidence shows that the possibility of hip spica cast immobilisation was discussed with Master A's parents before surgery, I am concerned that the likelihood of this and the practical implications of its use were not conveyed as well as they could have been. When a

change in postoperative management significantly alters recovery and care requirements, a more detailed discussion is appropriate. This was particularly important considering Mrs A's concerns about the impacts of a hip spica cast on Master A's physical and mental wellbeing.

70. I encourage Waikato Hospital to reflect on my comments and those of my experts in this respect.

Conclusion

71. For the reasons set out above, I find that Health New Zealand breached Right 4(1) of the Code in relation to Master A's postoperative care. I also make adverse comment regarding the adequacy of the preoperative discussion about the possible use of a hip spica cast. I trust that the recommendations made will assist in strengthening future practice and care.

Changes made

72. Health NZ has advised that steps have been taken since these events to strengthen postoperative oversight and escalation processes. These include reinforcing expectations regarding consultant review of complex paediatric inpatients, clarifying escalation pathways where clinical concern exists despite PEWS scores not meeting trigger thresholds, and reviewing cast management practices.

73. Health NZ has also advised that documentation of shared-care arrangements and consultant allocation has been emphasised within the orthopaedic and paediatric services. In addition, education has been undertaken regarding pressure injury risk in children requiring prolonged immobilisation.

74. I acknowledge these steps. Clear allocation of responsibility, consistent senior oversight, and early escalation are important safeguards in the care of medically complex children.

Publication

75. An anonymised copy of this decision, naming only Health New Zealand | Te Whatu Ora – Waikato, Waikato Hospital and the advisors, will be placed on the HDC website (www.hdc.org.nz) for educational purposes.

Rose Wall
Deputy Health and Disability Commissioner

Appendix A: Independent clinical advice to the Commissioner

The following independent advice was obtained from Dr John Dunbar, Consultant Orthopaedic Surgeon:

'Independent **clinical advice to Health and Disability Commissioner**

Complaint:	**[Master A] /Health New Zealand | Te Whatu Ora – Waikato District**
Our ref:	**22HDC02430**
Independent advisor:	**Dr John Dunbar**

I have been asked to provide clinical advice to HDC on case number **22HDC02430**. 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 qualifications include B.Ag.Sc. (Hons), F.R.A.C.S MBCHB gained in 1983 F.R.A.C.S. Orthopaedic Surgery in 1991 I have worked in Dunedin as a Consultant Orthopaedic Surgeon since 1993. My work has covered quite a wide range of orthopaedic surgery, but I have a subspecialty interest in paediatric orthopaedics and am familiar with the surgery undertaken for [Master A]. I have provided advice for the Commissioner on several occasions in the past.
Documents provided by HDC	1. Letter of complaint dated 30 September 2022 2. Health New Zealand's response dated 23 December 2022 3. Clinical records from Health New Zealand covering the period January 2022 to July 2022
Referral instructions from HDC	Health New Zealand | Te Whatu Ora – Waikato District 1. **Appropriateness of immobilisation** • Whether the intraoperative decision to apply a full hip spica cast was clinically appropriate in the context of [Master A]'s movement disorder, body size, and temperature-regulation issues. • Whether a reasonable alternative (such as broomstick casts, abduction brace, or a modified spica) would have been more appropriate, taking into account other relevant factors such as cast fit, positioning, risk of pressure injury, and temperature regulation. 2. **Management after skin compromise**

	• Whether, after rash and skin breakdown were identified on 4 June, it was appropriate to reapply the same cast. • Whether the subsequent monitoring, review, and timeliness of response (including referrals to Plastics and Dermatology and the delay until 7 June for cast change) met accepted standards. **3. Response to pain and swelling** • Whether the orthopaedic team's response to ongoing pain and scrotal swelling and subsequent referral to the pain team were appropriate. • Whether more proactive reassessment of the cast and/or surgical site (including examination, imaging, or modification) should have occurred. **4. Informed consent** • Whether the orthopaedic surgeon met accepted standards for informed consent regarding the immobilisation plan (including the hip spica and reasonable alternatives) considering [Master A]'s complex needs, material risks and practical implications for care, including the adequacy of documentation. **5. Any other comments you wish to make.**

Factual summary of clinical care provided complaint

Brief summary of clinical events	**Summary of the complaint** The complaint relates to [Master A], who was aged six at the time of surgery. The complaint was made by his parents, [Mr and Mrs A]. On 24 May 2022, [Master A] underwent extensive surgery to both his hips, following which in the postoperative period he developed septic shock, multiorgan failure, abdominal compartment syndrome, and third-degree burns to his body. There are four failures identified by his parents. **1. No discussion occurred regarding putting [Master A] in a spica cast.** The preoperative discussions recalled by the family with the surgeon, [Dr B], resulted in the family believing that a wedge would be used to position [Master A]'s hips and legs post-surgery. The family's understanding was that it was highly unlikely a spica cast would be used (near 0% possibility). However, [Master A] came out of his surgery in a full spica cast. The family indicated they had not been consulted about the likely possibility of this, nor had they had the chance to discuss the risks of the spica cast, particularly in relation to [Master A]'s other

	problems. The family was very concerned about the use of the cast but had not been given the opportunity to explain their concerns. **2. [Master A]'s severe deterioration resulted both from a lack of medical attention and care towards him and a total disregard of our concerns.** [Master A], in the postoperative period, was in the high observation unit between 24 May 2022 and 6 June 2022. The family had concerns regarding the extreme amount of pain, discomfort, and signs of illness that [Master A] suffered. The family explained to the medical staff that this was out of character for [Master A], but "they neglected to treat [Master A]'s symptoms and left [Master A] to deteriorate in agony for 12 days despite our numerous pleas each day for them to intervene and help [Master A]." The family were concerned about the management of swelling of the scrotum and [Master A]'s body from fluid retention and the resulting cast tightness. They felt there was inadequate assessment of the cast, of the degree of tightness, and the implications of the spica cast. There were concerns about the lack of oversight by [Dr B], especially when he was off work suffering from COVID. There was no other orthopaedic consultant involved in [Master A]'s care, and [Dr B] continued to offer advice by telephone from home but without actually seeing [Master A]. There were concerns that from 29 May 2022 [Master A] started coughing. This produced pain for him, and the parents warned that he was prone to chest infections and went downhill quickly. They felt these warnings were not heeded nor addressed and [Master A] continued to worsen over the following days. The parents called for antibiotics on 1 June 2022, but antibiotics were not started until 4 June 2022. In the meantime, despite the family's pleas for antibiotics, investigations occurred to try to determine the source of infection. **3. No observation of [Master A]'s body or skin occurred during cast removal.** [Master A] had his cast split and removed for him to undergo an MRI scan. During that time, no inspection was made of his back and buttocks to look for any skin problems. At the end of the scan, he was placed back into his spica cast, which was then taped up. **4. Concerns regarding [Master A]'s breathing were blatantly ignored.** On 6 June 2022, [Master A] was clearly very unwell. The parents stated, "[Master A]'s worsening condition and our concerns were still grossly ignored by doctors." During this time, [Master A] deteriorated to the point that an emergency call was made. [Master A] required transfer to

	the ICU for ventilatory assistance. He had renal failure and there was concern he might not live through the night. Under each of the itemised failures, there are a number of specific questions that have been addressed in the response from Waikato Hospital and are not repeated here. There are also some helpful photographs in the complaint document. These illustrate the skin lesions on [Master A]'s back and buttocks and [Master A] in the spica cast. **Summary of the Response to the Complaint.** **1. Why did nobody phone us during surgery to discuss a change in plans, so that we could have had vital input into this process?** [Dr B]'s perception was that the conversation on alternative options had been discussed and understood by both parents when the consent form was read and signed. He apologised for not realising that, in the consenting process, there had been assumptions made by him regarding the understanding of the parents for the potential to change from the wedge to spica casting during surgery. The response also identified some ways for improvement of understanding as part of the consent process. **2. Why was [Master A] put in such a heavy cast when he has a movement disorder and is of a larger size when this is not common practice at other hospitals?** Several reasons were given. The spica cast provided the best protection for the hip. It was best to go to the ankles to prevent rubbing on the Achilles tendons and stop the foot dropping. It needed to go to the nipple line to be able to create an opening to access the Mickey button for feeding. [Dr B] asked three colleagues what they would do in a similar situation, and two of the three indicated they would use a spica cast. This is a common practice. **3. We were extremely concerned about [Master A]'s cough, fevers, swelling and sickly appearance. Why were our worries and concerns, time and time again, not listened to or taken seriously?** The response stated: '[Master A] was regularly reviewed and our overall detailed assessment is that the majority of care looks appropriate. The documentation by the nursing team reflects that when a parental concern was raised with them that they listened, provided nursing or prescribed care (for example pain relief) and/or escalated to the relevant medical team.

	Nonetheless, I am very sorry that you did not feel heard and that we failed you in this regard.' [Master A] was getting regular paediatric medicine registrar reviews at least daily. However, there was a gap in paediatric consultant review between 29 May and 4 June, during which time [Master A] was becoming more unwell. An apology was offered for this. **4. We told each nurse and doctor that [Master A] goes downhill quickly. It is recorded that he is prone to chest infections and a blanket antibiotic has been proven to work effectively. Why was none of this taken into consideration? Why was he not given a blanket antibiotic when showing signs of a chest infection?** It was noted from the electronic prescribing record that [Master A] had only had antibiotic courses twice in the preceding three years. There were not significant concerns about a potential chest infection until 3 June 2022 when a chest X-ray was requested. 'The Paediatricians concur that with the benefit of hindsight that they should have potentially considered earlier antibiotics on 2 June 2022 after [Master A]'s brief febrile episode.' **5. Why did it take four days to complete all 'exploratory' tests when:** **a. it was stressed that [Master A] goes downhill quickly; and** **b. it was evident [Master A] was extremely sick, in severe pain, distressed and suffering? Why was there no urgency?** The response stated; 'Although [Master A] was reviewed by an Orthopaedic Consultant in the period from 30 May to 3 June 2022, we acknowledge that a Paediatric Medicine Consultant review in this timeframe would have been more appropriate and may have identified issues sooner.' Paediatric medicine consultant review did occur on 4, 5 and 6 June. **6. How could the doctors and nurses ignore [Master A]'s symptoms and our concerns and allow [Master A] to suffer the way he had? And for so long?** It was recognised that a change to not admitting children for complex procedures to the hospital the day before surgery has hindered the staff's ability to gain a good understanding of baseline activity level and needs. With respect to nursing care, it was stated that; 'The notations reflect that they have responded to the parental concerns and made a plan with you and/or escalated to the paediatric medical team. Prior to the epidural removal, parental and nursing concerns around pain/discomfort were elevated directly to the Paediatric pain consultant and during the orthopaedic/Paediatric medical rounds. The Paediatric Pain Consultant post review created plans on each review and the

	actions carried out in a timely way and appeared to have provided comfort for [Master A].' Some specific instances were described. It was also noted that [Master A] was not prescribed regular pain relief overnight and that this may have made a difference. A comment was made that, 'There was an opportunity to re-engage with the paediatric pain team following the removal of the epidural which we did not undertake and on reflection this may have offered a fresh assessment, with some different options that may have supported [Master A].' Although the paediatric medicine junior staff were doing their best, it was recognised that elevation to consultant level earlier when [Master A] was more unwell should probably have occurred. **7. When we had concerns about [Master A]'s cast tightness, why didn't the surgeon (or someone equally qualified) come and see [Master A] and assess this?** [Dr B] saw [Master A] on day 1 and day 3 post-surgery. He checked the cast and considered there was adequate room. The cast was again checked on day 4 by a registrar, who conveyed the situation to [Dr B], and again it was felt there was enough room. [Dr B] checked the cast again in person on day 6 postoperatively, by which time the swelling was subsiding. There was considerable scrotal swelling, and an ultrasound of the scrotum showed no adverse effects. **8. When we had concerns about [Master A]'s chestiness, cough and pain level, why did the surgeon (or someone equally as qualified) not assess the role the cast may have played on this or weighed up the benefits of removing the cast?** During this time, [Dr B] was isolating at home with COVID and was making decisions based on information passed on to him. It was not until the ICU consultant raised concerns about the cast affecting [Master A]'s breathing that [Dr B] was directly aware of the problem and the cast was then removed. An apology was made: 'We are very sorry that your concerns about the hip Spica and the effect it was having on [Master A]'s breathing were not heard directly by [Dr B]. He is also very sorry that he did not instigate antibiotic treatment sooner and that had he been able to hear your concerns directly as this would likely have altered that aspect of [Master A]'s care.' **9. [Master A] was in the high observation unit. Why was [Master A] failed so badly? Why were his medical needs not met?**

	The comment was made: 'On review of what occurred we can see that you were sharing your concerns that something underlying was going on for [Master A]. From a clinical perspective however, this concern was not being reflected in his PEWS score. This is where the mismatch in assessment occurred.' There was some further comment about ways in which the care process could be improved. It was noteworthy that a decision not to turn [Master A] during the night once he had settled to sleep may not have been appropriate. This was done at the parents' request to facilitate his sleep. **10. Due to the extent and severity or these sores/burns, it is obvious they must have been present on 4 June 2022 when the cast was initially taken off. How could it be that not one single health professional saw these sores/burns on [Master A]?** The response stated: 'The cast was split and the front part removed. He was then directly transferred over to the MRI bed. The registrar moved his legs enough to review the surgical wounds and noted they were satisfactory. The status of the back part of the spica was also observed and there was nothing obvious to alert the team to concerns. [Master A] was then placed back into the spica and it was wrapped in a temporary fashion. Neither the surgical nor the nursing team requested [Master A] be rolled to assess his back/heels for pressure areas prior the Spica being secured with soft band. I would like to sincerely apologise that this opportunity to assess for pressure areas was missed.' **11. [Master A] was extremely unwell at this point and had been for some time. Why didn't any medical professionals conduct any observations of [Master A]'s skin or body after the cast was taken off to rule out any other cause/source of his illnesses?** The response indicated: 'On 6 June 2022, [Dr G], Paediatrician, reviewed [Master A] with the orthopaedic registrar. They rolled him over and reviewed his bottom as the nurses had concerns about his skin. [Dr G] recalls the nursing team felt the cast for dampness.' It was clear [Master A] was unwell, but there had been some improvement with his being given oxygen at 2L/min. Nevertheless, there were still concerns from medical and nursing staff. **12. Was the inside of the cast observed to check its cleanliness, moisture levels or the presence of any skin due to skin breakdown from [Master A]'s back when the cast was removed or before it was placed back on his body?** 'As mentioned above, the back of the hip spica was observed at the time of the MRI and there was nothing obvious to alert the team to concerns, so the wounds may not have progressed to a stage that would affect the spica. I am very sorry to report that we missed the opportunity to check [Master A]'s skin when the spica cast was removed.'

	13. After [Master A] returned from the MRI, we asked a doctor if [Master A]'s back was ok and were told it was. Why were we told this if his back clearly wasn't looked at? It appears likely that in saying the back was ok, the doctor was referring to the fact there was no epidural abscess in the back, this being the reason for the MRI. **14. Why was [Master A] not given the urgent medical attention he so obviously needed in a timely manner?** In response, it was considered that, if the staff had been more aware of [Master A]'s baseline condition, then [Master A] may not have deteriorated in the way that occurred. The Waikato team sought the opinion of Dr […], specialist paediatric haematologist at the [specialist paediatric] hospital. Dr […] provided detailed recommendations for [Master A], which were to be available on his record. **15. Why were my frantic and emotional pleas for help so blatantly ignored?** The response was: 'I am very sorry that you felt this way; we hope that the Kōrero mai escalation pathway will assist any parent or caregiver should they feel ignored or not heard.' **16. [Master A]'s cast was taken off in ICU to help him breathe. Why was it not done sooner?** The timing of cast removal was based on weighing up risk versus benefit as seen at the time. The response ended with a discussion about issues relating to responsibility for care of a patient with input from different specialties – whether there be a shared care model or one responsible clinician. This was not clear in [Master A]'s case and contributed to some of the difficulties. Resolving this issue is work in progress for the Waikato team. The response was signed by […], Operations Manager for Women's and Children's Services. **Clinical Notes Summary** [Master A] was six at the time of the described events. He suffered from an undiagnosed neurogenetic condition causing microcephaly, severe epilepsy, global developmental delay, neutropenia and lymphopenia. He was non-verbal in communication. He required feeding through a feeding tube (Mickey button). He was on a ketogenic diet. Preoperative anaesthesia consent was done on 24 May 2022. Some specific risks were listed in relation to the proposed surgery. These were infection, epidural abscess, haematoma, peri-operative seizures, and aspiration. The surgical consent was signed on 24 May 2022 by the family and [Dr B], the surgeon. This consent was for bilateral proximal hip VDROs [varus derotation osteotomy], plus or minus right Dega

	osteotomy, plus arthrogram, plus or minus adductor/psoas release, plus or minus open reduction, plus or minus hip spica. The risks listed were infection, neurovascular damage, non-union, metalware, recurrence, and avascular necrosis. The postoperative plan for pain relief was to use an epidural. An indwelling catheter for bladder drainage was planned. The ketogenic diet would continue, and discussions had been had with a dietitian. [Master A] would also require paediatric follow-up to check on his seizures, diet, and general condition. The surgery was performed on 24 May 2022. An open reduction of the right hip was required, and [Master A] was placed in a full spica cast at the end of the procedure. In the PACU [post-anaesthesia care unit], it was noted he had a heart rate between 140 and 150 beats per minute but otherwise appeared stable. 25 May 2022. [Master A] was seen in the morning by [Dr B], the pain service, and Dr [C] (paediatrician). [Master A] was still running a high heart rate for unclear reasons. His ketones were a little low, and he had had a few seizures. It was expected that his ketones would be a little low following his surgery. He otherwise seemed well. 26 May 2022. [Master A] still had a tachycardia of approximately 145, thought most likely to be secondary to pain. It was also thought he may have some degree of atelectasis (incomplete expansion of part of his lungs), and chest physio was arranged. 27 May 2022. [Master A] was again seen by [Dr B], who checked him and his cast and felt there were no particular concerns. [Master A] was sounding somewhat chesty at that time, and there was some concern about atelectasis still, so chest physio continued. He was still requiring oxygen at 1 litre per minute, and the epidural was still running. It was noted he had some scrotal swelling, but it was explained that this was normal and to be expected. [Master A] was found to have a haemoglobin of 87 and was given a blood transfusion overnight. 28 May 2022. [Master A] was somewhat drowsy, and it was planned to remove the epidural. He also showed generalised oedema of his pelvis, groin, abdomen, and scrotum. He was seen by the paediatric consultant, who advised giving [Master A] frusemide to remove some of the excess fluid. It was noted his PEWS scores over the day were mostly two, due to increased heart rate and oxygen requirement, which was 0.5 litres per minute at that time. It was noted in the evening that he was more awake after stopping the epidural and giving frusemide.

	29 May 2022. [Master A] was reviewed by the pain team as he was uncomfortable. He needed some morphine given via his feeding tube. It was also noted that he had started coughing and on one occasion his oxygen saturation dropped to 80%. He continued on oxygen via nasal prongs at 0.5 litres per minute. 30 May 2022. [Master A] was seen by [Dr B]. He was afebrile and appeared stable with a cast that was satisfactory. The paediatric team were concerned about a low albumin, which might have been contributing to his swelling and also the continuing possibility of atelectasis, although he seemed to be improving. The physio thought [Master A] had reached his baseline respiratory function and planned to stop chest physio at that time, indicating [Master A]'s father was prepared to manage some suctioning. [Master A]'s PEWS score was one for most of the day and his oxygen saturation was 97% on room air (this being acceptable). 31 May 2022. The paediatric registrar saw [Master A]. His swelling had decreased, and his PEWS score was zero in the morning, and he was felt to be improving. However, by the evening, his PEWS score was up to three and he had spiked a low temperature to 37.6. He was also crying and sore at times. 1 June 2022. [Master A] had a further paediatric registrar review at 9.45am. His PEWS score was zero with an oxygen saturation of 98% on room air, heart rate 118, and temperature 36.9. It was thought he had good air entry to his chest and thought to be relatively stable. However, that night, he was crying and coughing, and his temperature again spiked to 37.9 with a PEWS score of three at that time. 2 June 2022. A ward round with the orthopaedic registrar and paediatric registrar occurred. It was noted that [Master A] had been having mild temperature spikes for two days with unsettled nights and his pain was still an issue. 3 June 2022. The paediatric registrar saw [Master A] and noted his rising CRP [C-reactive protein], which had risen from 90 to 140 and later that day was 190. Chest X-ray and MSU [mid-stream urine] were organised. Chest X-ray was later checked by the paediatric medicine registrar and thought not to show anything specific. The MSU showed no growth. The orthopaedic team was also concerned about the source of infection and ordered an MRI scan of the spine to look for an epidural abscess. The play specialist specifically recorded [Master A]'s mother's concerns regarding his fevers 4 June 2022. The day started with [Master A] having a desaturation and tachycardia with bad coughing. After about a 30-minute delay, the paediatric house officer came. The doctor found coarse crackles in the lungs, with decreased air entry. On review of the chest X-ray, it was thought there was a right lower lobe opacity. It was noted that his mother had noticed a decreased level of responsiveness from [Master

	A]. After a discussion with the paediatric registrar, antibiotics were started. The on-call paediatric consultant, Dr [E], also saw [Master A] later that morning and phoned [Dr B] to discuss his thoughts. There was no immediate change in management other than to continue to proceed with the MRI scan to check for the epidural abscess. Over the course of the day, [Master A] had a temperature up to 38.2 degrees, desaturations to 84%, and a PEWS score at one stage of seven. The MRI was done that evening, which confirmed a right lower lobe consolidation, but no epidural abscess. This was done under general anaesthetic, and the anaesthetist noted features consistent with chest infection with a tachycardia and secretions that required suctioning. [Master A] returned to the ward and had another PEWS score of seven that evening. It was arranged that he'd be reviewed overnight by the paediatric registrar, and when seen at 1.16am, he had improved a little. 5 June 2022. [Master A]'s CRP was 340. He was still spiking temperatures to a maximum of 39.1 degrees with a tachycardia. He was also desaturating at times. His treatment continued with the intravenous antibiotics and chest physio. PEWS scores over that afternoon were between three and five. He was seen during that day by the paediatric medicine registrar and consultant at different times and the orthopaedic registrar. 6 June 2022. It was clear [Master A] was in worsening respiratory distress with decreased urine output. He was seen by the paediatric registrar and orthopaedic registrar. He was noted to have increasing dyspnoea and worsening rash on his buttocks. The nursing summary from 2.25pm recorded that he had PEWS scores of seven and six during the day, worsening skin rash and he needed multiple deep suctioning for his chest secretions, which were more creamy. At 3.20pm on 6 June 2022, an emergency call was made. [Master A] was transferred to the ICU, intubated and given ventilatory support. He was found to be in renal failure. The following day, after discussion with [Dr B] by the ICU staff, the spica cast was removed, as it was thought this was hindering [Master A]'s breathing. Once stable, [Master A] was then transferred to the [specialist paediatric hospital] for further care.

Question 1: Appropriateness of immobilisation: • Whether the intraoperative decision to apply a full hip spica cast was clinically appropriate in the context of [Master A]'s movement disorder, body size, and temperature-regulation issues. • Whether a reasonable alternative (such as broomstick casts, abduction brace, or a modified spica) would have been more appropriate, taking into account other relevant factors such as cast fit, positioning, risk of pressure injury, and temperature regulation.	
List any sources of information reviewed other than the documents provided by HDC	There were no other documents reviewed for this question other than those provided by HDC.
Advisor's opinion	It should be pointed out initially that some form of immobilisation for [Master A] intraoperatively and continuing postoperatively was appropriate because of the need to perform an open reduction of the right hip. Open reduction means that the fibrous envelope (capsule) of the hip was opened, some soft tissue cleared out of the socket (acetabulum), then the ball part of the hip joint placed back into the socket and the capsule closed around the hip joint with sutures. The risk postoperatively, having done that procedure, was that any unwanted movement, including seizure activity, might have caused the sutures in the capsule to tear and the ball to pop out of the socket. The most commonly used form of immobilisation following such surgery is the use of a hip spica cast. Usually this will extend from the nipple line to the ankle. Sometimes the cast can stop above the knee, but where it stops above the knee, there is some compromise of control of rotation of the leg. Furthermore, use of a spica cast, or any form of immobilisation, is a balance of risks versus benefit. The benefits of a full spica cast are that: 1. It provides good protection of the hip joint and reduces significantly the likelihood of a postoperative dislocation of the hip. If that event occurred, it would be a very serious complication, possibly requiring further surgery. Such dislocation could occur from a seizure event or some other unplanned movement. 2. Immobilisation after surgery in a cast usually would be expected to provide some additional pain relief as the operated on parts are supported and not being moved around. Movement of freshly operated tissues is painful. 3. A third benefit of a spica cast is ease of movement and positioning of the child. The child can be picked up in the cast and the whole cast moved around and

	positioned as required. Admittedly that can be a two-person job if the cast and child is heavy. The risks of use of a spica cast include: 1. Seizure activity. If the child has a tonic clonic seizure within a spica cast, then the limbs and body can impact on the cast and that can create pressure areas. 2. The larger the child, the more awkward it is managing the child in the cast, just because of the size. The cast and child are heavier and the cast is larger, making it more difficult with seating and access to smaller spaces, including an MRI scan. [Master A] weighed 28.7kg and was 6 years old at the time of his surgery. This would place him nearer the upper end of the size range for ease of postoperative care in a spica cast. 3. A large cast that encompasses much of the body also carries a risk of overheating of the child, especially if they have problems with temperature regulation, as was a problem for [Master A], Should there be sweating, there is then a risk of the skin becoming moist and being more susceptible to breakdown and pressure areas. 4. There is always considerable swelling around the hips and pelvis after the type of surgery [Master A] underwent. Swelling makes the cast tighter with risk of skin irritation from rubbing and potentially limitation of abdominal and chest expansion. Thus, the use of a spica requires an assessment of the risk and benefit, as does the choice of any other immobilisation device. Possibilities might include a modified spica cast where it was not so high around the abdomen nor extend below the knees. This would not provide full control of rotation of the leg. In [Master A]'s case, on the left side where the hip wasn't opened, the spica could have been left above the knee. On the right side if a spica were being used, it would seem reasonable to continue it below the knee to prevent unnecessary or unwanted rotation of the limb. I believe the cast was taken quite high to allow a convenient window for the Mickey button. It may have been possible to keep the upper part of the cast below the button. A broomstick cast entails use of a cylinder cast placed on each lower limb with a bar between them. This usually keeps the legs apart but doesn't immobilise the hips because flexion and extension can occur at the hips as well as some degree of rotation. They would not provide the pain relief anticipated with a full cast, and there would be a

	degree of awkwardness induced by having the broomstick cast in place. In my opinion, the downsides would outweigh the benefits of using broomstick casts. Another alternative is some form of pre-manufactured abduction brace. These braces keep the thighs abducted and supported. They are usually made of plastic with some padding and do not offer many options for alternative positions other than very wide spreading of the legs. My experience is that these are not well tolerated in children, especially larger children. A custom-made abduction brace of some sort would have been a possibility but not likely to be available intraoperatively and immediately postoperatively unless manufactured some time before surgery. In [Master A]'s case, I believe the choices lay between the full spica cast, some modification of the cast, or simply postoperative positioning of the legs with foam wedges and pillows. I believe this latter option had been [Dr B]'s plan before it was necessary to perform the open reduction of the hip.
What was the standard of care/accepted practice at the time of events? Please refer to relevant standards/material.	I believe that an accepted standard of care following the surgery undergone by [Master A] would be to place him in a spica cast of some description, preferably the least enclosing of his body that would still allow sufficient immobilisation of the right hip. The cast that was applied to [Master A], I believe from the photos I have seen, did come quite high on his chest to the nipple line. That was partly to allow a window to be cut for the Mickey button, but it may have been possible to bring the top of the cast down further. I also believe that the cast included both legs in their entirety to their ankles, whereas that was probably not entirely necessary on the left leg where the cast could have been left above the knee. The use of a full spica cast for [Master A] came with an obligation to monitor [Master A] and his cast closely for any of the risks mentioned above. This would include a reassessment of risk versus benefit of the spica on a regular basis, particularly where the clinical progression was variable.
Was there a departure from the standard of care or accepted practice? • No departure;	I do not believe the decision to apply a spica cast intraoperatively represents any departure from standard care or accepted practice. Some more obvious consideration of the potential risks of the spica for [Master

• Mild departure; • Moderate departure; or • Severe departure.	A] may have led to a modified and smaller spica cast being applied.
How would the care provided be viewed by your peers? Please reference the views of any peers who were consulted.	My colleagues, I suspect, would feel similarly to what I have indicated. Most paediatric orthopaedic surgeons regularly employ spica casts after the type of surgery [Master A] underwent, but it would be expected there would be careful attention to the risks. I note that [Dr B] did survey three of his colleagues on their thoughts on the use of a spica cast in this situation. Two of the three indicated they would use a spica cast, whereas the third would use some other alternative. [Dr B]'s self-initiated survey suggests that his choice of spica cast lay within an accepted standard of care of our colleagues. I also asked one of my paediatric orthopaedic colleagues whether he would use a spica cast in a situation comparable to [Master A]'s. He indicated he would always use a spica right to the toes on both feet but, as a compromise in view of the risks, he would remove the cast after two or three weeks.
Please outline any factors that may limit your assessment of the events.	I have only seen photos of [Master A] in the cast, and it is therefore somewhat difficult to be absolutely specific in what I say, but I believe the points I have made will still be valid.
Recommendations for improvement that may help to prevent a similar occurrence in future.	[Master A]'s story provides a graphic example of some hazards of spica cast use. This represents an opportunity to explore guidelines around the use of such casts, reminding medical staff and nursing staff of the need to remain vigilant regarding possible complications arising. It is also an opportunity for surgeons to discuss pros and cons of various forms of postoperative immobilisation for situations such as [Master A]'s.

Question 2: Management after skin compromise: • Whether, after rash and skin breakdown were identified on 4 June, it was appropriate to reapply the same cast. • Whether the subsequent monitoring, review, and timeliness of response (including referrals to Plastics and Dermatology and the delay until 7 June for cast change) met accepted standards.	
List any sources of information reviewed other than the documents provided by HDC	No other sources reviewed

Advisor's opinion	I have reviewed the clinical record to determine the timing in relation to recognition of [Master A]'s skin problems, the comments relating to the extent of recognition of this problem and the actions taken between 4 and 8 June. On 4 June, [Master A] had his spica cast removed to allow him to have the MRI scan. The registrar observed the back of the padding on the back of the spica. This showed some changes consistent with sweat. The cast was reapplied after the MRI. The nursing note written at 10.45pm on 4 June recorded, "Noticed rashes in padding area, aware of this. Sudocrem applied." On the following day, 5 June, the nursing note recorded at 10.50am stated "noted red spots on bottom. No broken areas noted. Sudocrem applied. Turns done regularly to reduce pressure from bottom." A further nursing note from 9.25pm on 5 June recorded "noted rashes/red bumps on his buttocks, not broken. Sudocrem applied every nappy change." On 6 June, the nursing note recorded at 2.25pm stated "when doing bed wash this morning, found sores and rash over bottom. Skin appears to be deteriorating under cast. Informed paediatric medicine and orthopaedics." [Master A] was seen by both the paediatric medical and orthopaedic registrars that day, who both confirmed there was some skin degradation occurring on the buttocks with several pustules being present. There was no active discharge, though one pustule may have self-drained. The tissue underneath was firm with no large areas of fluctuance, though the skin looked inflamed and irritated. On 6 June, [Master A] was transferred to the ICU because of his deteriorating condition. The following day, 7 June, it had been planned to change his cast. In the ICU, [Master A] was found to have a very distended abdomen, and this distention, plus the cast were compromising his respiratory status and the cast was removed. It was at that stage that multiple oozing blisters were found on his back, buttocks and thighs. On the following day, 8 June, the blisters were described as "multiple blisters oozing – back, buttocks, thighs. Areas of erythema with eroded blisters and necrotic tissue." The orthopaedic registrar washed and debrided the blistered areas and applied a DuoDERM dressing.

	On 8 June, a referral was made to the dermatology and plastic surgical departments asking them to review [Master A]'s skin problem. However, the review by those specialists did not occur as [Master A] was transferred to the [specialist paediatric hospital] later the same day. However, on arrival at the [specialist paediatric hospital], [Master A] was reviewed by the plastic surgeons, and continued conservative treatment for the skin wounds was advised. The notes recorded quite a rapid change in the state of [Master A]'s skin. When the skin problem was first noticed on 4 June, it was really just some small red areas on his buttock, but by 7 June, these areas had turned into larger blisters, some of them discharging. It should also be noted that 4 June was a Saturday, 6 June a public holiday for Queen's birthday, and 7 June the first normal working day. The plan had been to change the spica cast on 7 June to make use of specialist nurses for the application of a new spica. On 4 and 5 June, the changes seen on [Master A]'s buttocks appeared to be relatively mild, and it does seem that the appropriate treatment of Sudocrem was applied. However, by 6 June, the skin changes had progressed and the nurse was clearly concerned about the appearance of [Master A]'s buttocks. Registrars were informed and saw [Master A]. That would have been an opportunity to inspect [Master A]'s skin more extensively and in particular look closely at his back and other areas on the back of his thighs that were enclosed in the cast. The cast at that stage was split and could still be removed. That step wasn't taken. It became quickly apparent on 6 June that [Master A] was very unwell and his skin issues were less important than his overall state and in particular his respiratory difficulties. The appropriate thing was done when he was in the ICU – the spica cast was removed and the skin inspected more thoroughly.
What was the standard of care/accepted practice at the time of events? Please refer to relevant standards/material.	It is quite common for children to develop some skin irritation manifest as a red, spotty rash under a spica cast. This is usually due to moisture, and the appropriate treatment is to protect the skin as best possible, keep the cast and skin dry and monitor the situation. When [Master A]’s cast was removed for the MRI, his wounds were checked, but it appears the rest of his skin was not inspected. The cast lining showed some signs of sweating and I assume may have been damp. This would have been a good time to change the lining to new, dry padding and to inspect, wash and dry [Master A]’s skin.

	It was still necessary to provide some immobilisation for [Master A]'s hips after the scan, and reapplication of the same cast in that scenario is very reasonable. If a skin rash had been identified, it could have been monitored closely and [Dr B] informed in case it was thought necessary to modify the immobilisation in some way as if a skin reaction worsens, it is usually necessary to change the cast within a few days or change to another form of immobilisation. It had already been the plan to change [Master A]'s cast under anaesthetic on the first available operating list after 4 June, this being on 7 June, allowing for the holiday weekend. [Master A] was also started on flucloxacillin on 6 June, quite appropriately, when his rash was clearly worse, to cover for likely staphylococcal infection. Once the cast was removed and the full extent of the skin lesions identified, they were cleaned, dressed, and a referral made asking for review by plastic surgery and dermatology. The course of action described above, in my opinion, is appropriate for what was observed by the staff. However, the observations were limited by not checking the skin when the MRI was done, nor lifting [Master A] out of his spica over the next few days to check his skin. Once a rash had been observed on the buttocks, there was always a possibility the rash was more extensive, and no effort was made to try to determine the extent of the skin reaction. That would have required removing [Master A] from his spica cast, which had already been split. This would have been difficult but not impossible.
Was there a departure from the standard of care or accepted practice? • No departure; • Mild departure; • Moderate departure; or • Severe departure.	I believe the decision to reapply the spica cast after the MRI was reasonable and would be considered normal practice and no departure from standard care. However, there was no apparent attempt to check the skin on [Master A]'s back or ensure the lining of the cast was dry. There was also no attempt to check [Master A]'s skin under the cast once it was recognised there was some breakdown occurring on his buttocks. I believe these failures represent a moderate departure from the accepted practice of a consultant. Unfortunately, there was no orthopaedic consultant on hand to see [Master A] and make the call relating to his cast management due to [Dr B] being unwell.

	When [Dr B] was asked about removing the spica by the ICU staff, the decision to do so was made very promptly.
How would the care provided be viewed by your peers? Please reference the views of any peers who were consulted.	I believe my peers would regard this situation similarly to me. The main problem was the lack of direct orthopaedic consultant oversight to make decisions about the spica cast. In general, I would not expect a registrar to remove a patient with a potentially unstable hip from a spica cast without direct instructions and probable supervision from the operating surgeon. I asked another paediatric orthopaedic colleague for his thoughts on the cast and skin management. He agreed that normal practice would involve checking the skin, washing and drying the skin and changing the cast lining and possibly the whole cast if there was an opportunity to do so. He agreed the management of [Master A]'s skin while in his cast represented a moderate departure from the standard of care expected of a consultant but recognised the complicating factor in this case of lack of direct consultant input.
Please outline any factors that may limit your assessment of the events.	It is not entirely clear to what extent [Dr B] was aware of the extent of the skin compromise nor the effect the cast may have been having on [Master A]'s respiratory state
Recommendations for improvement that may help to prevent a similar occurrence in future.	It would be useful to provide instruction to nursing and medical staff on care of the skin for children in spica casts. This could include a reminder of the necessity of a low index of suspicion for skin problems and to take steps to check the skin. If there were a designated spica cast nurse, this person could have a role in helping the ward staff in all aspects of care for the patient in a spica cast.

Question 3: Response to pain and swelling: • Whether the orthopaedic team's response to ongoing pain and scrotal swelling and subsequent referral to the pain team were appropriate. • Whether more proactive reassessment of the cast and/or surgical site (including examination, imaging, or modification) should have occurred.	
List any sources of information reviewed other than the documents provided by HDC	No additional sources of information were reviewed.
Advisor's opinion	I would like to summarise briefly the response to scrotal swelling, pain, and management of the cast. Scrotal swelling was first commented on in the medical record on 27 May 2022, i.e. three days postoperative.

	[Master A] was seen by [Dr B] on that day, and it was explained that scrotal swelling was common following this type of surgery. [Dr B] felt there was adequate room around the pelvic region and the scrotum at that time. Over the next two to three days, the swelling became significantly more marked. On 28 May 2022, it was noted [Master A] had generalised oedema and after being seen by the paediatric consultant, he was given frusemide to aim to reduce the swelling. [Master A] was also reviewed by Dr [H], paediatric anaesthetist. She noted the scrotal swelling and recommended a paediatric surgical check on the scrotum. [Master A] was seen by the paediatric surgical team and an ultrasound of the scrotum was performed, which did not show any concern with the testes. [Master A]'s swelling of the scrotum remained very marked through 29 May 2022 and 30 May 2022, but by 31 May 2022 it was starting to decrease and when [Master A] was seen on 1 June 2022 by [Dr B], he recorded that the scrotal swelling was getting better. With respect to [Master A]'s pain management postoperatively, he had an epidural in place from day of surgery, 24 May 2022, until 28 May 2022. During that time, he was seen every day by a consultant anaesthetist as part of his pain management. He required some boluses given through the epidural during that time. It was decided to remove the epidural on 28 May 2022 because [Master A] was becoming somewhat drowsy. A plan was put in place for intermittent morphine via the PEG. He was seen again by Dr [H] on 29 May 2022 for assessment of his pain. At that time, he was receiving morphine via the PEG. [Master A]’s pain management was passed on to the paediatric and orthopaedic teams with the understanding Dr [H] could be contacted again if necessary. There was no further input from the anaesthetic pain team whilst he was on the ward as they were not consulted. From 30 May 2022 onwards, [Master A] had problems with pain, particularly at night. This was managed initially with morphine given via the PEG intermittently. From 2 June 2022, it was decided to change to regular morphine doses, which seemed a little bit more effective, but still did not eliminate his pain. From early June, the orthopaedic and paediatric medical teams were looking for a potential source for [Master A]'s

	ongoing pain. Most of this investigation was centred around looking for sources of infection. With respect to [Master A]'s cast, on 3 June 2022, the cast was windowed over the wounds. This was done as part of the search for a potential source of infection and hence source of pain. The wounds were found to be fine. On 4 June 2022, [Master A] had his MRI done under anaesthetic at which time the cast was removed. As previously stated, there were some signs of sweat in the lining of the cast, but no skin changes were identified at that time. From 5 June 2022 it was noted there was a rash on [Master A]'s buttocks, which got progressively worse over the next few days. During this time, until the complete removal of the spica cast on 7 June 2022, [Master A]'s skin was not inspected by lifting him out of the cast.
What was the standard of care/accepted practice at the time of events? Please refer to relevant standards/material.	A totally acceptable standard of care with respect to management of the scrotal swelling was performed by [Master A]'s caring team. It is to be expected after the type of surgery [Master A] underwent that there would be scrotal swelling. It seems apparent that [Master A] had much more scrotal swelling than is commonly the case, and this was presumably contributed to by some generalised oedema. The medical team took care to ensure that the generalised oedema was decreased by giving [Master A] frusemide. The team also checked his skin integrity around the scrotum and around the pelvis and checked that the spica was not impinging. He was assessed by the paediatric surgical team and underwent an ultrasound scan of the scrotum to check that the contents were unharmed. As anticipated, the swelling subsided over the course of several days. There was nothing else that I can think of that would have helped relieve the scrotal swelling. With respect to the pain management postoperatively, [Master A] was seen by a consultant paediatric anaesthetist as part of his postoperative pain management for the time in which his epidural was in situ. He was seen from 24 May until 29 May, at which time a transition was made to medications via his PEG. It would be considered normal practice for the pain team to hand over the ongoing pain management to the paediatric medical team after the withdrawal of the epidural catheter. It would normally be up to the paediatric team or orthopaedic team to call the

	acute pain service if they were having problems controlling [Master A]'s pain. [Master A] continued feeling constant and significant pain from around 30 May. This was a time when [Master A] was not reviewed by a consultant paediatrician for several days and just once by [Dr B] on 1 June. Between 29 May and 4 June, had there been a consultant paediatrician see [Master A] and recognise the difficulties controlling his pain, some further consultation may have occurred with the acute pain service. The paediatric registrars did not see the need to call their consultant, which in retrospect would probably have been helpful. The expected standard of care with respect to the management of [Master A]'s cast has been previously discussed. I believe it was appropriate [Master A] was in a spica cast postoperatively. However, when it became apparent there was potential skin compromise after the cast had been removed at the time of the MRI, [Master A]'s skin was not checked. I believe it would have been appropriate to check his skin at the time of removing the cast and again thereafter, particularly as the rash became more apparent on his buttock from 5 June onwards.
Was there a departure from the standard of care or accepted practice? • No departure; • Mild departure; • Moderate departure; or • Severe departure.	In relation to management of the scrotal swelling, there was no departure from the accepted standard of care. With respect to pain management, the early management whilst [Master A]'s epidural was in place and including 29 May followed an accepted standard of care. After 29 May, [Master A]'s pain management was left to the paediatric medicine and orthopaedic teams after instituting a plan for morphine administration. This transition was consistent with normal practice. The acute pain service was available still at the request of the teams caring for [Master A]. No request for assistance from the pain service was made after 29 May and, in view of [Master A]'s ongoing pain, a request for further assistance might have been reasonable. It would also have had the benefit of [Master A] being reviewed by a consultant paediatric anaesthetist, possibly one who knew [Master A] and the potential risks to him. It was during this time from 29 May until 4 June when [Master A] was not seen by a paediatric medicine consultant. There also seemed a somewhat slow transition from as-required painkiller doses to regular doses during this time. This potentially meant that [Master A] may not have been receiving adequate pain relief at night.

	This and the absence of a request for pain service review represent, in my opinion, mild departures only from a standard of care. As mentioned in the previous question, the management of the cast when it was apparent there was worsening skin compromise represents, in my opinion, a moderate departure from a good standard of care. This, I believe, was likely to have been significantly influenced by a lack of consultant orthopaedic oversight at that time, unfortunately created by [Dr B]'s illness.
How would the care provided be viewed by your peers? Please reference the views of any peers who were consulted.	I have not consulted any other peers in relation to this question. I have little doubt that my comments on scrotal swelling would be supported by my peers. I believe they would also support the desirability of having input from a consultant paediatric anaesthetist during that period when [Master A]'s pain was not well controlled and during which time a search was being conducted to find a cause for potential sepsis, which might have explained his pain. An anaesthetist would potentially have been helpful for both concerns. His cast management was previously discussed.
Please outline any factors that may limit your assessment of the events.	I have assumed the lack of visits to [Master A] by a consultant paediatrician over several days probably affected his pain management. I am not aware what discussions about [Master A] may have occurred between registrar and consultant off the ward.
Recommendations for improvement that may help to prevent a similar occurrence in future.	Scrotal swelling after surgery such as that [Master A] underwent is normal, but some education of nursing staff and parents around expectations and management would be useful. The swelling suffered by [Master A] appeared greater than usual and would have been very alarming. The concerns may have been lessened by education. The problems with pain management and [Master A]'s general care would likely have been helped with more regular consultant input in the period from 30 May through to 4 June, whether this be anaesthetic or paediatric medicine. Thus, for complex patients such as [Master A], daily consultant input would seem appropriate, and perhaps protocols could be written about this. Cast and skin management would be facilitated also by having regular consultant orthopaedic review. It was not possible for [Dr B] to provide this at the critical time for [Master A]. An alternative consultant orthopaedic surgeon should probably have been called upon as, even if they were

	not specialists in children such as [Master A], it is more likely they would have picked up on the risks to him.

Question 4: Informed consent: Whether the orthopaedic surgeon met accepted standards for informed consent regarding the immobilisation plan (including the hip spica and reasonable alternatives) considering [Master A]'s complex needs, material risks, and practical implications for care, including the adequacy of documentation.	
List any sources of information reviewed other than the documents provided by HDC	Waikato Hospital Policy on Informed Consent
Advisor's opinion	The consent process can be considered to have occurred over a period of time. [Dr B] first met [Master A] with his family on 22 October 2021 and had a further consultation over the phone with the family on 11 February 2022. The discussion on those occasions was predominantly around the pros and cons of performing extensive surgery on [Master A]'s hips to prevent subsequent painful dislocation. It is no small undertaking to perform that type of surgery on a child with complex needs and hence the discussion focused on whether surgery was appropriate or not. At that time, the X-ray showed subluxation of [Master A]'s right hip rather than dislocation of the hip, and it was not envisaged that an open reduction would be required. Therefore, the plan for postoperative immobilisation was for use of an abduction pillow. A problem arose when [Master A] had a further hip X-ray on 29 April 2022. This was three and a half weeks prior to the surgery date. It was found on that X-ray that the right hip was dislocated. This meant that the surgical plan had to be changed to include potential open reduction of the right hip and, as mentioned previously, it would be standard practice to provide some type of immobilisation, probably using a spica cast, after such surgery. When the consent form was signed on the morning of surgery, [Dr B] placed on the consent form the possibility of open reduction and the possibility of application of a spica cast. The parents signed that consent form. It is not apparent from any of the notes how much discussion occurred around the pros and cons of application of a spica cast. [Master A]'s parents have indicated their belief was that a spica cast was very unlikely and that they had not had the opportunity to discuss the risks and

	possible alternatives. I am not aware of what [Dr B] may have said at the time about the use of a spica cast. The response to the complaint included the statement: '[Dr B]'s perception was that the conversation on alternative options had been discussed and understood by both parents when the consent form was read and signed. He apologised for not realising that in the consenting process, there had been assumptions made by him regarding the understanding of the parents for the potential to change from the wedge to spica casting during surgery.' A reasonable discussion about the pros and cons of a spica cast for [Master A] as the form of immobilisation following his surgery, would in my opinion, probably take about 30–45 minutes. My expectation is, had that discussion occurred, [Master A] would not have been placed in the spica cast as he was, but some modification or alternative would probably have been decided upon. In the postoperative period, the family did not appear, from the records available, to have complaints about the use of a spica cast specifically for immobilisation, but more some complaints about the weight of the cast. Even in the early postoperative period, there was an opportunity to continue discussion around risks versus benefits of a spica cast and there was potential to change to an alternative. Those concerns were not raised with [Dr B] and hence [Master A] remained in his spica.
What was the standard of care/accepted practice at the time of events? Please refer to relevant standards/material.	The consent process in relation to the surgery cannot be faulted, but the question asked was what was the standard of consent in relation to the postoperative immobilisation. The evidence available to me suggests there was minimal discussion to indicate the probability of use of a spica cast once the X ray of 29 April 2022 had shown the dislocation and minimal discussion of risks and alternatives. There is an extensive policy document from Waikato Hospital stating requirements of the consent process. Included in that document are the statements relating to expectations: '-an explanation of the options available for treating their condition – important details of each option including an assessment of the expected risks, side effects, benefits, and costs of each option and any alternatives to the particular treatment proposed'

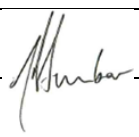
	'- allow time for the patient to ask questions and digest the information. In some cases this may involve giving the patient an opportunity to "sleep on it" and respond at a later time' These requirements were met in relation to the surgery but do not appear to have been met in relation to the use of the spica cast.
Was there a departure from the standard of care or accepted practice? • No departure; • Mild departure; • Moderate departure; or • Severe departure.	The lack of discussion in relation to use of a spica cast in my opinion represents a moderate departure from standard of care in the context of this particular case.
How would the care provided be viewed by your peers? Please reference the views of any peers who were consulted.	My opinion, and I believe it would be consistent with that of my colleagues, is that [Master A]'s story represents a very unfortunate sequence of events. If he had not become unwell, the issues around the use of the spica cast would probably not have been raised as they have been. It is common practice, but not necessarily ideal, to sign the consent form on the day of surgery. There are several problems with this: 1. There is time pressure and little time for in-depth discussion about pros and cons of aspects of the care. 2. The surgeon is often focused on the technical aspects of the forthcoming surgery, which may be quite demanding. He or she is less likely to be very focused on what might be considered routine, as for example, the form of immobilisation used at the end of the case. 3. The parents are often more focused on the child surviving the procedure and similarly may not be as focused on what comes afterwards and may not, at the time of consent taking, be thinking in terms of the risks of immobilisation by particular means. It seems also that if the parents were very worried about the cast they might have asked in the postoperative period about some of the risks involved in [Master A] remaining in the cast.

	My understanding is that the concerns were more about the weight and bulk of the cast rather than other risks to his health.
Please outline any factors that may limit your assessment of the events.	I am not aware of what exactly was discussed at the time of the consent signing, nor do I have a complete record of all the discussion which occurred between [Dr B] and [Master A]'s family prior to or after his surgery. Therefore, my comments are based on the information available to me and some inference.
Recommendations for improvement that may help to prevent a similar occurrence in future.	Firstly, I believe that the discussion involved in obtaining consent for surgery and the signing of that consent should occur at a time before the day of surgery in complex cases such as [Master A]'s. This would help reduce the impact of the factors listed above related to day-of-surgery consenting and provide a better and less pressured opportunity to ensure that all concerns of the parents/patient were addressed adequately. Caring for a child in a spica cast is difficult and unfamiliar for parents. Some enhanced education, both preop and postop would assist this process. Such education might include photos of a child in a spica, a doll in a spica and a designated staff member to provide practical advice.

Question 5: Any other matters in this case that you consider warrant comment.	
List any sources of information reviewed other than the documents provided by HDC	No other information sources were reviewed.
Advisor's opinion	Some general comments can be made from impressions gained on reviewing this case. The period from 1 June to 4 June, during which [Master A]'s condition was deteriorating, appeared to be a crucial time. [Master A]'s care was managed in this period by registrars and house officers without a consultant of any discipline seeing [Master A]. There were several potential problems associated with this: 1. Whilst the doctors were generally moving in the right direction in caring for a child with sepsis, they were moving slowly and I suspect did not fully appreciate the increasing seriousness of [Master A]'s condition and hence did not escalate concerns as a consultant may have. The fluctuations and variations in [Master

	A]'s clinical appearance most likely made it more difficult for the staff to appreciate what was happening. 2. Part of the difficulty in appreciating [Master A]'s condition was probably related to not knowing [Master A] well, particularly the impact of his comorbidities such as neutropenia on his response to illness. The people who knew him best were his parents and [Dr B], [Dr C] (paediatrician) and Dr [H] (paediatric anaesthetist). Unfortunately, none of these consultants actually saw [Master A] during this time. [Dr B] was in phone contact but could only respond to the information presented to him. There was quite clearly a problem for the parents, knowing [Master A]'s response to illness, in having their concerns fully addressed, given the subsequent complaint. 3. There are some decisions that a registrar or house surgeon would be reluctant to make. This includes removing a spica cast in a child known to have a potentially unstable hip when the consultant has considered the spica necessary. This reluctance probably influenced the failure to assess [Master A]'s skin condition thoroughly. In addition, phoning an ICU consultant or anaesthetist directly with concerns about [Master A]'s ventilatory capacity would be unlikely to be considered at an early stage. Such concerns would usually be passed through the consultant of the caring team first. There appeared to be times when [Master A] needed prompt attention where it was not clear to the nursing staff who should be called; whether that be the orthopaedic team or paediatric medicine team. This reflects some lack of clarity regarding which service was fulfilling the role of prime responsibility for [Master A]'s care. This role was possibly assumed by the paediatricians, but it was not clear. There appear to have been instances leading up to [Master A]'s admission to ICU where the mandated responses to elevated PEWS scores were not followed exactly. In general, I have the impression the medical and nursing staff were doing their best for [Master A], allowing for the level of experience and knowledge of the staff. Nevertheless, more direct consultant input would have been appropriate. It is very unfortunate that neither [Dr C] nor Dr [H] was aware of [Master A]'s problems, and [Dr B], I suspect, was only partly aware.

What was the standard of care/accepted practice at the time of events? Please refer to relevant standards/material.	As mentioned above, an accepted standard of care, I believe, would involve direct consultant input to [Master A]'s care during the time he was not seen by a consultant. Better definition of who was primarily responsible for his care would have been appropriate. The nursing staff should ideally not be confused about who to call or when medical staff should be called. The nursing staff should also be expected to carry out the responses listed according to the PEWS.
Was there a departure from the standard of care or accepted practice? • No departure; • Mild departure; • Moderate departure; or • Severe departure.	I consider the lack of direct consultant input for a period of time, the lack of clear primary responsibility for [Master A]'s care and the variable response to elevated PEWS scores to be mild to moderate departures from an ideal standard of care. It is possible that, even if there had been more consultant input, [Master A] may still have followed a similar course, given the difficulties the medical staff appeared to have in assessing his true state.
How would the care provided be viewed by your peers? Please reference the views of any peers who were consulted.	I believe my peers would have similar opinions. I expect the HDC will have asked the opinion of other reviewers in these matters and my opinion can be compared with theirs.
Please outline any factors that may limit your assessment of the events.	My comments are made from remote observation from afar and by inference. It should be recognised that, on the vast majority of occasions, medical staff try to make the best decisions they can at the time, based on the current circumstances. It is not always easy to predict the future course of events, but clinical experience is helpful in that regard.
Recommendations for improvement that may help to prevent a similar occurrence in future.	I understand from Waikato Hospital's response that measures have been put forward to address the issues raised. Clear guidelines around responsibility for care in complex cases involving different teams could be established. Some guidelines for consultant involvement may help and some further education and clarification of responses to high PEWS scores would be appropriate.

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: Dr John Dunbar
Date of Advice: 13 November 2025

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Appendix B: Independent clinical advice to the Commissioner

The following independent advice was obtained from Dr John Garrett, Consultant Paediatrician:

'**Independent clinical advice to Health and Disability Commissioner**

Complaint:	**[Master A] /Health New Zealand | Te Whatu Ora – Waikato District**
Our ref:	**22HDC02430**
Independent advisor:	**Dr John Garrett**

I have been asked to provide clinical advice to HDC on case number 22HDC02430**.** 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	FRACP 2009 MBChB 1998 BMedSci 1998 General Paediatrician Medical Advisor to the Health Quality & Safety Commission for the National Paediatric Early Warning System 2021–2023 Member of the Health Quality & Safety Commission Sepsis Technical Advisory Group 2023–present
Documents provided by HDC	1. Letter of complaint dated 30 September 2022 2. Health New Zealand's response dated 23 December 2022 3. Clinical records from Health New Zealand covering the period January 2022 to July 2022
Referral instructions from HDC	Health New Zealand | Te Whatu Ora – Waikato District **1. Overall care planning and coordination** Was the planning and coordination of [Master A]'s care – both preoperatively and postoperatively – appropriate for his complex needs, including whether a formal multidisciplinary care plan should have been in place? **2. Clinical management and monitoring** Was the postoperative management of fluids, electrolytes, and monitoring (including PEWS scores, blood pressure, and documentation) consistent with accepted practice, and were any omissions significant? **3. Postoperative fluids and oedema** Was the fluid and electrolyte management appropriate following surgery, particularly in relation to the development of oedema and scrotal swelling; was the attribution to fluid

	overload reasonable; and was the paediatric monitoring/response adequate? **4. Recognition and response to clinical deterioration** Were sepsis and other signs of deterioration (including rash and skin breakdown) recognised and managed in a timely and appropriate manner, and should escalation have occurred sooner? **5. Systemic and organisational factors** Are the changes implemented by the provider (alerts, care plans, Korero Mai, sepsis education) sufficient to address the issues identified, and would access to a paediatric high-dependency unit have likely improved [Master A]'s care? **6. Any other comments you wish to make.**

Factual summary of clinical care provided complaint

Brief summary of clinical events	**Synopsis** [Master A] was aged 6 years and 10 months when he underwent elective surgery in Waikato Hospital to manage bilateral unstable hips. He has a complex medical background resulting from an undefined neurodevelopmental disorder, which is associated with global developmental delay, cerebral palsy, visual impairment, epilepsy, constipation, and a low neutrophil count. His seizures are difficult to control and require treatment with medications, including steroids, and a therapeutic ketogenic diet. [Master A] was managed on the paediatric surgical ward from 24 May, but because of a clinical deterioration was transferred to the ICU at Waikato Hospital on 6 June, then to the Paediatric ICU at the [specialist paediatric hospital] on 8 June. He required treatment for multiorgan failure, and this treatment included mechanical ventilation (a machine to breath[e] for him), inotropic support (medications to support his circulation), and dialysis (a machine to support his kidneys). He was transferred back to Waikato Hospital on 7 July and was discharged on 13 July. **Complaint** [Master A]'s mother [Mrs A] made a complaint to HDC on his behalf. The complaint covered several areas of [Master A]'s care, including the application of a Spica cast, which his parents did not expect, and which they felt should have been discussed with them at the time a decision was made to use it (during [Master A]'s operation). In addition, there were concerns about [Master A]'s postoperative care, including fluid retention, unmanaged pain, failure to check the condition of [Master A]'s skin, and not recognising and responding to the signs of deterioration that eventually led to him requiring treatment in the Paediatric ICU at the [specialist paediatric hospital]. Throughout the complaint, [Mrs A] described multiple occasions where she expressed her concern about

	[Master A]'s condition to the medical and nursing staff caring for him but was ignored. She was also concerned about the coordination of [Master A]'s care, and specifically the lack of direct oversight of his progress by his surgeon. **Provider Response** The provider response included a timeline and summary of [Master A]'s care from the initial consultation with his orthopaedic surgeon regarding his hip subluxation (thigh bone moving out of the hip joint) through his admission for surgery on 24 May, and transfer to the [specialist paediatric hospital] on 8 June. It provided rationale for some of the decisions made around [Master A]'s care. Some of this rationale may be based on subsequent discussion with the staff involved, rather than solely what is recorded in the notes. While there is some acknowledgement in the provider response and in the clinical notes of parental concern, this is significantly less than that described in the complaint. The notes record several episodes where [Master A]'s parents were said to be happy with his progress. Specific detail is included about the informed consent process, and the decision to change to a hip spica for post operative immobilisation. It is apparent that there is a difference in understanding of these two processes between the provider and the complainant. The provider acknowledged shortcomings in the provision of shared care for [Master A] and discussed some options being considered for how this might be done in the future. A description of issues related to the management of postoperative pain and fluid overload was provided, including involvement of the pain team, and paediatric surgery. The sequence of events that led to [Master A]'s deterioration and admission to ICU was discussed in detail, including shortcomings in the recognition of, and response to, his deterioration. Issues in relation to the MRI scan, removal of the hip spica, and delay in identifying the state of [Master A]'s skin were discussed, as was the clinical significance of his neutropenia. The provider was asked to discuss whether an Advanced Care Plan was considered. I wonder if what was meant in the questions raised by HDC was a Multidisciplinary Care Plan. An Advanced Care Plan is usually used to communicate limitations to treatment in the setting of a life-limiting condition. The provider response concludes with a list of the actions taken to address issues raised in the complaint.

Question 1: Overall care planning and coordination: Was the planning and coordination of [Master A]'s care – both preoperatively and postoperatively – appropriate for his complex needs, including whether a formal multidisciplinary care plan should have been in place?	
List any sources of information reviewed other than the documents provided by HDC	Good Medical Practice – Medical Council of New Zealand. Accessed 2 December 2025 College of Intensive Care Medicine or Australia and New Zealand. Guidelines on Standards for High Dependency Units for Training in Intensive Care Medicine. Accessed 4 December 2025 A Review of Progressive, High Dependency and Intensive Care for Children at Christchurch Hospital. October 2014. (appended)
Advisor's opinion	After [Master A] was identified as needing an orthopaedic procedure, there was communication between his paediatrician [Dr C], his surgeon [Dr B], and his anaesthetist Dr [H] that included consideration of [Master A]'s complex medical background. The Anaesthetic Care Plan documents [Master A]'s medical background, current management, and possible perioperative issues and their management. Although it is not a multidisciplinary care plan, it represents good preoperative planning and coordination. Following surgery, [Master A] was admitted to the paediatric surgical ward under [Dr B]. The first entry in his clinical notes appears to be from before he was admitted to the ward and relates to a plan for managing his therapeutic ketogenic diet postoperatively. It does not include a summary of his background or current treatment or refer to the availability of advice from his therapeutic ketogenic diet dietitian in the [specialist paediatric hospital]. Subsequently, there does not appear to be an admission note that 'sets the scene' for [Master A]'s care on the ward. Medical entries in [Master A]'s notes were made by the pain management service, and the orthopaedic and paediatric teams, as well as one review by paediatric surgery. Most were in relation to postoperative issues that arose, which included pain, oedema – including significant scrotal oedema – fluid balance, anaemia requiring blood transfusion, seizures, and fever, and document a management plan for whichever issue was being addressed. On occasion there is reference to seeking input from another service, and the first time this occurs is in [Dr B]'s ward round note on the first postoperative day where he includes paeds med input in his plan. This occurred later that day when [Dr C] reviewed [Master A]. Communication between specialities occurred on several other occasions during [Master A]'s admission, but it was not apparent from

	the notes that one team or service was responsible for coordinating [Master A]'s care overall. On the ninth postoperative day, an entry by the paediatric registrar includes "no further paediatric input" in the plan, suggesting that paediatric medicine were not the lead team in [Master A]'s care. Paediatric medicine did, however, continue to be involved due to a change in [Master A]'s condition. The limitation to my assessment here is that the information provided to me does not capture communication that occurred between staff, but which is not recorded in the clinical notes. For example, it is likely that the teams involved would have a formal handover meeting, usually at least twice a day, where each patient's condition, progress, and potential issues are discussed. It is also common for senior doctors to be updated on a regular basis by their junior staff as to patient progress, but doing so may not be recorded in the notes.
What was the standard of care/accepted practice at the time of events? Please refer to relevant standards/material.	The following standards are from the Waikato Hospital Children's Inpatient Standards of Care: *7.3 Health services admitting children and adolescents should use a risk assessment strategy to ensure that safe staffing levels (and adequate facilities and equipment) are in place to meet the safety and care needs of children.* *7.5 Health care practitioners must have systems that promote continuity and co-ordination of care between the speciality areas. As an absolute minimum, any health service admitting children and adolescents must have access at all times to a resource person with paediatric clinical experience and expertise.* The following statements are from Good Medical Practice and relate to continuity of care: *50. Work collaboratively with colleagues to improve care, or maintain good care for patients, and to ensure continuity of care wherever possible.* *51. Make sure that your patients and colleagues understand your responsibilities in the team and who is responsible for each aspect of patient care.* *52. If you are the patient's principal health provider, you are responsible for maintaining continuity of care.*

Was there a departure from the standard of care or accepted practice? • No departure; • Mild departure; • Moderate departure; or • Severe departure.	In relation to the Children's Inpatient Standards of Care, I cannot make a comment about standard 7.3 as there is no detail in the material available to me that describes the facilities available or staffing levels, but there is no specific mention of a required resource not being available when required. In regard to Standard 7.5, there was no departure in regard to preoperative planning and coordination but a moderate departure for postoperative coordination of care. The hospital standards outline an expectation that there will be a system to ensure continuity and coordination of care, and the mitigating factor for the staff involved is that the organisation has not defined what that system should be. A multidisciplinary care plan would have been useful in this regard, along with a comprehensive admission note.
How would the care provided be viewed by your peers? Please reference the views of any peers who were consulted.	I think this situation will be easily recognisable to peers as being relatively common, particularly when a patient's condition becomes more complex during their admission. There would be a general expectation that at some point deliberate coordination between teams would have occurred.
Please outline any factors that may limit your assessment of the events.	Because the notes generally record the fact that communication between teams happened, rather than the content of that communication, it is not possible to be certain as to whether effective communication was happening.
Recommendations for improvement that may help to prevent a similar occurrence in future.	1. Develop a procedure in relation to shared care of complex patients. It should include, as far as possible, a description of how to identify which patients need shared care, either before they are admitted, or if their care becomes more complex during an admission. In addition, there should be structure in terms of documenting shared care, which could include a multidisciplinary care plan at admission, daily problem-based summaries, and comprehensive summaries prior to a weekend or public holiday. Complex patients undergoing shared care should be identified at shift handover, although it is likely to be very difficult to coordinate multiple specialities attending the same handover. 2. Consider changes to the care environment that may support shared care, particularly for children who are medically complex. My suggestion would be to consider opening a Paediatric High Dependency Unit. This physical location would form the basis for better coordination between teams, increased nursing and medical competence, a suitable physical environment,

	and a working relationship with the ICU. The standards set out by the College of Intensive Care Medicine outline the requirements for such a unit, and a review conducted at Christchurch Hospital in 2014 prior to the development of a Paediatric High Dependency Unit there would be informative. 3. Review the current clinical handover process to ensure it is effective. The resources available here may be helpful.

Question 2: Clinical management and monitoring: Was the postoperative management of fluids, electrolytes, and monitoring (including PEWS scores, blood pressure, and documentation) consistent with accepted practice, and were any omissions significant?	
List any sources of information reviewed other than the documents provided by HDC	Health Quality & Safety Commission Paediatric Early Warning System. Accessed 4/12/25
Advisor's opinion	Given that question 3 relates to postoperative fluid and electrolyte management, and to avoid duplication, responses to this question will focus on the other aspects of postoperative monitoring. The two components of the PEWS are recognition (plotting physiological observations on a vital signs chart and calculating a PEWS score) and response (an escalation pathway based on the PEWS score, whānau, or clinician concern). In general, the higher the PEWS score, the higher the risk of deterioration, and therefore the higher the level of escalation. The frequency of routine observations is usually determined by a nursing observation and monitoring policy and is adjusted according to the patient's condition, including their PEWS score. It is generally accepted that, as PEWS is not completely sensitive and specific for detecting patient deterioration, care can also be escalated based on clinical concern, regardless of PEWS score. **Adequacy of observations** Observations were recorded throughout [Master A]'s admission, and for the most part are of reasonable quality in terms of frequency and completeness. They seem to be completed accurately, with occasional errors in plotting and PEWS score calculation. Notable exceptions to this: 1. Extended periods without measurement of blood pressure, the most significant being between 8am on 5 June where the systolic BP was 109mmHg, and 3.30pm on 6 June where it had fallen to 87mmHg.

	This was during the time where he has become febrile and had developed a significant tachycardia, with elevation of his PEWS score to a maximum of 10. 2. Three sets of observations where parental concern was noted, which contrasts with the frequency with which family members, in their complaint, expressed raising concerns. 3. No method for indication that a calculated PEWS score was from an incomplete set of observations. **Escalation response** During [Master A]'s admission there were a number of instances of elevated PEWS score for which there did not appear to be an escalation response, for example on 27 May there were three episodes of PEWS scores of 4. Higher PEWS scores did seem to result in a response, for example on 4 June at 7am the PEWS score was 6 and paediatric medical review was requested and occurred within 20–40 minutes, and later that day at 1.15pm there was a PEWS score of 7 that generated a timely response from the nurse and paediatric registrar. On 6 June the nursing entry from 2.25pm documents the difficulty the nurse had finding a doctor to review [Master A] for an elevated PEWS score and other concerns. This included a 30-minute delay before being able to contact the orthopaedic registrar, who recommended calling the paediatric registrar, before a second paediatric registrar came to review [Master A]. While the PEWS chart recommends that parental concern is escalated to the nurse in charge, this did not happen for the times that parental concern was document in the nursing notes. There was, however, usually some documentation of the action taken to address the parental concern. **Documentation** While there was documentation in the nursing and medical notes of PEWS score escalations and the response to them, there was only one time where this involved the use of the EWS Activation Sticker, and no examples of escalation being documented on the PEWS chart in the area allocated for this. The medical reviews that occurred in response to an elevated PEWS score usually did not include specific information regarding ongoing monitoring requirements or the criteria that would warrant further review.

	The comments made in pages 15 and 16 of the complaint response provide further detail about whether escalation pathways were followed, and I agree with them.
What was the standard of care/accepted practice at the time of events? Please refer to relevant standards/material.	A PEWS was in place across New Zealand at the time of [Master A]'s admission. Several different versions were in use, based on locality, prior to the national PEWS being published by the Health Quality & Safety Commission in March 2023. Waikato had an Early Warning Scoring System for the Deteriorating Patient procedure, which was a general procedure relating to the adult, maternity and paediatric early warning systems. Included with the complaint response was a copy of the Canterbury DHB Early Warning Score procedure, most likely because the Waikato PEWS was based on one developed in Canterbury. Specific guidance in Waikato relevant to this review includes the following: 1. Parental concern should be escalated to the nurse in charge (PEWS chart) 2. For all situations when escalation is required, place a EWS activation sticker in the patient's clinical record at the time of the request for medical and/or Clinical Resource Nurse as the 'Patient at Risk' review (EWS Procedure Waikato) 3. All staff (Medical and Clinical Resource Nurse) responding to a patient escalation, based on an EWS trigger must complete the response section of the EWS Activation Sticker (EWS procedure Waikato) 4. Following a clinical review, an EWS may be modified to tolerate "abnormal" vital signs based on the patient's clinical condition and expected outcome (EWS procedure Waikato). Note that there is also advice relating to modification of EWS triggers for patients with normally abnormal vital signs
Was there a departure from the standard of care or accepted practice? • No departure; • Mild departure; • Moderate departure; or • Severe departure.	There was a moderate departure from the standard of care in relation to the use of the PEWS. There were delays in escalation for significantly elevated PEWS scores, which were occurring in conjunction with evolving clinical signs, and the significance of this is discussed under question 4. There were also periods of time where blood pressure was not measured but where doing so could have contributed to the overall understanding of [Master A]'s illness.
How would the care provided be viewed by your peers? Please	Most clinicians using the PEWS would recognise the difference between the ideal practice of following

reference the views of any peers who were consulted.	escalation pathways every time they are triggered and the reality that they are often not. There are likely to be a number of different reasons this occurs, including but not limited to workload of the responders, the high PEWS score being explained by a condition less likely to lead to deterioration, eg, bronchiolitis, or an effective treatment plan already being in place. It is worth noting that, in audits of the PEWS across New Zealand, blood pressure is the most common physiological variable to be omitted from a set of observations. Reasons for this may include perceived or actual difficulty in obtaining a blood pressure measurement from a child, and a misunderstanding that measurement of blood pressure does not contribute to the ability to estimate the risk of deterioration in an unwell child. In recognition of this, when the Health Quality & Safety Commission developed a national PEWS, they provided a rationale for the importance of measuring blood pressure and guidance on how to correctly obtain a blood pressure in a child. This information was not published until after the events that led to this complaint.
Please outline any factors that may limit your assessment of the events.	For the observations charts relevant to the dates 24–31 May, only the vital signs charts were provided. The pages from these charts where escalations would have been documented were not included. No nursing observation and monitoring policy was provided, so it is difficult to know what the expected frequency of observations is for particular clinical situations, outside of those defined by the PEWS escalation pathways.
Recommendations for improvement that may help to prevent a similar occurrence in future.	1. Ensure that the National Paediatric Early Warning System, including the 2025 vital signs update, has been implemented in Waikato Hospital. 2. Conduct an audit to measure the frequency of blood pressure measurement, recording of whānau concern, compliance with escalation pathway actions, and documentation of escalations. 3. Utilize the resources provided by HQSC, and local education processes, to address any issues raised by the audit in 2. This should include the education resources, some of which specifically relate to blood pressure, to make sure nursing and medical staff have received education on PEWS. 4. Update the Waikato EWS guideline so that modifications to the PEWS score are not made for abnormal vital signs related to an acute illness. The

	reasoning for this is provided in the HQSC National PEWS supporting documents. 5. Consider implementing electronic observation charts.

Question 3: Postoperative fluids and oedema: Was the fluid and electrolyte management appropriate following surgery, particularly in relation to the development of oedema and scrotal swelling; was the attribution to fluid overload reasonable; and was the paediatric monitoring/response adequate?	
List any sources of information reviewed other than the documents provided by HDC	The [specialist paediatric hospital] Child Health Clinical Guideline – Intravenous Fluids. Published 13/10/21. (appended)
Advisor's opinion	[Master A] was normally fully gastrostomy fed with a formula consistent with his therapeutic ketogenic diet. He has a weight at admission of approximately 28kg. His anaesthetic assessment identified specific fluid issues in relation to his therapeutic ketogenic diet that would need to be managed in the perioperative period, including limiting his exposure to glucose, monitoring blood glucose and ketones, using a threshold of 2.5mmol/L to signify hypoglycaemia, and restarting enteral feeds soon after surgery. [Master A] received the following fluid volumes in the peri- and postoperative period, with the volumes being daily totals, which include his feed and flushes, intravenous fluids, and epidural fluid. D1 2510ml, including 2440ml in theatre D2 2559ml, including red blood cells. IV fluid at 20ml/h D3 1614ml D4 2092ml, including red blood cells 300ml D5 1320ml, epidural stopped. In the postoperative period, [Master A] developed significant oedema, including scrotal oedema, but also signs of generalised oedema. This required treatment with intravenous frusemide before eventually resolving. The presence of oedema may have contributed to [Master A]'s deterioration with sepsis if it was antecedent to his skin breakdown and infection, and his lower respiratory tract infection, but it is not possible to be certain of this. Scrotal swelling was first mentioned on postoperative day four in the nursing notes, and during an anaesthetic review the following day, which led to a referral to paediatric

	surgery, where the opinion was that it represented postoperative oedema and was not felt to be related to the hip spica. A review by paediatric medicine during day five noted generalised oedema in addition to the scrotal oedema, and a positive fluid balance, and concluded that the oedema was related to fluid overload, with a plan to give frusemide. A further paediatric review on postoperative day 6 regarding oedema and fluids, while difficult to read due to legibility, also seems to conclude that there was significant fluid overload, exacerbated by low albumin. The possibility of giving further frusemide and albumin was raised, but the decision was to not administer these. By postoperative day eight, the fluid overload was thought to be improving. Fluid management in a complex surgical patient can be complicated. While it is possible to estimate the daily fluid requirements for a 28kg child (1120ml, representing 70% of calculated maintenance), many other factors determine whether this starting point will be adequate. These include, for example, postoperative fluid shift, renal function, nutritional status, activity level, and temperature. It is also important to recognise that fluid requirement and nutritional requirement for children who receive liquid nutrition are not equivalent. As such, the general principle of fluid management is to choose a sensible starting point, then make adjustments following review, which would include clinical assessment (hydration status and signs of fluid overload, urine output and fluid balance, weight change, and laboratory assessment (electrolytes and renal function, albumin level). Sometimes, competing processes make achieving ideal fluid management difficult, such as the need to maintain adequate intravascular volume in the setting of significant fluid shift driven by a postoperative inflammatory response. [Master A] received significantly more fluid than his estimated daily requirement in his first four postoperative days. Avoiding this increased volume was difficult in that he needed to have his feeds restarted early to maintain his ketotic state, he had an epidural running, and he needed to have two blood transfusions. It was also a reasonable expectation that there would be a degree of fluid shift in response to the surgery he had. I note that his intravenous fluid once he returned to the ward was running at 20ml/h and was stopped the day after his surgery. His fluid status was being monitored by daily fluid balance charts, which look to be complete, and his urine output was able to be measured accurately as he had an indwelling catheter in place. It was not possible to weigh him due to

	the hip spica. The medical notes seem to include some assessment of whether he was adequately hydrated, but there does not appear to be much consideration given to the potential for fluid overload. A registrar assessment on postoperative day three notes a positive fluid balance on 1328ml the day before, concluded that he was well hydrated, and that he didn't need additional fluids. It is only after the development of significant oedema that his elevated fluid volumes and positive fluid balance in the days after surgery were recognised. Reducing the fluid volume that [Master A] received postoperatively would have been difficult. He did not seem to need the 20ml/h of intravenous fluid he received, but this was stopped on the day after his surgery and contributed a relatively small amount to his total fluid input. It may have been reasonable to give him frusemide earlier than he eventually received it, but this would have required careful monitoring of his intravascular status. Once it became obvious [Master A] had oedema secondary to fluid overload, frusemide was given with good effect. At this point, it may have also been reasonable to give him an albumin infusion.
What was the standard of care/accepted practice at the time of events? Please refer to relevant standards/material.	The accepted practice for fluid management is reflected in a number of clinical guidelines, including the [specialist paediatric hospital] Guideline, which was available to Waikato staff at the time of [Master A]'s admission. No one fluid prescription will suit all patients, so the general approach to fluid management is to choose an initial composition and rate of fluid, then undertake regular clinical reassessment so that adjustments can be made to meet the needs of an individual patient. The frequency and nature of the reassessment also need to be tailored to the clinical situation and as such requires a degree of critical thinking. In some situations, assessment of fluid balance is required every six hours.
Was there a departure from the standard of care or accepted practice? • No departure; • Mild departure; • Moderate departure; or • Severe departure.	Regarding fluid management, there was a moderate departure from the accepted standard in that in the first several postoperative days there did not appear to be a deliberate assessment of his fluid management. There was an opportunity to recognise that his requirement for enteral feeds, epidural analgesia, and blood transfusions was resulting in a significant positive fluid balance and putting him at risk of fluid overload. In mitigation, there was limited opportunity to reduce his fluid input or to monitor fluid balance by daily weight measurement (due to [Master A] being in a cast). However, earlier administration of frusemide and albumin could have been considered. This

	would have required careful monitoring to ensure there was not a negative effect on intravascular volume.
How would the care provided be viewed by your peers? Please reference the views of any peers who were consulted.	It is understood that fluid management, especially in a complicated patient, is a complex and dynamic process, which at times may lead to issues such as fluid overload, even with optimal management. It is difficult to find clear guidelines for the use of interventions such as frusemide and albumin, and different clinicians may weigh the risks and benefits differently. There should, however, be a clear record in the patient notes that their fluid status is being assessed, and the reasoning behind fluid management should be apparent.
Please outline any factors that may limit your assessment of the events.	I have not been provided with a full set of laboratory results, only those that are mentioned in the clinical notes, so it is not possible to determine whether these were monitored in accordance with fluid guidelines.
Recommendations for improvement that may help to prevent a similar occurrence in future.	1. Develop a local fluid management guideline that could form the basis for educating medical staff on issues relating to fluid management, including identifying and addressing fluid overload.

Question 4: Recognition and response to clinical deterioration: Were sepsis and other signs of deterioration (including rash and skin breakdown) recognised and managed in a timely and appropriate manner, and should escalation have occurred sooner?	
List any sources of information reviewed other than the documents provided by HDC	International Consensus Criteria for Paediatric Sepsis and Septic Shock. Published 22 Jan 2024. Accessed 7 Dec 2025.
Advisor's opinion	I will address the recognition of clinical deterioration and sepsis but not rash and skin breakdown. These latter issues are important, and while it is possible their occurrence was in part a consequence of generalised oedema in a child in a hip spica, and that they were a potential source of infection, I do not have adequate knowledge of the risks associated with a hip spica, or the expected standard of care and monitoring when one is used, to make comment. An opinion from a paediatric orthopaedic surgeon and/or an orthopaedic nurse may be helpful. The recognition of children who at risk of or are developing sepsis is difficult. There is no clinical tool that is completely reliable for completing this task, but a combination of critical thinking to consider the possibility, screening for suggestive signs or symptoms, and starting treatment early are likely to improve morbidity and mortality. At the time of [Master A]'s admission, the tools available included clinician assessment,

	the PEWS, and the Sepsis Trust Paediatric Sepsis Screening and Action Tool. The first mention in the notes in relation to possible infection is a paediatric medical entry from 1 June, the eighth postoperative day, noting that nursing staff had been concerned about fevers the night before, and [Master A]'s dad had been concerned about the possibility of a urinary tract infection given he still had an indwelling catheter in place. No elevated temperature was recorded on the observation chart around this time, the PEWS score remained low, and septic workup was felt to be unnecessary as [Master A]'s temperature was normal. On 3 June, a further paediatric medical review noted low-grade temperatures (a term usually used to describe a temperature that is elevated above normal, but not above the threshold to meet the definition of a fever) and that the C-reactive protein (CRP) had risen from 90 to 140. CRP is a blood test for a non-specific marker of inflammation and, as such, cannot be reliably used to diagnose infection or differentiate a bacterial from a viral infection, and it may become elevated after surgery. However, a rise in CRP on postoperative day 10 is less likely to have been as a result of [Master A]'s surgery. There was no impression given at this time, but infection was likely to have been considered as a chest X-ray (to look for pneumonia) and midstream urine (to look for urinary tract infection) were requested. A review by the Orthopaedic Team shortly after this also seemed to give consideration to the possibility of an infection as the plan made included an MRI scan to look for an epidural site infection (around the catheter that was delivering pain relief into [Master A]'s lower back), and removal of the hip spica to assess the surgical wounds. The CRP was noted to have increased further, and a plan was made that if [Master A] became febrile, he would need a blood culture (to look for bloodstream infection) and consideration of antibiotics. Overnight into the 11th postoperative day, the nursing notes mention episodes of coughing, desaturation (oxygen levels falling) requiring supplemental oxygen, tachycardia (fast heart rate), drowsiness, and maternal concern. A review by the Paediatric House Officer occurred at 7.44am, and while no diagnosis or differential diagnosis were recorded, a plan was made to take a blood culture and start antibiotics. If [Master A] had been screened at this point, he would have met the criteria for Red Flag Sepsis, and it would have been appropriate to start the Sepsis 6 pathway. If this had occurred, actions in addition to the treatment he received could have included informing a senior clinician, administering a fluid bolus, early reassessment, and

	consideration of inotropes (medications to support cardiac output) depending on progress. Using the term Red Flag Sepsis is designed to improve communication around the seriousness of a patient's condition. The first person to use the term sepsis to refer to [Master A]'s condition was the anaesthetist who managed him during his MRI; however, this also did not result in a Sepsis 6 response, and in fact there was a modification made to his observation chart to accept a heart rate less than 190 beats per minute. A review in one hour was requested of the orthopaedic house officer. [Master A] was reviewed several times over the next two days, and while his clinical state was felt to be stable, his PEWS score remained high, his CRP rose to over 400, and he developed renal impairment (a decrease in the filtering function of his kidneys). He eventually had an acute deterioration on postoperative day 13 and was transferred to Waikato ICU, then subsequently to the [specialist paediatric hospital] PICU. The diagnosis of septic shock was confirmed by [Master A] having a Phoenix Sepsis Score of at least 6 and scoring ≥1 for cardiovascular status. He needed mechanical ventilation (use of a breathing machine), inotropic support (medications to support blood pressure) and renal-replacement therapy (dialysis) but did recover and was eventually able to be transferred back to Waikato Hospital, then discharged home.
What was the standard of care/accepted practice at the time of events? Please refer to relevant standards/material.	The PEWS and the Sepsis Trust Paediatric Sepsis Screening and Action Tool were in place at Waikato Hospital, and the accepted clinical guideline was the [specialist paediatric hospital] Sepsis Guideline.
Was there a departure from the standard of care or accepted practice? • No departure; • Mild departure; • Moderate departure; or • Severe departure.	The lack of timely recognition and response to [Master A] developing sepsis represents a severe departure from accepted practice. A number of different clinical staff showed a lack of critical thinking in that they were instituting management for possible infection but not including sepsis in their differential, despite there being enough clinical information to diagnose Red Flag Sepsis. When sepsis was correctly diagnosed following his MRI, the Sepsis 6 pathway was not started, and further management responsibility was transferred to a junior doctor. Paediatric and ICU SMO review, and transfer to ICU would have been appropriate at this time.
How would the care provided be viewed by your peers? Please	Many children experience an illness caused by an infection of some kind, but very few of them have sepsis, and the difficulty in detecting it is well recognised.

reference the views of any peers who were consulted.	As explained above, the tools that have been developed to help recognise and respond to sepsis are not perfect, and when applied they will – a proportion of the time – suggest a patient does have sepsis when in fact they do not. This is usually called the false-positive rate, a form of false alarm. As the initial treatment of sepsis involves significant resources, including the administration of antibiotics, and is not risk free for patients, clinicians face a real dilemma when considering initiating treatment. In addition, when sepsis evolves while the patient is being managed for another condition, the switch to managing red flag sepsis can seem very sudden and dramatic. For [Master A], however, it did seem that those involved in looking after him recognised that something was happening, that it involved infection, and he was in fact diagnosed with sepsis. Most clinicians would then expect that he was managed as such, and while that eventually occurred, it could have happened earlier.
Please outline any factors that may limit your assessment of the events.	Nil
Recommendations for improvement that may help to prevent a similar occurrence in future.	1. Implement the updated Health Quality & Safety Commission Paediatric Sepsis Screening and Action Tool and supporting documents. 2. Provide education to clinical staff on critical thinking and consider adopting a documentation format for medical staff that supports critical thinking, such as an assessment section that includes a problem list, diagnosis, differential diagnosis, and reasoning. 3. Educate medical staff on the importance of providing a clear and comprehensive plan in the medical notes after they assess a patient. The plan should include advice to nursing staff about when and to whom to escalate further changes in the patient's condition. 4. Consider implementing an electronic patient record, which should include note templates that support more effective documentation. 5. Educate clinical staff on how to check for and respond to parental concern and implement Kōrero mai. 6. Develop local guidelines on escalation of care, similar to those available in the [specialist paediatric hospital]. 7. Consider establishing a Paediatric High Dependency Unit in Waikato Hospital.

Question 5: Any other matters in this case that you consider warrant comment.	
List any sources of information reviewed other than the documents provided by HDC	
Advisor's opinion	I have no other matters to comment on.
What was the standard of care/accepted practice at the time of events? Please refer to relevant standards/material.	
Was there a departure from the standard of care or accepted practice? • No departure; • Mild departure; • Moderate departure; or • Severe departure.	
How would the care provided be viewed by your peers? Please reference the views of any peers who were consulted.	
Please outline any factors that may limit your assessment of the events.	
Recommendations for improvement that may help to prevent a similar occurrence in future.	

By signing this report, I agree to HDC correcting any formatting, spelling, or grammar issues on the proviso that the substance of the report and any quoted material remains unchanged.
Signature: 
Name: Dr John Garrett
Date of Advice: 31 December 2025