IN THE CORONERS COURT
OF VICTORIA
AT MELBOURNE

Court Reference: COR 2017 4991

FINDING INTO DEATH WITHOUT INQUEST

Form 38 Rule 63(2)
*Section 67 of the **Coroners Act 2008***

Findings of:	Caitlin English, Deputy State Coroner
Deceased:	Baby MNL[1]
Date of birth:	27 September 2017
Date of death:	30 September 2017
Cause of death:	1(a) Hypoxic ischaemic encephalopathy complicating peri partum asphyxia
Place of death:	The Royal Women's Hospital, 20 Flemington Road, Parkville, Victoria

[1] This Finding has been de-identified by order of Deputy State Coroner English to replace the names of the deceased and their family members with pseudonyms of randomly generated three letter sequences to protect their identity and to redact identifying information.

INTRODUCTION

1. On 30 September 2017, MNL was three days old when he passed away following complications experienced at his birth. He was the much-loved first child of Mr QBH and Ms FGX.

THE CORONIAL INVESTIGATION

2. Baby MNL'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.

3. 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.

4. 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.

5. As part of my investigation, I obtained Ms FGX's maternal records and Baby MNL's neonatal records. I also obtained a statement from Dr Jacqueline van Dam, Clinical Director Maternity Services at Werribee Mercy Hospital (**WMH**), and advice from the Court's Health and Medical Team about the events leading up to Baby MNL's death. Mr QBH and Ms FGX also submitted correspondence for my consideration.

6. This finding draws on the totality of the coronial investigation into Baby MNL's death, including evidence contained in the medical records and statements. 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.[2]

[2] 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.

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

Identity of the deceased

7. On 30 September 2017, Baby MNL, born 27 September 2017, was visually identified by his father, Mr QBH.

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

Medical cause of death

9. Dr Jacqueline Collett from the Royal Women's Hospital conducted a post-mortem examination on 3 October 2017.

10. Senior Forensic Pathologist, Dr Matthew Lynch, from the Victorian Institute of Forensic Medicine (**VIFM**), reviewed Dr Collett's findings and the post-mortem computed tomography (**CT**) scan and provided a written report of his findings dated 25 January 2018.

11. Dr Lynch noted the following:

    (a) Baby MNL was normally formed with growth and development appropriate to gestation;

    (b) while there were signs of medical intervention, no complications were evident; and

    (c) there was third trimester singleton placenta with hyper coiled umbilical cord, features were suggestive of cord vascular obstruction with probable fresh thrombus in the lumen of dilated umbilical vein and ectatic placental surface veins, meconium exposure, early acute chorioamnionitis (maternal inflammatory response to stage II, grade I), and chorangiosis.

12. Dr Lynch provided an opinion that the medical cause of death was *"1(a) Hypoxic ischaemic encephalopathy complicating peri partum asphyxia".*

13. I accept Dr Lynch's opinion.

Circumstances in which the death occurred

14. Baby MNL was born at Werribee Mercy Hospital (**WMH**) on 27 September 2017 at 8.13pm at 40 +2 weeks, with a birth weight of 3200 grams. He died at three days of age with a clinical diagnosis of perinatal asphyxia sequelae.[3]

15. Ms FGX's pregnancy care was shared between WMH and her general practitioner. She was 32 years of age at the time of her pregnancy. The estimated date of birth was 24 September 2017.

16. Ms FGX's pregnancy was considered uncomplicated, with A Positive blood group, rubella immune, and negative serology testing.[4] A glucose tolerance test was negative for gestational diabetes and a vaginal swab was positive for group B streptococcus.[5] Regular blood tests during the pregnancy indicated a low vitamin D for which Ms FGX commenced vitamin D supplements.

17. A second trimester ultrasound scan at 20 weeks gestation was normal.[6]

18. At 37 weeks gestation, a fetal growth ultrasound scan was performed given serial low symphysis-fundal height measurements. The ultrasound scan placed the foetus on the 66 percentile in growth and measured a normal amniotic fluid index.[7] Importantly, middle cerebral artery Doppler studies[8] were normal.

19. Ms FGX presented to the WMH Maternity Assessment Unit on several occasions in spurious labour.[9] On 21 September 2017, Ms FGX presented with a history consistent with a spontaneous rupture of membranes and mild crampy pains. A test to check for premature

[3] Meconium aspiration.
[4] Blood tests to detect the presence of varicella, syphilis, Human Immunodeficiency Virus (**HIV**) infection, hepatitis B and C serology, maternal blood group, iron levels, and immunity to rubella.
[5] Group B streptococcus (**GBS**) is a gram positive bacteria 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.
[6] A second trimester ultrasound performed between 18 to 20 weeks gestation to detect fetal structural and growth abnormalities and placental location.
[7] Amniotic fluid index (**AFI**) is an estimate of the amount of amniotic fluid and is an index of fetal well-being. The AFI was estimated at 18.1cm. According to the 2016 Royal Australian and New Zealand College of Obstetricians and Gynaecologists 'Assessing Fetal Wellbeing' guide, an AFI of 5-24 is normal.
[8] Indicative of fetal wellbeing. Middle cerebral artery Doppler studies assess the distribution of blood flow, with preferential blood flow redistributed to critical organs of the brain and heart when a fetus is growth restricted.
[9] Painful uterine contractions without cervical effacement or dilation.

rupture of membranes[10] did not show spontaneous rupture of membranes and cardiotocograph (**CTG**)[11] monitoring traces were normal.

20. On 26 September 2017 and at 40 weeks and two days, Ms FGX called WMH Maternity Assessment Unit on two occasions describing early labour. At 10.32am she was advised to remain at home until labour was established and on the second occasion at 5.32pm was advised to attend hospital.

21. Ms FGX presented to the Maternity Assessment Unit at 6.38pm and remained until 11.30pm when she was discharged home in early labour. No vaginal examination was performed during this presentation. Mr QBH and Ms FGX noted that they discussed a vaginal examination with staff and declined the examination on advice from the nurse, who indicated that it was unnecessary on the basis that Ms FGX was in early labour. A normal CTG was noted.

22. On 27 September 2017, Ms FGX re-presented at 2.40pm to WMH Maternity Assessment Unit reporting *"regular contractions 1:10 minutes since Sunday"* (being 24 September 2017).

23. A CTG was applied between approximately 3.00pm to 3.30pm, which was normal.

24. A vaginal examination at 4.50pm found the cervix effaced and three centimetres dilated, seven centimetres dilated with contraction. The membranes were bulging and not ruptured.

25. Mr QBH and Ms FGX stated:

> *Ms FGX attended the out-clinic at WMH where she was assessed by a midwife. Though this is noted in the statement from the hospital, I would like to add that the midwife showed concerns that Ms FGX had been experiencing contractions for several days. The midwife advised that an internal examination be requested in triage. In triage, the nurse once again discouraged the internal examination on the basis that Ms FGX was still in early labour. On the advice of the out-clinic midwife, Ms FGX insisted on the examination which revealed that she was 8cm dilated. Once the examination was done, the nurse was visibly surprised that Ms FGX was in active labour. A midwife was called to confirm dilation, and Ms FGX was immediately moved to the birth suite.*

[10] Actim® Prom is a rapid test for detecting premature rupture of membranes.
[11] CTG is electronic fetal monitoring of the heartbeat. CTGs are a widely used technique for assessing fetal wellbeing.

26. At 5.10pm Ms FGX was transferred to the birth suite, and intravenous cannula inserted, and penicillin administered.[12] Uterine contraction frequency was 2-3 in 10 minutes, mild moderate lasting up to 45 seconds.

27. The vaginal examination was rechecked at 5.10pm, and the cervix assessed to be eight centimetres dilated.

28. At 7.15pm, uterine contractions were five minutely (2 in 10 minutes), moderate in strength and lasing 45 seconds.

29. The Fetal Heart Rate (**FHR**) was heard from 3.30pm until 7.30pm, at which time the FHR was unable to be located.

30. The CTG was immediately reapplied, and a further vaginal examination performed (at 7.30pm). The cervix remained unchanged from the last examination, two and a half hours earlier at eight centimetres dilated. I note that during normal labour progress in a primigravida, (that is, a woman who is pregnant for the first time) the cervix dilates approximately one centimetre an hour.

31. The membranes were subsequently artificially ruptured revealing *"thick meconium liquor"*. I note that the presence of meconium-stained liquor is considered a marker of possible fetal hypoxia. However, the presence of meconium in isolation at the time of delivery in a term pregnancy, cannot be considered a clear sign that the foetus was compromised before birth.

32. A fetal scalp electrode was applied. A fetal scalp clip is applied to the fetal head to accurately and reliably record the FHR.

33. Following the vaginal examination at 7.30pm fetal bradycardia (104 beats per minute) persisted, lasting 15 minutes. A 250 ml intravenous fluid bolus and uterine relaxant terbutaline 250 mcg were administered. These were interventions to improve placental oxygenation.

34. A reapplication of the fetal scalp electrode at 7.48pm confirmed fetal bradycardia (110 beats per minute).

35. An emergency code for an urgent caesarean section[13] was called at 7.51pm, with timely progression to theatre despite competing theatre demands. The anaesthetist was in another

[12] Prophylactic antibiotics for GBS status.
[13] Defined as urgent threat to life of a woman or fetus according to The Royal Australian and New Zealand College of Obstetricians and Gynaecologists 'Categorisation of urgency for caesarean section' July 2015.

theatre intubating another patient and initially unable to attend in person but advised staff to prepare for theatre by pre oxygenation rapid intravenous fluid administration. During the 22 minutes to delivery in theatre, the FHR remained profoundly bradycardic.

36. A vaginal examination in theatre confirmed the cervix remained unchanged at eight centimetres dilated.

37. Following a rapid sequence induction[14] general anaesthetic, Baby MNL was born in poor condition at 8.13pm, which was 24 minutes after an emergency code for an urgent caesarean section.

38. Baby MNL had no initial heart rate and was noted to be pale and floppy in tone. Apgar scores[15] were 0 at 1 minute, 1 at 5 minutes, 2 at 10 minutes and 3 at 20 minutes.

39. The paediatrician, Dr Reshma Silas, attended theatre and was present for the birth and resuscitation.

40. A neonatal code blue was called 8.38pm, prompting attendance by consultant paediatrician, Dr Kalpesh Jain, who managed the resuscitation in accordance with current guidelines.

41. Initial umbilical cord gas analysis showed a pH of 7.16 (acidotic) and lactate 18.0 (very elevated), both indicating the outcome of prolonged hypoxia.

42. Baby MNL was immediately ventilated using intermittent positive pressure ventilation,[16] intubated with an endotracheal tube and suction was performed under direct vision within one minute of life. There was no note of meconium. Intermittent positive pressure ventilation continued with peak inspiratory pressures increased appropriately and adrenaline 3 mls given via the endotracheal tube to treat the low heart rate and poor oxygenation. The position of the endotracheal tube was confirmed satisfactory on chest x-ray.

43. The Paediatric Infant Perinatal Retrieval (**PIPER**) was contacted and arrived at approximately at one hour 30 minutes of age. I note that PIPER is a state-wide service which provides

[14] Rapid sequence induction ensures the person rapidly becomes unconscious and flaccid in order to facilitate emergent endotracheal intubation and to minimise the risk of aspiration. Pre oxygenate, monitor ECG, pulse oximetry, and administer suxamethonium whilst applying cricoid pressure then insert the endotracheal tube.
[15] The Apgar score utilises five physical signs of a baby at birth, with the score usually given by the caregiver when the baby is 1 minute old and again when they are 5 minutes old. However, if the baby takes longer to fully breathe and respond, the scoring may continue at 5, 10, and 20 minutes of age.
[16] Intermittent positive pressure ventilation provides oxygenation and ventilation until a more definitive airway can be established.

accessible and timely expert advice to health care providers for paediatrics and high-risk obstetric care.

44. In the intervening time Baby MNL was passively cooled. Controlled passive hypothermia is the technique used in special care nurseries in Victoria to initiate hypothermia treatment during stabilisation prior to retrieval and transport to the neonatal intensive care unit. It allows the baby to cool naturally at ambient environmental temperature by removing all external heat sources.

45. Baby MNL had an umbilical venous catheter and an umbilical arterial catheter inserted, with positions confirmed on chest x-ray. He received a further four doses of adrenaline 1 ml each, normal saline fluid and glucose boluses, prophylactic antibiotics, and blood products such as packed red cells and fresh frozen plasma.

46. Baby MNL's pupils were noted to be non-reactive at 9.36pm and a blood gas test indicated profound metabolic acidosis.[17] Inotropes[18] were started for low blood pressure and a slowing heart rate at 9.45pm, just prior to transfer to the special care nursery. Baby MNL also received prophylactic vitamin K, hepatitis B vaccination and hepatitis B immunoglobulin.[19]

47. Baby MNL was commenced on high frequency oscillation ventilation to improve oxygenation prior to transfer to the Royal Women's Hospital Neonatal Intensive Special Care, where he arrived on 28 September 2017 at 1.40am.

48. At the time of transfer, Baby MNL remained in poor condition with his pupils fixed and dilated.[20] Complex medical issues over the following three days included hypoxic ischaemic encephalopathy,[21] meconium aspiration syndrome, and renal and liver failure.

49. Due to significantly abnormal neurological assessments and investigations,[22] a diagnosis of hypoxic ischaemic encephalopathy and multi-organ failure, active treatment was ceased.

50. Baby MNL passed away on 30 September at 7.43am at the Royal Women's Hospital.

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[17] ABG in 100% oxygen showed severe lactic acidosis in addition to respiratory acidosis with a pH 6.6, PCO2 61, PO2 73, HCO3 6.0, and lactate >18.
[18] Inotropic drugs are used to increase the strength of contraction of the heart and peripheral blood vessels in order to support cardiac function and blood pressure.
[19] Maternal hepatitis B positive status.
[20] A commonly identified endpoint in medical assessment to signify hypoxic (inadequate oxygen) brain injury.
[21] Hypoxic ischemic encephalopathy is a condition in which the brain does not receive enough oxygen leading to brain damage.
[22] A cranial ultrasound and electroencephalography.

REVIEW OF BABY MNL'S CARE

51. As part of my investigation into Baby MNL's death, I obtained advice from the Court's Health and Medical Investigation Team (**HMIT**) about the events leading to his death.

52. The HMIT is staffed by healthcare professionals, including practising physicians and nurses. Importantly, these healthcare professionals are independent of the health professionals and institutions under consideration. They draw on their medical, nursing, and research experience to evaluate the clinical management and care provided in particular cases by reviewing the medical records, and any particular concerns which have been raised.

53. I note that Dr van Dam was provided with a copy of my proposed comments in accordance with the principles of procedural fairness. On 8 June 2021 and 15 June 2021, I received written submissions and further clarification from Dr van Dam in response to my proposed comments. Dr van Dam's submission and further statements have been incorporated below where relevant and have significantly clarified the events of Baby MNL's birth.

Management of prolonged first stage of labour

54. The HMIT noted that it is not uncommon for labour to 'stop and start' with multiple episodes of early/spurious labour before labour is finally established. Recurrent or prolonged episodes of spurious labour may lead to a decision to induce labour in some women. The HMIT noted that Ms FGX presented in spurious labour and, when labour was established, was slow to progress.

55. The threshold at which slow cervical dilation requires augmentation by an oxytocin infusion is any less than one centimetre an hour for most women in labour.[23] Ms FGX's uterine contractions were mild to moderate in strength and cervical dilation remained relatively unchanged at seven or eight centimetres between 4.50pm and 7.30pm.

56. Dr van Dam noted that a primigravida can progress slowly up to six centimetres, after which dilation can progress at one centimetre per one to two hours. Slow progress in the first stage of labour is sometimes augmented by oxytocin, but in the presence of adequate contractions, may require alternate measures such as artificial rupture of membranes. Dr van Dam also

[23] Royal Australian and New Zealand College of Obstetricians and Gynecologists 'Provision of routine intrapartum care in the absence of pregnancy complications.' July 2017. Accessed on 18 February 2020 at www.ranzcog.edu.au.

noted that the CTG trace from 2.35pm to 3.35pm was normal and that the membranes were artificially ruptured at 7.30pm.

57. The findings of uterine contractions and cervical dilation are usually documented graphically on a partograph. The partograph is a graphic record of vital observations to assess progress during labour. Correct use of the partograph can help to prevent and manage prolonged or obstructed labour and other serious complications The HMIT noted that the vaginal examination findings were written in the progress notes, but not in the partograph, which led to discrepancy regarding to the timing Ms FGX's vaginal examinations.

Delay in birth

58. Fetal bradycardia was first detected at 7.30pm with confirmation 15 minutes later. Dr van Dam explained that at 7.30pm staff were unable to detect the fetal heart rate with a Doppler so CTG monitoring was commenced. At this time, the fetal heart rate was slightly bradycardiac at 104 beats per minute. At 7.46pm, staff had difficulty in accurately ascertaining if the heart rate on the CTG was fetal or maternal. Sometimes, this occurs if the two rates are similar. A fetal scalp electrode was re-applied, which confirmed fetal bradycardia. Mr QBH and Ms FGX may have interpreted this discussion as the CTG malfunctioning.

59. Misinterpreted fetal bradycardia and competing theatre demands for the anaesthetist ultimately may have contributed to a lengthened decision to deliver interval. However, once the decision to deliver and proceed to theatre was made, the time to delivery was an acceptable 22 minutes.

Hospital's internal review

60. Dr van Dam confirmed that Baby MNL's death had been reported to Safer Care Victoria as a sentinel event as well as being presented to two other internal review meetings.

61. Difficulty starting the caesarean section due to no anaesthetist being immediately available was identified as an issue. A recommendation was therefore made to increase anaesthetic and theatre staff to allow for immediate access for an emergency caesarean section. Dr van Dam has confirmed that anaesthetic rostering has been revised since Baby MNL's death so that an onsite anaesthetist is now available at all hours and a dedicated operating theatre for emergency caesarean sections has now been opened.

62. Dr van Dam also noted that WMH instituted a 'code green', which indicates immediate caesarean section, from 1 September 2021, which immediately makes a theatre and anaesthetist available immediately, which assists in expediting emergency caesarean sections.

Conclusion regarding contributing factors in Baby MNL's death

63. Additional statements from Dr van Dam in June 2021 clarified the timing of vaginal examinations. This evidence required further review by the HMIT (in August 2021), which considered that Ms FGX's labour was managed reasonably.

64. The further evidence from Dr van Dan highlighted a difficulty in the coronial investigation to establish labour progress due to the incomplete partogram documentation (uterine contractions, abdominal palpation, and vaginal examinations).

65. The lack of a partograph in this case led to significant delays in my investigation. On initial examination of the medical records, it appeared that labour was unnecessarily prolonged and that the labour was not progressed within a reasonable timeframe. This triggered a series of multiple correspondences between Court staff and Dr van Dam. Upon receipt of submissions from Dr van Dam and her explanations of the evidence, it is now clear that labour progressed reasonably, and vaginal examinations were performed as recommended in guidelines.

66. Had a partograph been properly completed and provided, my investigation would have been finalised earlier and Mr QBH and Ms FGX would not have had to endure the additional distress of a prolonged coronial investigation.

67. Dr van Dam has informed me that she has reminded staff of the need to ensure the partogram is completed. However, given the effect the lack of a partogram has had on this investigation, I will recommend that the relevant guidelines are amended to ensure a partogram is completed for every labour.

FINDINGS AND CONCLUSION

68. Pursuant to section 67(1) of the Act I make the following findings:

    (a) the identity of the deceased was MNL, born 27 September 2017;

    (b) the death occurred on 30 September 2017 at The Royal Women's Hospital, 20 Flemington Road, Parkville, Victoria, from hypoxic ischaemic encephalopathy complicating peri partum asphyxia; and

(c) the death occurred in the circumstances described above.

RECOMMENDATIONS

Pursuant to section 72(2) of the Act, I make the following recommendations:

1. I recommend **Werribee Mercy Hospital** amend relevant guidelines to require a partogram to be completed for each labour and birth.

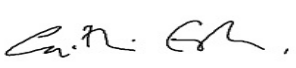
I convey my sincere condolences to Baby MNL's family for their loss.

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:

Mr QBH and Ms FGX, senior next of kin
Dr Jacqueline van Dam
Mercy Health
Royal Children's Hospital (PIPER team)
Safer Care Victoria
Senior Constable Carlie Debono, Victoria Police, reporting member

Signature:



Caitlin English, Deputy State Coroner

Date: 08 November 2021

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.