IN THE CORONERS COURT
OF VICTORIA
AT MELBOURNE

COR 2022 003313

FINDING INTO DEATH WITHOUT INQUEST

Form 38 Rule 63(2)

*Section 67 of the **Coroners Act 2008***

Findings of:	Coroner Simon McGregor
Deceased:	Mia Rose Iskander
Date of birth:	18 June 2022
Date of death:	18 June 2022
Cause of death:	1a: Complications of ascending uterine infection (Klebsiella pneumoniae) in the setting of premature pre-labour rupture of membranes
Place of death:	Northern Hospital, 185 Cooper Street, Epping, Victoria, 3076
Keywords:	Foetal distress, abnormal CTG, Preterm Pre-labour Rupture of Membranes, ascending uterine infection, Category 1 caesarean section

INTRODUCTION

1. Mia Rose Iskander was born at 3:32 pm on Saturday 18 June 2022 at the Northern Hospital at 33 weeks and 4 days gestation. Mia was born by emergency caesarean section and passed away at just under 8 hours of age.

2. Mia was the first child to Danielle and Stephen Iskander. At the time of Mia's birth, Danielle was 31 years old. Her pregnancy care was provided by Northern Health.[1] Overall, aside from migraines,[2] the pregnancy was uncomplicated. On 10 December 2021, urine micro and culture grew Group B Streptococcus (GBS).[3]

3. On 21 March 2022, at 20 weeks 6 days gestation, Danielle attended the Northern Hospital for a routine scan. At this appointment, it was discovered that she had a shortened cervix and progesterone treatment was commenced.[4] On 28 March 2022, Danielle attended a follow-up appointment, and her cervix was found to be further shortened.[5] A cervical suture[6] was inserted on 30 March 2022, and Danielle was given 24 hours of intravenous (IV) antibiotics and a seven-day course of oral metronidazole to treat bacterial vaginosis.[7]

4. On Thursday 9 June 2022, at 32 weeks 2 days gestation, Danielle was at work when she felt wetness, but was unsure whether it was the result of incontinence or her water breaking.[8] She presented to the Northern Hospital and pre-term pre-labour rupture of membranes (**PPROM**) was confirmed.[9] Danielle and Stephen recalled that during an ultrasound scan, the technician commented that the baby was sitting quite low and there was not much amniotic fluid left.[10] The cervical suture was removed and Danielle was given a single course of antenatal corticosteroids to promote foetal lung maturity.[11] She was initially managed as an inpatient

[1] Four pregnancy reviews by obstetricians, with the rest provided by midwives.
[2] Northern Health medical records of Danielle Iskander, p.41.
[3] Northern Health medical records of Danielle Iskander, p.279. GBS is a gram-positive bacterium that colonises the gastrointestinal and genital tracts of 15 to 40 percent of pregnant women and is usually asymptomatic. GBS can cause infection in neonates and young infants. GBS is an important cause of serious infections such as sepsis and meningitis in neonates. If GBS is detected, mothers in labour are given intravenous antibiotics. This has been demonstrated to reduce the risk of GBS-related disease in the neonate
[4] Northern Health medical records of Danielle Iskander, p.71.
[5] Northern Health medical records of Danielle Iskander, pp.65-66.
[6] Otherwise referred to as 'cerclage'.
[7] Northern Health medical records of Danielle Iskander, pp.505-506
[8] Statement of Danielle Iskander, Coronial Brief.
[9] Northern Health medical records of Danielle Iskander, pp.446-447.
[10] Statements of Danielle and Stephen Iskander, Coronial Brief.
[11] Northern Health medical records of Danielle Iskander, p.447 Betamethasone steroid loaded on 9 June and 10 June 2022.

with high and low vaginal swabs[12] and IV antibiotics. Regular observations of maternal and foetal status, including inflammatory markers (maternal) and CTG (foetal) were normal.[13]

5. One week later, on 16 June 2022, Danielle was discharged from hospital. At the time of her discharge, she was clinically stable with no signs or symptoms of infection. Following discharge, oral amoxicillin antibiotics were continued and Danielle was advised to return to hospital for review 'every two to three days',[14] with the aim of proceeding to an induction of labour at 36-plus weeks if possible.[15]

THE CORONIAL INVESTIGATION

6. Mia's death was reported to the coroner as it fell within the definition of a reportable death in the *Coroners Act 2008* (**the Act**). Reportable deaths include deaths that are unexpected, unnatural or violent or result from accident or injury.

7. The role of a coroner is to independently investigate reportable deaths to establish, if possible, identity, medical cause of death, and surrounding circumstances. Surrounding circumstances are limited to events which are sufficiently proximate and causally related to the death. The purpose of a coronial investigation is to establish the facts, not to cast blame or determine criminal or civil liability.

8. Under the Act, coroners also have the important functions of helping to prevent deaths and promoting public health and safety and the administration of justice through the making of comments or recommendations in appropriate cases about any matter connected to the death under investigation.

9. Victoria Police assigned an officer to be the Coronial Investigator for the investigation of Mia's death. The Coronial Investigator conducted inquiries on my behalf and gathered statements from Mia's parents, the forensic pathologist, and investigating officers – and submitted a coronial brief of evidence.

[12] Northern Health medical records of Danielle Iskander, pp.166-167.
[13] Northern Health medical records of Danielle Iskander, pp.447-449. Initially benzylpenicillin on 9 June to 15 June 2022, then changed to IV amoxycillin and oral erythromycin on 15 June 2022 due to cerclage growing E.coli (sensitive to amoxycillin, ceftriaxone and cotrimoxazole).
[14] Northern Health medical records of Danielle Iskander, pp.446-447. Follow-up is recorded in medical records as 'MAC follow up as per PPROM protocol till date of induction'.
[15] Northern Health medical records of Danielle Iskander, pp.446-447, 488-490.

10. This finding draws on the totality of the coronial investigation into the death of Mia Rose Iskander including evidence contained in the coronial brief. Whilst I have reviewed all the material, I will only refer to that which is directly relevant to my findings or necessary for narrative clarity. In the coronial jurisdiction, facts must be established on the balance of probabilities.[16]

11. In considering the issues associated with this finding, I have been mindful of Mia's human rights to dignity and wellbeing, as espoused in the *Charter of Human Rights and Responsibilities Act 2006*, in particular sections 8, 9 and 10.

MATTERS IN RELATION TO WHICH A FINDING MUST, IF POSSIBLE, BE MADE

Circumstances in which the death occurred

12. On Saturday 18 June 2022, Danielle presented to the Northern Hospital Maternity Assessment Centre (**MAC**) for her first review after being discharged on 16 June 2022. She reported normal foetal movements, clear vaginal loss and no uterine contractions. Danielle was asymptomatic and afebrile.[17]

13. Danielle and Stephen recalled that the midwives initially had difficulty placing the foetal heartbeat monitor and struggled to get a clear and accurate CTG reading.[18] Medical records show the CTG was applied at 12:23 pm and abnormal readings were recorded from around 12:43 pm,[19] with examination notes recording a queried 'prolonged deceleration'.[20] In response to these readings a Maternity Rapid Response (**MatRAP**) was called at 12:51 pm.[21]

14. In response to the MatRAP, obstetrics and gynaecology registrar Dr Eva Shalou attended at 12:56 pm and reviewed Danielle, including by bedside ultrasound.[22] The records indicate Danielle was further reviewed by Dr Shalou at various times, including at 1:05 pm,[23]

[16] Subject to the principles enunciated in *Briginshaw v Briginshaw* (1938) 60 CLR 336. The effect of this and similar authorities is that coroners should not make adverse findings against, or comments about, individuals unless the evidence provides a comfortable level of satisfaction as to those matters taking into account the consequences of such findings or comments.
[17] Northern Health medical records of Danielle Iskander pp.27-28.
[18] Statement of Stephen Iskander, Coronial Brief. See also Northern Health medical records of Danielle Iskander, p 28.
[19] Northern Health medical records of Danielle Iskander, p.123.
[20] Northern Health medical records of Danielle Iskander, p.28.
[21] Ibid.
[22] Northern Health medical records of Danielle Iskander, pp.28, 357
[23] Northern Health medical records of Danielle Iskander, p.361.

1:20 pm,[24] 1:35 pm,[25] and 2:00 pm.[26] During this period, an intravenous cannula was inserted, and blood collected for pathology.[27] Immediate management included fluid resuscitation to maximise uterine perfusion.[28] Blood tests included a group and hold and full blood examination.[29] A plan was made to admit Danielle to the birthing the suite for further one-on-one monitoring (recorded at 12:57 pm), with consideration of delivery by induction of labour or caesarean section if there was no improvement in the baby's heart rate.

15. Retrospective progress notes contained in the records authored by obstetric consultant Dr Leah Brown, dated 20 June 2022, document a discussion Dr Brown had with Dr Shalou by telephone at 1:14 pm.[30] According to this note, Dr Brown and Dr Shalou agreed that Danielle required delivery. A note by nursing staff at 1:20 pm also documents a review by Dr Shalou and a discussion regarding expediting delivery given the non-reassuring CTG findings.[31]

16. By the time of Dr Shalou's conversation with Dr Brown at 1:14 pm, the CTG had been abnormal for around 31 minutes. Dr Shalou's plan for transfer to the birthing suite for one-on-one monitoring had not been implemented, as there were reported to be no available beds. It was noted again at 1:25 pm that no beds were available for transfer, and at 1:40 pm that they were 'awaiting [a] clean bed'.[32]

17. At 1:55 pm, the abnormal CTG[33] was escalated to Dr Shalou, who was at that time unable to attend to review it, as she was involved in another birth in the birthing suite. At 2:00 pm, another phone call was made to Dr Shalou to escalate the CTG review, but she was still unable to attend. It was then escalated to obstetrics and gynaecology registrar Dr Emma McLaughlin, who attended and reviewed the CTG.[34]

18. At 2:02 pm, a decision was made to proceed to a Category 1 emergency caesarean section.[35] Under Northern Health policy, a Category 1 emergency caesarean is indicated where there is

[24] Northern Health medical records of Danielle Iskander, pp.28, 358.
[25] Northern Health medical records of Danielle Iskander, p.28.
[26] Northern Health medical records of Danielle Iskander, pp.28, 359.
[27] Northern Health medical records of Danielle Iskander, pp.28, 358.
[28] Northern Health medical records of Danielle Iskander, p.28. See also statement of Dr Jeremy Chin (6 January 2024) [5].
[29] Northern Health medical records of Danielle Iskander, p.28.
[30] Northern Health medical records of Danielle Iskander, p 385. See also statement of Dr Arzoo Khalid (17 May 2024) [5].
[31] Northern Health medical records of Danielle Iskander, p.28.
[32] Ibid.
[33] Rising baseline 10 180 bpm and complex variable decelerations.
[34] Northern Health medical records of Danielle Iskander, pp.28, 358. These records indicate Dr Shalou was also present at this time.
[35] Northern Health medical records of Danielle Iskander, pp.28, 358.

'immediate threat to the life of a woman or fetus'.[36] It requires that the patient be transferred to theatre within 20 minutes and that the time from decision to birth, expressed as a Decision Delivery Interval (**DDI**), be under 60 minutes.[37] Contemporaneous notes indicate that this decision was made with Dr Shalou and Dr McLaughlin present.[38] Dr Brown is not documented as having been involved in this decision. Retrospective notes of Dr Shalou indicate that a Category 1 caesarean section was booked at 2:05 pm, and that sometime after this, 'Dr Brown informed, on her way into hospital to help manage BS (birth suite) 2° acuity'.[39] In retrospective documentation, Dr Brown noted that at 2:24 pm she received a text message from Dr Shalou stating Danielle was being transferred to theatre for caesarean section. She further notes that she left home at 2:30 pm and arrived at the Northern Hospital at approximately 3:15 pm.[40] Dr Brown ultimately arrived in the operating theatre after Mia's birth at 3:32 pm, but was present when a neonatal code blue was called at 3:35 pm.[41]

19. Danielle was transferred to the operating theatre, arriving at 2:32 pm. There were delays in theatre attributed to attempts at insertion of spinal anaesthesia followed by rapid general anaesthesia. The first attempt at spinal anaesthesia was made by a junior anaesthetic registrar under supervision of the senior anaesthetic fellow. The anaesthetic fellow then made a second attempt at spinal anaesthetic, which was also unsuccessful, and a general anaesthetic was required.[42] An anaesthetic consultant was onsite in the theatre complex attending to another emergency and was aware of the category 1 emergency caesarean section. This consultant subsequently attended when a neonatal code blue was called.[43]

20. Mia was born at 3:32 pm, with an estimated birth weight of 2,500 grams.[44] At birth, her APGAR scores were 1 at 1 minute, 1 at 5 minutes and 2 at 10 minutes.[45]

[36] Northern Health, *O & G Caesarean Section* (8 December 2023), p.4
[37] Ibid.
[38] Northern Health medical records of Danielle Iskander, p.358.
[39] Northern Health medical records of Danielle Iskander, p.362.
[40] Northern Health medical records of Danielle Iskander, p.385.
[41] Ibid.
[42] Northern Health medical records of Danielle Iskander, pp.359, 362, 403.
[43] Statement of Dr Arzoo Dr Khalid (17 May 2024), [14].
[44] Northern Health medical records of Danielle Iskander, p.300.
[45] Ibid. The APGAR score (referring to Appearance, Pulse, Grimace, Activity and Respiration) standardises the way healthcare professionals evaluate a baby's physical wellbeing at birth and how well each baby makes the physical transition to independent life from their mother. The APGAR score utilises five physical signs and is scored when the baby is 1 minute old and again when they are 5 minutes old. The APGAR score ranges from 0 to 10, with a lower score indicating poorer outcome. However, the maximum score is usually 9, since almost all newborns lose 1 point for blue hands and feet (which is normal after birth).

21. Junior paediatric staff, though not the paediatric consultant, was present at the delivery.[46] Mia was born pale, with no respiratory effort.[47] Intermittent Positive Pressure Ventilation (**IPPV**)[48] was commenced in 100% inspired oxygen, and cardiopulmonary resuscitation (**CPR**) was commenced. At three minutes of life, a Code Blue was called at 3:35 pm. Intravenous access was obtained at 3:41 pm and Mia was intubated at first pass at 3:43 pm. Two doses of intravenous adrenaline at the correct dosing were administered and a heart rate was detectable at around 14 minutes of life. CPR was ceased and IPPV continued.[49]

22. An initial venous blood gas was unrecordable, with a second blood gas showing severe respiratory and metabolic acidosis.[50] Mia was transferred to the Special Care Nursery (**SCN**) at 40 minutes of life. The Paediatric Infant Perinatal Emergency Retrieval (**PIPER**) service was called and arrived the Northern Hospital to take over Mia's care at approximately 4:50 pm.[51]

23. Despite intensive resuscitation efforts, Mia remained hypotensive with seizures and absent gag and pupillary reflexes. Following discussions with her parents, a decision was made to redirect the goals of care. Mia was extubated at 10:27 pm and passed away at 10:48 pm.[52]

24. Mia's death was referred to Safer Care Victoria as a sentinel event and as such was subject to a Root Cause Analysis (**RCA**) review by panel members consisting of Northern Health staff members from various specialties, a consumer representative member, and a member from an external health service.[53]

Identity of the deceased

25. On 18 June 2022, Mia Rose Iskander, born 18 June 2022, was visually identified by her father, Stephen Iskander.

26. Identity is not in dispute and requires no further investigation.

[46] Northern Health medical records of Danielle Iskander, p.300.
[47] Northern Health medical records of Mia Iskander, p.53.
[48] The initial pressures 30/6 when preterm baby should be 20-25/5. This was changed to 25/6 at 4:19 pm, then 28/6 at 4:48 pm. This error is unlikely to have changed outcome.
[49] Northern Health medical records of Mia Iskander, p.53; statement of Dr David Tran (7 March 2023) [22]-[24].
[50] Statement of Dr David Tran (7 March 2023) [26]: Arterial cord gas pH 6.96, CO2 85 and Lactate 13.5. Venous cord gas showed pH 7.04, CO2 82, Lactate 11.4.
[51] Statement of Dr David Tran (7 March 2023), [28].
[52] Northern Health medical records of Mia Iskander, p.53-54.
[53] Statement of Dr David Tran (7 March 2023), [31].

Medical cause of death

27. Registrar Dr Eric Park and Pathologist Dr Madeleine McKinley from Austin Pathology performed a full autopsy on 23 June 2022[54] and provided a written report of their findings dated 19 August 2022.

28. Dr Park and Dr McKinley found that most external measurements (crown heel/crown rump length, head/chest/abdominal circumference and foot length) were between 50th to 95th percentile for 33 weeks gestation.[55] Mia's body weight was above the 95th percentile.

29. An external examination revealed no structural abnormalities.

30. Internal examination showed normal organ position and orientation, with most organs (brain, heart, bilateral kidneys, adrenals, thymus, spleen and pancreas) weighing between 50th to 95th percentile for 33 weeks gestation. The bilateral lungs and liver were both above the 95th percentile.

31. Histological examination showed florid acute inflammatory infiltrate within the alveolar spaces of both lungs, and severe umbilical cord vasculitis with funisitis present (foetal inflammatory response stage 2 grade 2).

32. Examination of the placenta revealed severe acute chorioamnionitis[56] with foetal inflammatory response.

33. No skeletal abnormalities were identified on skeletal survey.

34. Microbiology showed growth of micro-organism from lung tissue culture (Klebsiella pneumoniae) and placental swabs (Klebsiella pneumoniae and mixed anaerobes).

35. The findings at autopsy were consistent with neonatal death due to perinatal infection. Dr Park and Dr McKinley explained that advanced chorioamnionitis, umbilical vasculitis and neonatal pneumonia are characteristic of ascending intrauterine infection progressing to infection of the baby. They considered that Klebsiella pneumonia, which was cultured from Mia's lung and placental swabs, was the likely pathogenic organism.

[54] Under the auspices of the Victorian Perinatal Autopsy Service (VPAS).
[55] Phillips J.B., Billson V.R. and Forbes A.B. Autopsy standards for fetal lengths and organ weights of an Australian perinatal population. Pathology 2009; 41 :6, 515-526.
[56] Intra-amniotic infection.

36. Dr Park and Dr McKinley further explained that premature pre-term rupture of membranes can be considered either a contributing factor or a consequence of intrauterine infection. They added that the risk of ascending intrauterine infection is reported to be increased in the setting of cervical incompetence and cervical cerclage, although the contribution of these risk factors in any specific case is not determinable by post-mortem examination.

37. Forensic Pathologist Dr Victoria Francis from the Victorian Institute of Forensic Medicine reviewed the autopsy report and provided an opinion[57] that the medical cause of death was 1(a) complications of ascending uterine infection (klebsiella pneumoniae) in the setting of premature prelabour rupture of membranes. I accept Dr Park and Dr McKinley's findings, and Dr Francis' opinion.

FAMILY CONCERNS

38. In Danielle and Stephen's statements dated 30 August 2022, they expressed a number of concerns about the medical care provided by Northern Health from the time Danielle was identified as having a shortened cervix.

39. Their concerns can be summarised as follows:

    a) They received inconsistent information about appropriate aftercare following insertion of the cervical suture, including the continuation of progesterone treatment;

    b) They received inconsistent information about the plan and timeframe for removing the cervical suture and, consequently, the likely timing of the birth;

    c) There was inadequate monitoring of the pregnancy once it was considered high risk due to Danielle's identified short cervix; and

    d) There was inadequate communication from clinicians about Mia's condition immediately after her birth, meaning Danielle and Stephen were not aware of the seriousness of her condition.

40. I acknowledge the family's concerns as they relate to communication and provision of aftercare advice and information, however, the role of the coroner is limited, and I consider that these matters fall outside the scope of the coronial investigation in this instance. Under

[57] Report of Dr Victoria Francis dated 22 November 2022.

the Act, I am empowered to examine matters that are proximate and causative, or contributory, to a death. Coroners do not investigate aspects of care that have not contributed to death.

41. The limitations on the jurisdiction sometimes lead to the result that concerns raised by families are not able to be investigated because they are not sufficiently connected with the cause and circumstances of their loved one's death. In those circumstances, there may be other avenues available for the concerns to be addressed, such as contacting health service directly or, where appropriate, investigatory bodies such as the Health Complaints Commissioner.

CPU REVIEW

42. As a result of receiving the family's concerns relating to medical care and management, I referred Mia's case to the independent practitioners in the Health and Medical Investigation Team of the Coroners Prevention Unit (**CPU**)[58] to review the medical care Mia and Danielle received at the Northern Hospital.

43. To gain a fuller picture of Danielle and Mia's clinical course, I directed that further information be obtained from Northern Health, and the Court subsequently received three statements from the Divisional Director of Women and Children's Services, Dr David Tran, dated 7 March, 22 June and 8 November 2023, and a statement prepared by Consultant Obstetrician Dr Arzoo Khalid dated 17 May 2024.

44. On review of Mia's case, the CPU recommended that expert opinion be sought from a senior obstetric clinician, and a report was subsequently obtained from Consultant Obstetrician Dr Jeremy Chin. Dr Chin was asked to review Danielle's pregnancy and labour management, specifically with a view to identifying factors that may have been recognised and managed during Danielle's pregnancy to prevent chorioamnionitis and subsequent neonatal sepsis. The timing of the caesarean section was a particular focus, as well as the after-hours senior consultant support on the day.

[58] The Coroners Prevention Unit (CPU) was established in 2008 to strengthen the prevention role of the coroner. The unit assists the Coroner with research in matters related to public health and safety and in relation to the formulation of prevention recommendations. The CPU also reviews medical care and treatment in cases referred by the coroner.

EXPERT OPINION OF DR JEREMY CHIN

Clinical management of PPROM

45. Dr Chin opined that Danielle's pregnancy management by Northern Health was reasonable and appropriate and, including, the management of Prolonged Premature Rupture of Membranes (**PPROM**) during her admission from 9 to 16 June 2022.[59]

46. Dr Chin observed that Danielle was admitted to hospital on 9 June 2022 with a diagnosis of ruptured membranes in the context of a cervical suture ('cerclage'), that removal of the suture occurred on the same day, antibiotics were commenced and a single course of antenatal corticosteroids was administered to promote foetal lung maturation. Dr Chin considered that all these steps were appropriate. In particular, he commented, the choice of antibiotics was justified by the clinical diagnosis (pre-term ruptured membranes, not in labour) and results of microbiological tests (including E. Coli cultured from the cerclage). He considered that observations of maternal and foetal status, including inflammatory markers (maternal) and CTG (foetal) were appropriate, and that the decision to observe a transient rise in maternal inflammatory markers (white cell count) was appropriate, given that it was most likely secondary to the administration of antenatal corticosteroids and not infection.[60]

47. Dr Chin further noted that the causative organism that was ultimately identified at autopsy, Klebsiella pneumoniae, was not detected on microbiological tests taken during this hospital admission. He considered that the choice of broad-spectrum antibiotics during and following Danielle's admission was in line with relevant guidelines and was justified by the clinical diagnosis[61] and results of microbiological testing,[62] but acknowledged that the recommended antibiotics are not effective against all organisms, including the causative organism in this case.[63] He explained that the infective Klebsiella pneumoniae is resistant to amoxycillin,[64] but sensitive to ceftriaxone and cotrimoxazole.[65]

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[59] Statement of Dr Jeremy Chin (6 January 2024), [1]-[4].
[60] Statement of Dr Jeremy Chin (6 January 2024), [3].
[61] Pre-term ruptured membranes, not in labour.
[62] Including E. Coli cultured from the cervical cerclage.
[63] Statement of Dr Jeremy Chin (6 January 2024), [14].
[64] IV amoxycillin and oral erythromycin were commenced on 15 June 2022 due to the cerclage growing E.coli (sensitive to amoxycillin, ceftriaxone and cotrimoxazole).
[65] Statement of Dr Jeremy Chin (6 January 2024), [12].

Decision to proceed to Category 1 caesarean section

48. CTGs performed at the time of Danielle's presentation to the MAC on 18 June 2022 from 12:43 pm showed baseline foetal tachycardia, reduced-absent variability and complicated variable decelerations. Dr Chin noted that RANZCOG guidelines, adopted by Northern Health,[66] indicate these features are 'likely to be associated with significant fetal comprise and require immediate management, which may include urgent delivery'.[67] In this case, immediate management included maternal repositioning and intravenous fluid resuscitation to maximise uterine perfusion. Dr Chin explained that a response is usually observed as resuscitative efforts are undertaken, and the absence of a response indicates treatment failure.[68]

49. Dr Chin observed that at 2:02 pm, Danielle was noted to be 2cm dilated and not in labour, indicating vaginal birth was not imminent and could not be safely achieved in a timely manner. He considered the decision to proceed to caesarean section was appropriate given the ongoing abnormal CTG features and lack of response to resuscitative efforts.[69]

50. He observed that various attempts were made to move Danielle to the birth suite and involve obstetric registrars from 1:25 pm, and that the CTG remained largely unchanged for this period and, by extension, the clinical urgency that prompted the decision to undertake a Category 1 caesarean section.[70]

Timing of Category 1 caesarean section

51. From the time of deciding to proceed to Category 1 caesarean section, Northern Health procedure stipulates that the patient should be in theatre within 20 minutes and the birth should occur within 60 minutes.[71] The delay from decision-making to performance of the caesarean section in this case appears to be attributable to a number of factors, including awaiting blood results' pathology and confirmation of fasting states, as well as failed attempts at spinal anaesthesia.[72]

52. After decision-making at 2:02 pm, the theatre preoperative checklist indicates completion of ward nurse checks occurred at 2:09 pm, and completion of anaesthetic nurse checks at

[66] See statement of Dr Arzoo Dr Khalid (17 May 2024), [9].
[67] RANZCOG Intrapartum Fetal Surveillance Clinical Guideline, 4th Edition, 2019, p.16.
[68] Statement of Dr Jeremy Chin (6 January 2024), [5].
[69] Ibid [6].
[70] Ibid.
[71] Northern Health, *O & G Caesarean Section* (8 December 2023), p.4.
[72] Northern Health medical records of Danielle Iskander, p.403.

2:30 pm.[73] The Emergency Caesarean Section Timesheet then indicates 'Time into Operating Theatre Complex' at 2:32 pm, and 'Time into Operating Theatre' at 3:03 pm, with the 'Reason for delay' noted to be 'Awaiting blood results + confirming fasting status'. The 'Knife to skin' time is recorded as 3:31 pm, and birth at 3:32 pm.[74]

53. Dr Chin reflected that it is common practice to proceed with the most urgent caesarean sections irrespective of a patient's fasting status, whilst acknowledging that this creates increased risks of aspiration and resultant respiratory failure in cases where a general anaesthetic is required. He noted that routine fasting in labour is no longer recommended and, therefore, it is understood that women requiring a Category 1 caesarean section in labour are unlikely to be fasted.[75] He added that it is not clear what pathology tests were required and pending at this time, but in certain cases, it may be reasonable to proceed without specific pathology test results where the index of suspicion for materially abnormal results is low and the risks of delay are high.[76]

54. In relation to anaesthetics, Dr Chin noted that a spinal anaesthetic is generally safer for the mother and can often be achieved by experienced staff in the same timeframe as a general anaesthetic. In this case, between 3:03 pm and 3:27 pm, the anaesthetic notes indicate an attempt at spinal anaesthesia by a junior doctor (RMO), followed by a more senior doctor (fellow).[77] Following this, a general anaesthetic was achieved in approximately four minutes, permitting rapid birth. Dr Chin reflected that 'Whilst it is important that teaching hospitals, in general, maximise educational opportunities for junior doctors, it is recognised that these opportunities need to occur in environments where clinical risk can be adequately mitigated'.[78]

Attendance by consultant obstetrician

55. The after-hours[79] on-call obstetrics and gynaecology consultant, Dr Leah Brown, started work at 7:00 am on 18 June 2022, for 24 hours. Dr Brown completed a ward round from 8:00 am to 11:30 am, then remained on call at home.[80]

[73] Northern Health medical records of Danielle Iskander, p.353.
[74] Northern Health medical records of Danielle Iskander, p.403.
[75] Statement of Dr Jeremy Chin (6 January 2024), [8].
[76] Statement of Dr Jeremy Chin (6 January 2024), [9].
[77] Northern Health medical records of Danielle Iskander, pp.359, 362, 403.
[78] Statement of Dr Jeremy Chin (6 January 2024), [10].
[79] A Saturday.
[80] Statement of Dr Arzoo Dr Khalid (17 May 2024), [3].

56. In retrospective documentation, Dr Shalou noted that a Category 1 caesarean section was booked at 2:05 pm, and that at an unspecified time, Dr Brown was informed and was making her way into hospital.[81] Dr Brown retrospectively recorded that she received a text message at 2:14 pm from Dr Shalou indicating that Danielle was being transferred to theatre. She recorded having left home at 2:30 pm and arriving in theatre shortly after Mia was born at 3:32, approximately 90 minutes after the decision for Category 1 caesarean section.[82]

57. Dr Chin commented that RANZCOG guidelines[83] describe circumstances where consultant obstetrician attendance is essential. This is to avoid 'delays in escalation and decision-making, especially in urgent situations of high clinical risk'.[84] I note that Northern Health procedures describe a category 1 emergency caesarean as denoting an 'immediate threat to the life of a woman or fetus'[85]. Dr Chin reasonably opined that this circumstance would generally be understood as an urgent situation of high clinical risk. He added that the requirement for a consultant obstetrician to be present at the most urgent caesarean sections would be consistent with guidelines at all maternity units that he was familiar with.[86]

Conclusions of expert review

58. On review of the available evidence, Dr Chin opined that the CTG features at the time of Danielle's admission on 18 June 2023 were consistent with chorioamnionitis and foetal hypoxia. He added that whilst immediate recourse to caesarean section may have resulted in a less severe state of hypoxia at birth, it would not have substantively altered the degree of foetal infection, which was ultimately overwhelming.[87]

59. Dr Chin explained that chorioamnionitis and foetal infection often progress rapidly in the context of ruptured membranes, with little or no warning. He considered that the first indication of the infection appeared to have been foetal tachycardia on CTG on 18 June 2022, in the context of Danielle having no other signs or symptoms of infection. Given this, Dr Chin concluded that it is uncertain whether Mia's status would have been detected any earlier if

[81] Northern Health medical records of Danielle Iskander, p.362.
[82] Northern Health medical records of Danielle Iskander, p.385.
[83] RANZCOG Training Registrar Supervision Guideline (C-Trg 5) (November 2017), [6].
[84] Statement of Dr Jeremy Chin (6 January 2024), [11].
[85] Northern Health, *O & G Caesarean Section* (8 December 2023), p.3.
[86] Statement of Dr Jeremy Chin (6 January 2024), [11].
[87] Statement of Dr Jeremy Chin (6 January 2024), [13].

Danielle had remained in hospital until 18 June 2022, rather than being discharged on 16 June 2022.[88]

FAMILY SUBMISSIONS

60. By letter of 20 September 2024, legal representatives on behalf of Danielle and Stephen submitted that the coronial investigation had identified serious inadequacies in the care provided to Danielle and Mia by Northern Health.[89]

Management following premature rupture of membranes

61. The family noted Dr Chin's opinion that Danielle's management following diagnosis with PPROM and the decision to discharge her on 16 June 2022 for outpatient management was appropriate, but submitted that Dr Chin did not address other relevant aspects of Danielle's medical history, namely:

    a) A urine test performed on 9 June 2022 which was reported to show elevated leucocytes and erythrocytes with epithelial cells '++';

    b) The high vaginal swab performed on 9 June 2022 which was reported to show heavy growth of mixed anaerobes;

    c) The finding of oligohydramnios on obstetric ultrasound on 16 June 2022;

    d) The background of bacterial vaginosis; and

    e) The background of Group B Streptococcus ('GBS').

62. They noted that elevated leucocytes, erythrocytes and epithelial cells on urine test are possible indicators of infection, and that PPROM, GBS, bacterial vaginosis and oligohydramnios are reported risk factors for infection.

63. The family submitted that these factors were relevant to the assessment of Danielle's risk and/or signs of infection during her admission to Northern Hospital between 9 and 16 June 2022 and the appropriateness of her management.

[88] Statement of Dr Jeremy Chin (6 January 2024), [14].
[89] These submissions were made having had the opportunity to review the additional materials listed in paras [40]-[41] above.

64. Having regard to Dr Chin's expert opinion and the evidence of Dr Tran in his statement dated 7 March 2023,[90] I remain satisfied that Danielle was appropriately monitored and managed between 9 and 16 June 2022, given what was a dynamic presentation that did not, at the time of discharge, indicate ongoing infection. I note particularly Dr Chin's opinion that Danielle's white cell count was appropriately monitored in circumstances where the transient increase was most likely secondary to corticosteroid use, rather than infection, and that her discharge on 16 June 2022 occurred in the context of a stable clinical picture, with no signs or symptoms of infection and normal assessments of foetal status.[91]

65. I am mindful also of the risk of interpreting clinical findings with the benefit of hindsight, and am in this instance satisfied that Danielle's medical history was appropriately considered as part of the overall clinical picture.

Delay in decision to perform caesarean section

66. The family expressed serious concerns regarding Danielle's management during her labour, particularly relating to a delay in the decision to perform an emergency caesarean section on 18 June 2022.

67. Noting that abnormal CTG readings were recorded from around 12:43 pm and records show that the CTG remained abnormal, the family expressed concern that the decision was ultimately made for a category 1 emergency caesarean section at 2:02 pm, 1 hour and 19 minutes after the CTG was first reported to be abnormal.

68. Retrospective progress notes made by Dr Brown document a discussion with Dr Shalou by telephone at 1:14 pm.[92] According to this note, Dr Brown and Dr Shalou agreed that Danielle required delivery. By the time of Dr Shalou's conversation with Dr Brown, the CTG had been abnormal for around 31 minutes. In context of the abnormal CTG and the consensus of Dr Brown and Dr Shalou that Danielle required delivery at 1:14 pm, the family expressed serious concerns regarding the 48-minute delay between Dr Brown's conversation at 1:14 pm and the decision for emergency caesarean section at 2:02 pm.

[90] Particularly at [5]-[11].
[91] Statement of Dr Jeremy Chin (6 January 2024), [2]-[4].
[92] Northern Health medical records of Danielle Iskander, p 385.

Involvement of senior clinical staff in decision-making and management

69. The family noted that medical records suggest Dr Brown was not further involved in Danielle's clinical management after the phone call at 1:14 pm, including the decision to perform an emergency caesarean section at 2:02 pm.[93] In particular, the records only document that Dr Brown was 'informed' of the decision for category 1 emergency caesarean section sometime after it was booked at 2:05 pm.[94]

70. The family drew my attention to the RANZCOG Intrapartum Fetal Surveillance Clinical Guideline, which recommends that '[i]n clinical situations where the foetal heart rate is considered abnormal, immediately management should include … [e]scalation of care if necessary to a more experienced practitioner'.[95] Further, the RANZCOG Training Registrar Supervision Guideline provides a list of events where consultant attendance is expected, including where there are multiple pregnancies in labour.[96] Northern Health's procedure also specifies the 'Consultant obstetrician shall be the final arbiter of the degree of urgency of Caesarean and recommend the DDI in consultation with the duty labour ward HMO/REG'.[97]

71. The family expressed serious concerns regarding the level of involvement of senior staff in Danielle's management, including the decision to proceed to Category 1 emergency caesarean section.

72. In this regard, I note that the Root Cause Analysis (**RCA**) undertaken by Northern Health identified the following issues relating to delays in escalation and decision-making:

> *c. The urgency and complexity of the clinical scenario on the background of a heavy workload in the birth suite. The issue of escalation after hours within the Obstetric team and its association with delay in escalation and decision-making.*
>
> *d. The activation of a MatRAP versus a Code Pink and the notification of key staff of an antepartum obstetric emergency and its association to a delay in decision making to expedite delivery and key staff not being present at the time of birth.*[98]

[93] The decision is documented as having been made in the presence of registrars Dr Shalou and Dr McLaughlin: Northern Health medical records of Danielle Iskander, p.358.
[94] Northern Health medical records of Danielle Iskander, p.362
[95] Fourth Edition (2019), Recommendation 8, p.16.
[96] RANZCOG Training Registrar Supervision Guideline (November 2017), p. 2-3.
[97] Northern Health, *O & G Caesarean Section* (8 December 2023), p.5.
[98] Statement of Dr David Tran (7 March 2023), [32].

73. I note also the recommendation arising from the RCA to '[r]eview the caesarean section procedure to include requirements of senior staff being present at Category 1 preterm births, and early escalation to Code Green[99] for non-labouring preterm patients with CTG changes'.[100] Under Northern Health policy, a Category 1 caesarean case should be escalated in circumstances where the DDI for the booked category is exceeded.[101] In this case, such an escalation would be expected to occur from 3:02 pm, 60 minutes after the Category 1 decision was made.

74. Mia's family expressed serious concerns regarding the appropriateness of the decision for category 1 emergency caesarean section rather than a 'code green', and submitted that the material before me demonstrates:

    a) a significant delay in the decision to perform an emergency caesarean section; and

    b) inadequate involvement of senior staff in Danielle's clinical management.

Delay in performance of category 1 caesarean section

75. The medical records show that the category 1 caesarean section was commenced at 3:31 pm – a period of 2 hours and 48 minutes after the CTG was first reported to be abnormal, 1 hour and 29 minutes after the decision for emergency caesarean section, and 28 minutes after Danielle's arrival in the operating theatre. As noted above, a category 1 emergency caesarean section is expected to be performed within one hour according to Northern Health's relevant policy.[102]

76. As described above, the Maternity Emergency Caesarean Time Sheet contained in the medical records notes the delay in commencing the caesarean section was due to medical staff waiting for blood results and confirmation of fasting status.[103] The records also detail the initial failure of the spinal anaesthetic and the decision to proceed to general anaesthetic.[104] Mia's family expressed serious concerns regarding the appropriateness of each of these factors in delaying

[99] Under Northern Health policy, a Code Green is indicated where there is urgent threat to the life of the woman or fetus. Under a Code Green, transfer to theatre should occur within 10 minutes and birth should occur within 30 minutes: Northern Health, *Code Green – Emergency Caesarean Section* (October 2020).
[100] Statement of Dr David Tran (7 March 2023), [33].
[101] Northern Health, *O & G Caesarean Section* (8 December 2023), p.4.
[102] Northern Health, *O & G Caesarean Section* (8 December 2023), p.4.
[103] Northern Health medical records of Danielle Iskander, p.403.
[104] Northern Health medical records of Danielle Iskander, pp.359, 362, 403; Statement of Dr Arzoo Dr Khalid (17 May 2024), [14].

the performance of a category 1 caesarean section in the circumstances of Danielle's presentation.

77. I note Dr Chin's opinion in this regard,[105] and the recommendation arising from Northern Health's RCA review to ['r]eview the caesarean section procedure to include requirements of senior staff being present at Category 1 preterm births, and early escalation to Code Green for non-labouring preterm patients with CTG changes'.[106]

78. Mia's family expressed further concerns regarding the appropriateness of the decision for a category 1 emergency caesarean section rather than a 'code green' in the circumstances of Danielle and Mia's presentation, and submitted that the material before me demonstrates a significant and unreasonable delay in the performance of the emergency caesarean section.[107]

FINDINGS AND CONCLUSION

79. The standard of proof for coronial findings of fact is the civil standard of proof on the balance of probabilities, with the *Briginshaw* gloss or explications.[108] Adverse findings or comments against individuals in their professional capacity, or against institutions, are not to be made with the benefit of hindsight but only on the basis of what was known or should reasonably have been known or done at the time, and only where the evidence supports a finding that they departed materially from the standards of their profession and, in so doing, caused or contributed to the death under investigation.

80. Pursuant to section 67(1) of the *Coroners Act 2008* I make the following findings:

    a) the identity of the deceased was Mia Rose Iskander, born 18 June 2022;

    b) the death occurred on 18 June 2022 at Northern Hospital, 185 Cooper Street, Epping, Victoria, 3076, from 1(a) complications of ascending uterine infection (Klebsiella pneumoniae) in the setting of premature prelabour rupture of membranes.

    c) the death occurred in the circumstances described above.

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[105] See above at [51]-[52]
[106] Statement of Dr David Tran (7 March 2023), [33].
[107] SNO submissions p.4.
[108] *Briginshaw v Briginshaw* (1938) 60 CLR 336 at 362-363: 'The seriousness of an allegation made, the inherent unlikelihood of an occurrence of a given description, or the gravity of the consequences flowing from a particular finding, are considerations which must affect the answer to the question whether the issues had been proved to the reasonable satisfaction of the tribunal. In such matters "reasonable satisfaction" should not be produced by inexact proofs, indefinite testimony, or indirect inferences…'.

81. Having considered all of the circumstances, I make the following additional findings:

a) Danielle's pregnancy care was reasonable and appropriate.

b) The medical care provided to Danielle during her admission from 9 to 16 June 2022 for PPROM was reasonable and appropriate in all the circumstances, including her discharge on 16 June 2022.

c) During Danielle's attendance at the MAC on 18 June 2022, midwives appropriately recognised the need to escalate abnormal CTGs to senior clinical staff.

d) It was apparent and agreed by Danielle's treating doctors from approximately 1:14 pm on 18 June 2022 that Danielle required expedited delivery.

e) High workload in the birthing suite on 18 June 2022 led to unreasonable delays in attendance by obstetrics and gynaecology registrars to review the ongoing abnormal CTGs, contributing to a delay in reaching the decision to proceed to Category 1 caesarean section.

f) There was inadequate involvement of the consultant obstetrician on call in Danielle's management and the decision to proceed to a Category 1 emergency caesarean section, leading to a delay in decision-making and escalation, and contrary to Northern Health procedures.

g) Between 2:02 pm and 3:03 pm there were unreasonable delays in transferring Danielle to theatre pending 'blood results' and confirmation of fasting status in circumstances where the risks of delay made it reasonable to proceed irrespective of fasting status and in the absence of pathology results.

h) From 3:02 pm, Danielle's case should have been escalated to a Code Green in accordance with Northern Health procedure.

i) In these circumstances of urgency, it was inappropriate to provide an educational opportunity to a junior doctor (RMO) to attempt spinal anaesthesia between 3:03 pm and 3:27 pm.

j) In circumstances where an 'immediate threat to the life of a woman or fetus' had been recognised as evidenced by the designation as Category 1, it was reasonable to expect

that the consultant obstetrician would be present for delivery, though this was not expressly required under Northern Health procedure.

I convey my sincere condolences to Mia's family for their loss.

Pursuant to section 73(1A) of the Act, I order that this finding be published on the Coroners Court of Victoria website in accordance with the rules.

I direct that a copy of this finding be provided to the following:

Danielle & Stephen Iskander, Senior Next of Kin (C/- Maurice Blackburn Lawyers)

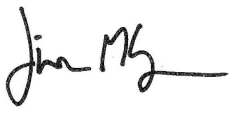
Northern Health

Safer Care Victoria

The Victorian Consultative Council on Obstetric and Paediatric Mortality and Morbidity

Senior Constable Katherine Repalust, Coronial Investigator

Signature:



Coroner Simon McGregor

Date: 20 February 2025

NOTE: Under section 83 of the *Coroners Act 2008* (**the Act**), a person with sufficient interest in an investigation may appeal to the Trial Division of the Supreme Court against the findings of a coroner in respect of a death after an investigation. An appeal must be made within 6 months after the day on which the determination is made, unless the Supreme Court grants leave to appeal out of time under section 86 of the Act.