IN THE CORONERS COURT
OF VICTORIA
AT MELBOURNE

Court Reference: COR 2011 004307

FINDING INTO DEATH WITHOUT INQUEST

Form 38 Rule 60(2)
Section 67 of the ***Coroners Act 2008***

I, PARESA ANTONIADIS SPANOS, Coroner,

having investigated the death of HANNAH McNEIL
without holding an inquest:
find that the identity of the deceased was HANNAH McNEIL
born on 15 November 2011
and that the death occurred on 15 November 2011
at the Mercy Hospital for Women, 163 Studley Road, Heidelberg Victoria 3084

from:

I (a) PULMONARY HYPOPLASIA IN THE SETTING OF ASCENDING MATERNAL GENITAL TRACT INFECTION.

Pursuant to section 67(2) of the **Coroners Act 2008**, I make findings with respect to **the following circumstances**:

1. Hannah McNeil was a term baby and the daughter of Mr Wayne and Mrs Danielle McNeil. Baby Hannah was born at the Mercy Hospital for Women by emergency caesarean section at 2.14am on 15 November 2011, at 40.4 weeks gestation.

2. Mrs McNeil was 42 years old and had had a spontaneous miscarriage in 2010 before becoming pregnant again. She underwent amniocentesis to check chromosome normality, which showed a normal female foetus, and had an uneventful antenatal course. An untrasound at 35.6 weeks showed a well formed baby with no abnormalities noted. At term, Mrs McNeil met criteria for management in the Hospital's Family Birth Centre and there was no medical reason to limit her choice.

3. Mrs McNeil contacted the hospital midwives on several occasions from 10 November 2011 with spurious labour. She was assessed on 12 November 2011 at 40.1 weeks. A CTG trace and Amniotic Fluid Index were found to be normal. Mrs McNeil was reviewed again on 13 November 2012 when the CTG trace was again found to be normal, and she was offered an induction of labour which she accepted.

4. On 14 November 2011, Mrs McNeil was admitted for induction of labour, and her membranes were artificially ruptured at 9.40am. At this time the cervix was 2cm dilated and liquor was clear. At 11.30am, a Syntocinon infusion was commenced. By 7.35pm the cervix was 6cm dilated. Mrs McNeil continued to labour and at 8.05pm an epidural was inserted for labour analgesia. At 9.40pm the cervix was 8-9cm dilated and the CTG trace showed an episode of foetal tachychardia 15-165bpm with normal variability.

5. At 11.00pm the cervix was fully dilated, examination confirmed the baby was in a right-occipito-posterior position and the CTG trace was reassuring. At 11.50pm active pushing commenced.

6. The obstetric registrar was paged at 12.35am as there had been little descent of the head despite 45 minutes of pushing. A vaginal examination at 12.50am confirmed the baby was presenting brow first, a presentation that is incompatible with spontaneous vaginal birth. Mrs McNeil was advised accordingly that a caesarean section was recommended and she consented. Also, thick meconium was present indicating that Baby Hannah was in some distress. The CTG trace was noted to show an elevated foetal heart rate of 160 beats per minute (bpm), but with normal variability and variable decelerations.

7. The operating theatre was occupied at the time the decision to proceed to caesarean section was made. Mrs McNeil was booked as a Category 2 caesarean section and was not able to be transferred to theatre until 1.35am. About 5 minutes of CTG trace in the anaesthetics room, at about 2.00am, showed foetal tachycardia with reasonable variability and decelerations.

8. Paediatric Registrar Dr Tuibeqa was present at the birth. When Baby Hannah was born at 2.14am, she was described as pale, bradycardic and in poor condition with an initial heart rate of less than 100 beats per minute (bpm). She responded to initial resuscitative efforts with a temporary increase in heart rate, but did not continue to respond. Initial resuscitative efforts included drying, airway clearance by suction and the initiation of mask ventilation with a 'Neopuff' device.

9. As Baby Hannah's heart rate initially rose, then fell despite ventilation, Dr Tuibeqa called a Code Blue. Baby Hannah was intubated after suctioning and adrenaline was administered, but she remained bradycardic. Further repeated doses of adrenaline were administered.

10. When there was no detectable heart rate 21 minutes after birth, resuscitation was ceased and Baby Hannah was pronounced deceased at 2.36am on 15 November 2011.

11. An autopsy of Baby Hannah's body was performed by Forensic Pathologist Dr Yeliena Baber from the Victorian Institute of Forensic Medicine (VIFM) who reviewed the circumstances as reported by the police to the coroner and provided a detailed written report of her findings. Dr Baber attributed death to *pulmonary hypoplasia in the setting of ascending maternal genital tract infection* and stated that post mortem CT scanning revealed the presence of a right-sided pneumothorax with mediastinal shift and collapse of the right lung, as well as changes consistent with peri-mortem oedema and/or peri-mortem aspiration. Other ancillary investigations, including toxicology, microbiology, metabolic screening and radiology, were considered by Dr Baber to be non-contributory.

12. Dr Baber commented that at autopsy, Baby Hannah's lungs were normally formed but their weights were well below that expected for her gestational age, and that this is consistent with pulmonary hypoplasia. The kidneys were also smaller than expected for gestational age. A small amount of meconium was present within some airways.

13. Examination of the placenta by Dr Virginia Billson from the Royal Children's Hospital revealed umbilical venous and arterial vasculitis, together with moderate acute chorioamnionitis, which are features of maternal ascending genital tract infection with a response from the foetus.

FAMILY CONCERNS

14. Mr and Mrs McNeil expressed concerns about antenatal and post-natal clinical management. On their behalf, Maurice Blackburn Lawyers, requested further investigation of several issues, including the following:

    - the appropriateness of the management of syntocinon during Mrs McNeil's labour
    - whether CTG monitoring and interpretation was conducted appropriately during labour, and the appropriateness of allowing labour to continue given periods of foetal tachycardia identified on the CTG trace

- whether symptoms of an ascending maternal genital tract infection were present during labour
- whether Mrs McNeil should have undergone a caesarean section earlier, and after the decision was made to proceed to caesarean section, whether it was reasonable for the procedure to have commenced over an hour later
- the appropriateness of the five-minute delay between Baby Hannah being born and a Code Blue being called
- whether it was possible to identify that Baby Hannah had pulmonary hypoplasia prior to Mrs McNeil's labour commencing and whether labour would have been managed differently if hospital staff were aware that Baby Hannah had pulmonary hypoplasia.

OPINION OF DR CALDWELL

15. Mr and Mrs McNeil engaged obstetrician and gynaecologist Dr Edwin E Caldwell to provide them with an expert opinion regarding the clinical management provided, and provided the Court with a copy of Dr Caldwell's report.

16. Dr Caldwell opined that Baby Hannah should have been delivered by caesarean section by 7.45pm on 14 November, being as soon as reasonably possible, due to Mrs McNeil's age, labour being induced, the foetal position, hyperstimulation using a syntocinon infusion, late decelerations and rising CTG base lines, poor progress as measured by cervix dilation, early CTG anomalies and an unknown length of time before delivery could be effected. Dr Caldwell stated that it appeared that it was not best practice to take over an hour to commence the caesarean section in the presence of foetal distress, and that labour was mismanaged by use of syntocinon infusion.

OVERVIEW OF CLINICAL MANAGEMENT

17. Dr Bernadette White, Mercy Hospital Clinical Director (Medical) Obstetric and Maternity Services provided an overview of Mrs McNeil's antenatal management, labour and delivery, the outcome of an internal review and Root Cause Analysis (RCA), identification of any issues by the internal review process and recommendations for improvements.

18. Dr White explained that the decision to proceed to caesarean section was based on brow presentation, which means that a spontaneous vaginal birth is not possible, and not foetal distress. The operating theatre was occupied at the time it was decided to deliver Baby Hannah by caesarean section, and Mrs McNeil was transferred to theatre at 1.35am, 45

minutes after the decision was made. Dr White stated that this was not unreasonable or unusual.

19. Dr White noted that drying, positive pressure, ventilation and suctioning were performed when Baby Hannah was born but she did not respond, and a Code Blue was called at 2.19am. The paediatric consultant, Dr Holberton, and the neonatal intensive care unit nurse arrived at 2.20am.

20. A RCA of Baby Hannah's death was undertaken. The conclusion of the RCA was that, although there was meconium staining, the CTG did not indicate concerning foetal distress, and there was no evidence of abruption or uterine rupture, or any indication in the umbilical cord blood that might have explained Baby Hannah's poor condition.

21. The RCA determined that there was a delay in the initiation of intensive resuscitation due to the absence of guidelines for initiating a paediatric Code Blue and the delayed recognition of a compromised baby.

22. The RCA further noted that the resuscitation procedure deviated from Newborn Life Support Guidelines due to lack of awareness of the severity of Baby Hannah's bradycardia and the loss of situational awareness. The key departure from the Guidelines was the failure to perform chest compressions, however the RCA concluded that it could not be stated that absence of compressions would have altered the outcome for Baby Hannah.

23. The RCA recommended that clear guidelines be introduced for initiating a paediatric Code Blue response, and that education be provided to implement the above guidelines. Several other recommendations with respect to resuscitation, availability of paediatric ECG monitors and equipment layout were also made.

24. Regarding the medical cause of Baby Hannah's death and placental examination, which showed moderate acute chorioamnionitis, Dr White stated that Mrs McNeil did not show clinical signs of infection, that there was no prolonged rupture of membranes for greater than eighteen hours and that no swabs or cultures were taken from the placenta.

25. Dr White also stated that although Baby Hannah's diagnosis of pulmonary hypoplasia explains the lack of response to resuscitation, the RCA resulted in the development and implementation of recommendations designed to improve future neonatal resuscitation outcomes.

26. Regarding Dr Caldwell's criticism of labour management, I note that it was submitted that Dr White disagreed with several aspects of Dr Caldwell's report, particularly in relation to the presence of foetal distress in CTG traces.

OPINION OF ASSOCIATE PROFESSOR ROSS HASLAM

27. Neonatologist Associate Professor Ross Haslam AO provided an expert opinion at the request of the Court, specifically addressing the concerns of Mr and Mrs McNeil. Associate Professor Haslam stated that, in his view, the questions relating to obstetric matters were adequately addressed by Dr White.

28. With respect to perinatal issues, Associate Professor Haslam commented on the categorisation of Mrs McNeil's caesarean section as a Category 2,[1] stating that in his opinion, Mrs McNeil's clinical situation is an example of an appropriate categorisation of Category 2.

29. Associate Professor Haslam stated that Baby Hannah's condition warranted immediate and aggressive resuscitation, and that there was no record of actions taken in the first few minutes of delivery, nor how Baby Hannah's heart rate was assessed. Associate Professor Haslam explained that the internationally accepted standard for neonatal resuscitation for a baby with a heart rate of <100 and who is apnoeic requires immediate positive pressure ventilation and oxygen saturation monitoring if possible, within 30 seconds of birth. Cardiac massage should then be administered if this fails to generate a heart rate of >100.

30. Associate Professor Haslam stated that Baby Hannah was provided with highly skilled and aggressive respiratory resuscitation from the arrival of the Code Blue paediatric team, but no cardiac massage, from 2.20am, but that ventilation for lung expansion (which is a key component of neonatal resuscitation) was not possible in any event, because of Baby Hannah's pulmonary hypoplasia.

31. In concluding, Associate Professor Haslam stated that Baby Hannah had significantly small lungs to a degree that, even if resuscitation had been achieved, long term survival would have been highly unlikely, and that the severe pulmonary hypoplasia was almost certainly the reason for the inability to resuscitate her, despite appropriate measures for positive pressure ventilation.

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[1] A Category 2 caesarean section is defined by the Royal Australian and New Zealand College of Obstetrics and Gynaecology (RANZCOG) as for 'maternal or foetal compromise but not immediately life-threatening'. The RANZCOG also states that a Category 2 caesarean section can become urgent if recurrent delays for other emergencies in the Labour Ward repeatedly postpone surgery, and that it is imperative that there is sufficient staffing and resourcing to meet the requirements of these recommendations.

32. Associate Professor Haslam did raise concerns about the time that the Code Blue was called, being five minutes after Baby Hannah's birth, and stated that staff present for her care at birth may not have fully appreciated the seriousness of her condition or been appropriately skilled in the resuscitation of a newborn baby, although resuscitation was being performed before the Code Blue was called. Associate Professor Haslam also referred to comments that Mr and Mrs McNeil heard staff make in relation to calling the Code Blue,[2] and stated that this reflected a worrying degree of professionalism and appreciation of the state of Baby Hannah's parents.

NEED FOR AN INQUEST

33. A mention hearing was held at the Coroners Court of Victoria in Melbourne on Thursday 28 March 2013 to hear submission on the need for an inquest and to determine whether an inquest into Baby Hannah's death should be held. The McNeil family were represented by Ms Hart, from Maurice Blackburn Lawyers. Mr Petts, instructed by Tresscox Lawyers, represented Mercy Health.

34. After hearing submissions, and as indicated ex tempore at that hearing, I determined that it was not necessary to hold an inquest into Baby Hannah's death because, based on the evidence before me, I would be unable to establish a causal connection between the primary medical cause of Baby Hannah's death, being pulmonary hypoplasia, and the clinical management of Mrs McNeil's antenatal care and labour and resuscitative efforts employed immediately after Baby Hannah's birth.

CONCLUSION

35. Baby Hannah unfortunately suffered from pulmonary hypoplasia, a rare and serious condition with a low survival rate, which was not able to be diagnosed prior to her birth.

36. I note Dr Caldwell's concerns about management of Mrs McNeil's labour and about delay between the decision to perform a caesarean section and admission of Mrs McNeil to theatre.

37. I also note the family's concerns regarding the adequacy of resuscitative efforts, lack of external cardiac massage and their query whether Baby Hannah's death could have been prevented at that time. The Mercy Hospital submits that cardiac massage was not implemented in Baby Hannah's case because the establishment of ventilation and venous

[2] Mr and Mrs McNeil submitted that after the Code Blue was called, one staff member asked 'who called the Code Blue, we don't need a Code Blue' another replied 'that's how we get the doctors here' and that this was followed by laughter.

access, as her presentation was respiratory (very stiff lungs), was an essential first step and some ventilation was being achieved after this.

38. The Hospital also stated that the intense focus on establishment of ventilation likely led to chest compressions not being instituted when they should have been, but that it was unlikely that initiation of chest compressions immediately could have altered the outcome. The Hospital acknowledged that the Code Blue should have been called sooner than five minutes after Baby Hannah's birth, but that it does take some time for normal resuscitative measures to be tried beforehand.

39. Nevertheless, the evidence of Dr White of changes that have been put in place as part of the RCA indicate the Hospital's acknowledgement that improvement in both education and guidelines for resuscitation of newborn babies was required. I recognise the efforts already made by the Mercy Hospital in this regard.

40. Regarding Mr and Mrs McNeil's concerns about staff comments following the calling of the Code Blue, I can understand how they would have found them distressing in light of the tragic outcome, and note Associate Professor Haslam's comments that they were unprofessional and insensitive. That said, I do not consider it appropriate to make adverse findings or comments against the staff members involved or the hospital in the absence of any plausible connection with Baby Hannah's death, and in light of the likelihood that they were unaware of the catastrophic outcome and simply trying to forestall panic. If the family wish to pursue this matter, I would suggest that they address their concerns directly to the Hospital or to the Health Services Commissioner.

41. I find that the cause of Baby Hannah McNeil's death is pulmonary hypoplasia in the setting of ascending maternal genital tract infection.

42. I further find that due to her rare and debilitating condition, it is improbable that Baby Hannah would have survived for any significant period even if resuscitative efforts had been performed differently.

43. I acknowledge the actions of the hospital in conducting a RCA and implementing changes as a result of the RCA. In light of that remedial action, I do not propose to make any comments or recommendations pursuant to sections 67(3) or 72(2) respectively of the *Coroners Act 2008*.

I direct publication of this finding on the Court's website, and provision of a copy of this finding to the following for their information:

The family of Hannah McNeil

Ms Kathryn Booth, Principal, Maurice Blackburn

Ms Deidre Watson, Mercy Hospital for Women

Consultative Council for Obstetric & Paediatric Mortality & Morbidity

Associate Professor Ross Haslam

Dr Edwin E. Caldwell.

Signature:

PARESA ANTONIADIS SPANOS
CORONER
Date: **22 January 2014**