IN THE CORONERS COURT
OF VICTORIA
AT MELBOURNE

Court Reference: COR 2012 004248

FINDING INTO DEATH WITH INQUEST

Form 37 Rule 60(1)
*Section 67 of the **Coroners Act 2008***

Inquest into the Death of: LILY IRWIN

Delivered On:	28 August 2014
Delivered At:	Coroners Court of Victoria 65 Kavanagh Street SOUTHBANK Vic 3006
Hearing Dates:	7th – 11th April 2014
Findings of:	Coroner Rosemary Carlin
Representation:	Dr P. Halley for Eastern Health
	Mr R Gipp for Ms Peters, Ms Stegman, Ms Adams and Ms Occleshaw
	Mr B Ihle for Dr Yeoh
	Ms M Bylhouwer for Dr Fitzgerald
Police Coronial Support Unit	Leading Senior Constable Tania Cristiano

I, ROSEMARY CARLIN, Coroner having investigated the death of LILY IRWIN
AND having held an inquest in relation to this death on 7th – 11th May 2014
at Coroners Court MELBOURNE
find that the identity of the deceased was LILY IRWIN
born on 25 September 2012
and the death occurred on 25 September 2012
at Box Hill Hospital, 51 Nelson Road, Box Hill 3128
from:

1 (a) SEPSIS

In the following circumstances:

BACKGROUND AND CHRONOLOGY

1. Baby Lily Irwin died shortly after she was born on 25 September 2012 at Box Hill Hospital. She was the first child of Tanya, aged 28, and Luke Irwin.

2. Ms Irwin gave birth at the Birralee Midwifery Maternity Unit (**Birralee**) at Box Hill Hospital. Ms Irwin was a qualified midwife and actually worked as an Associate Unit Manager (**AUM**) at Birralee. Ms Irwin participated in a program called Know Your Midwife (**KYM**), in which her care was allocated to a single midwife. Because she worked at Birralee Ms Irwin knew her KYM midwife and others involved in her care. Her first KYM midwife was Felicity Occleshaw. At 30 weeks gestation Ms Occleshaw left the employ of the hospital and was replaced as Ms Irwin's KYM midwife by Anne Marie Peters.

3. Ms Irwin's pregnancy was uncomplicated and her expected date for delivery was 19 September 2012. At about 5 pm on 22 September Ms Irwin's membranes spontaneously ruptured. She attended at Birralee at around 9.30 pm for examination.

4. Her amniotic fluid was clear and all clinical observations (pulse, respirations, temperature and blood pressure) were within normal range. Cardiotocography (**CTG**)[1] was also normal. Ms Irwin was offered, but declined, a swab to test for the presence of Group B

[1]CTG enables electronic monitoring of foetal heart rate as an indicator of foetal wellbeing. Foetal heart rate may also be monitored by auscultation.

streptococcus (**GBS**)[2]. As she was not in labour, she was advised to return home and that an induction would be scheduled for 26 September.

5. The next day, 23 September, Ms Irwin returned to Birralee and had a CTG at 3 pm which was normal. Ms Irwin then returned home. At about 10 pm that night she started having regular painful contractions, indicating the commencement of labour. This was 29 hours after her membranes ruptured.

6. At about 11 am on 24 September, Ms Occleshaw visited Ms Irwin at her home (as a friend) and noted that Ms Irwin moved between resting in bed, sitting in the bath or sitting on a ball[3]. At 4.20 pm Ms Irwin attended Birralee and was admitted. This was almost 48 hours after her membranes ruptured.

7. At the time of admission, Ms Irwin's draining amniotic fluid was clear and her pulse, respiration, temperature and blood pressure measurements were again within normal range. Doppler auscultation of the foetal heart was normal with no decelerations. In accordance with Eastern Health's 'Term Pre Labour Rupture of Membranes' (**PROM**) policy[4], Ms Irwin was offered but declined CTG monitoring, preferring intermittent auscultation of the foetal heart rate.[5] Again in accordance with PROM policy, intravenous antibiotics were recommended, but again were declined. However, Ms Irwin agreed to the insertion of an intravenous cannula so that intravenous antibiotics could be administered if clinical signs of infection were detected at any point during labour.

8. Ms Irwin's first stage labour was uncomplicated. Ms Peters and Ms Occleshaw remained with her throughout, with Ms Peters making and recording all clinical observations[6]. The Birralee AUM, Linda Stegman, also attended Ms Irwin on occasions. Ms Irwin's observations remained within normal limits, as did the foetal heart rate during the first stage of labour. During this stage, Ms Irwin spent considerable time in a bath to manage her pain.

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[2] GBS is a cause of serious infections in neonates. If it is detected mothers in labour are routinely given intravenous antibiotics.

[3] Whilst in her statement Ms Irwin described her contractions at 10 pm on 23 September as regular, Ms Occleshaw in her statement noted the contractions on 24 September to be irregular.

[4] Policy Number 2025 last reviewed 8/6/2010.

[5] Pre labour rupture of membranes of greater than 18 hours is considered prolonged and a risk factor for ascending infection.

[6] The times in this chronology are taken from the Maternity Progress notes made by Ms Peters, or if she did not document the event, by reference to statements of the various witnesses.

9. At 11 pm, Ms Irwin's cervix was fully dilated and she commenced active pushing. This was the beginning of second stage labour. The foetal heart rate was auscultated after each contraction and no foetal heart rate abnormalities were reported.

10. Between midnight and 1 am on 25 September, progress of second stage labour was slow. At around 1 am Ms Peters asked the night obstetric registrar, Dr Amy Swanson to assess Ms Irwin for possible intervention due to lack of progress.

11. Dr Swanson attended Ms Irwin at 1.13 am. She recorded "full dilation, @ spines, no descent with pushing, unable to determine position". She advised Ms Irwin that an instrumental delivery by the obstetric consultant was necessary in theatre.[7]

12. Dr Swanson then discussed Ms Irwin's circumstances with the consultant, Dr Chester Yeoh who was present in the hospital theatre about to perform a caesarean section on another patient. Dr Swanson relayed to Ms Irwin and the attending nursing staff that Dr Yeoh had recommended she be transferred to theatre for an attempted forceps vaginal delivery. Ms Irwin requested that she not be transferred to theatre, but rather that Dr Yeoh attend her in the Labour and Delivery area for an assessment. Dr Swanson advised and Ms Irwin accepted that this would result in a delay in her assessment.

13. At 1.45 am meconium stained liquor was noted by Ms Peters.[8] This was the first sign that baby Lily was in distress. Continuous CTG monitoring was then commenced at 1.49 am. It also indicated foetal distress.

14. At 1.55 am, Dr Yeoh arrived to assess Ms Irwin. He performed a vaginal examination and commenced a forceps delivery. He was assisted by Dr Swanson. At 2.11 am the forceps were applied and the foetal heart rate immediately dropped to around 60 to 80 beats per minute. At 2.15 am the baby's head was delivered and Dr Yeoh clamped and cut the umbilical cord, which was wrapped around the baby's neck. The cord was noted to be tight, flat and white with no visible blood flow.

15. Shoulder dystocia delayed delivery of the rest of the baby, which occurred at 2.18 am. This was seven minutes after the application of the forceps blades and the onset of foetal bradycardia[9] and three minutes after the umbilical cord was clamped and cut.

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[7] In evidence she explained why such a trial should occur in theatre and said that she imagined she would have said 'in theatre", Transcript page 361.

[8] Meconium is normally stored in a neonate's bowel until after birth, however it is sometimes expelled into the amniotic fluid, or liquor, prior to or during labour and delivery. The stained amniotic fluid is a recognised sign of foetal distress.

16. Dr Yeoh handed the baby to the paediatric resident, Dr Nerissa Imeri[10], who observed her to be "flat, white and floppy, with no respiratory effort". Dr Imeri immediately commenced intermittent positive pressure ventilation with 100% oxygen via a face mask. A neonatal code blue was called. At 30 seconds of life the baby's heart rate was noted as 40 beats per minute, but subsequently it was inaudible. A one minute Apgar[11] score of 1 was assigned, indicating *significant intrapartem compromise* and that the baby remained flat despite initial resuscitation attempts.

17. Dr Swanson commenced chest compressions, as there was no detectable heart rate. At approximately 2 minutes of life Dr Yeoh intubated the baby with a size 3/0 endotracheal tube. There were auditory and visual clinical indicators that the tube was correctly positioned in the trachea.

18. Dr Ravi Bangia, staff anaesthetist at the hospital responded to the neonatal code blue and arrived in the delivery room at approximately 2.20 am. He determined that the endotracheal tube was, at that time, in the oesophagus, and repositioned it into the trachea. Dr Bangia managed the baby's ventilation whilst chest compressions continued. A dose of adrenaline was administered via the endotracheal tube. Dr Yeoh injected 20 ml of normal saline into the umbilical vein.

19. At 2.27 am the on call paediatric consultant, Dr Justin Graham arrived. A further dose of endotracheal adrenaline was administered. At this time no heart rate was audible on auscultation of the chest. Dr Graham inserted an umbilical vein catheter and administered intravenous adrenaline. A heart rate was briefly detected using pulse oximetry monitoring[12]. Dr Graham replaced the umbilical vein catheter with a larger one so that he could aspirate blood for analysis. At 2.46 am, Dr Graham drew blood and sent it for venous blood gas, full blood examination and electrolytes (to measure oxygenation, carbon dioxide levels and acid build up). At around this time Dr Swanson temporarily ceased cardiac compressions, inserted a catheter into baby Lily's left hand and also extracted blood, though it is not clear whether this blood was sent for analysis.

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[9] Slow heartbeat.
[10] She was the most senior doctor in the paediatric department working that night.
[11] The Apgar score is a measure of the condition of a newborn infant. It was designed so as to standardise the way caregivers evaluate a baby's physical wellbeing at birth by utilising five physical signs and giving each a possible score of 0, 1 or 2, reaching a total assessment of up to 10 points. The score is usually given when the baby is 1 minute old and again at 5 minutes.
[12] A pulse oximeter measures how much oxygen the blood is carrying as a percentage of the potential maximum it could carry.

20. Baby Lily's cardiac output remained poor despite the maintenance of chest compressions and ventilation support. Further doses of adrenaline and a bolus of normal saline were administered via the new umbilical venous catheter. A heart rate was intermittently detected by the pulse oximeter, however it could not be palpated and it was not heard after 2.58 am. At 3.02 am, analysis of the blood sample from baby Lily indicated severe acidosis and a very high lactate.

21. Approximately 40 minutes after delivery, given the lack of response to ongoing resuscitation efforts and the blood gas results, Dr Graham decided that it was no longer appropriate to continue resuscitation efforts. Following discussion with the parents, resuscitation was ceased at 3.03 am and the baby was pronounced deceased. Baby Lily was then placed in Ms Irwin's arms.

CORONIAL INVESTIGATION AND INQUEST

22. The death of baby Lily was 'reported' to the Coroners Court on 25 September 2012 by Dr Alison Fitzgerald, an obstetric and gynaecology registrar at Box Hill Hospital involved in the care of Ms Irwin during labour. Dr Fitzgerald was erroneously advised by the Court that baby Lily's death did not fall within the definition of a reportable death in the Coroners Act 2008, as she did not take any spontaneous breaths after birth. On 8 October 2012, a medico-legal officer from Eastern Health again 'reported' the death to the Court and requested advice from the Coroner given that baby Lily did have a heartbeat after birth.

23. Examination of the hospital medical records by forensic pathologist, Dr Yeliena Baber, revealed that baby Lily had a spontaneous cardiac output on more than one occasion during the resuscitation procedure. On this basis baby Lily's death was determined to be reportable and the Coroner's investigation began.

24. A Coronial Brief of Evidence was prepared comprising witness statements and various exhibits, generally consisting of hospital records or guidelines. An inquest was held from 7th to the 11th April 2014 at which a number of witnesses were called and further documents were tendered to the Court.

25. Section 67 of the Coroners Act 2008 requires me to find, if possible:

    a) the identity of the deceased;

b) the cause of death; and

c) the circumstances in which the death occurred.

26. In the coronial jurisdiction, '*cause of death*' refers to the medical cause or mechanism of death. The circumstances in which death occurred include circumstances which may have contributed to death.

27. As Coroner, I have another important function and that is, where possible to contribute to the reduction in number of preventable deaths and the promotion of public health and safety by way of making comment or recommendations about any matter connected to the death.

28. In the course of this Finding, I will be examining the course of events leading to the death of baby Lily, not just to determine possible contribution, but also with a view to preventing a death occurring in similar circumstances.

IDENTITY

29. There was no dispute in relation to the identity of baby Lily and I formally find her identity to be Lily Irwin.

CAUSE OF DEATH

30. Ms Irwin declined a hospital autopsy of baby Lily and by the time the coronial investigation commenced it was too late to order a coronial autopsy. This meant the cause of death of baby Lily was in issue in the investigation. Ms Irwin was apparently advised by Box Hill Hospital some time after the death that baby Lily died from sepsis. Ms Irwin disputed that sepsis was the cause of death as there were no signs of infection and the first sign of distress was the observation of meconium liquor just before birth.

31. Three expert witnesses provided reports and gave evidence in relation to the cause of death of baby Lily: Dr Karen Talia, an anatomical pathologist employed by Eastern Health at Box Hill Hospital, Dr Yeliena Baber, a forensic pathologist with the Victorian Institute of Forensic Medicine and Dr Philip Henschke, a staff neonatologist at Mercy Hospital for Women. Dr Henschke was an independent expert retained by the Court. The evidence of these three witnesses is outlined below.

Dr Talia

32. Dr Talia has a special interest in gynaecological (including placental) pathology and estimated she examined about one placenta a week for the hospital.[13] In 2013, she conducted 60 such examinations.

33. Between 28 September and 4 October 2012, Dr Talia examined Ms Irwin's placenta and various tissue and swab cultures. She received the placenta intact with attached membranes and umbilical cord.

34. The blood sample taken from baby Lily during resuscitation was not cultured because Dr Talia was unaware of its existence prior to giving evidence.[14] If this blood had been cultured it may have established definitively whether baby Lily had an infection.[15]

35. On 18 December 2013, Dr Talia prepared a report for the Court. She found clear evidence of amniotic fluid infection and resultant severe maternal and foetal acute inflammatory response.

36. Most amniotic infections are due to bacteria ascending the vagina into the amniotic cavity via the cervix from the cervicovaginal region or perineum. Dr Talia determined that Ms Irwin's placenta was heavily infected with penicillin resistant Staphylococcus aureus. She told the Court that it was very uncommon to find such a dense coating of bacteria on a placenta and even in infected placentas it was unusual. Only two of the total 214 placentas examined in Box Hill Hospital in 2013 had such a thick coating of bacteria. In one case, the foetus died and Dr Talia was unsure of the outcome in the other.

37. Surface swabs taken from the mouth and nose of baby Lily on 25 September and perineal swabs taken from Ms Irwin on 27 September, all showed a heavy growth of apparently identical bacterium to that found on Ms Irwin's placenta.[16] Dr Talia dismissed *contamination* during delivery of the placenta (for example from skin or the perineum) as being responsible for the presence of the bacterium thereon. She noted that in the case of amniotic infection caused by ascending bacterial infection it would be expected that the same bacterium would be colonising the maternal perineum, as here. Further, the fact

[13] Placentas are only examined if there is a clinical reason to do so.
[14] This blood was analysed but not cultured. It is not clear whether one or two blood samples were retained and/or analysed.
[15] Dr Henschke explained that a positive culture would have proved sepsis but a negative result would not necessarily have meant there was no sepsis.
[16] The bacteria all had the same antibiotic sensitivity profile.

that all sites had a single virulent population in large quantities was the exact opposite of that expected with contamination.

38. I accept Dr Talia's reasons and am satisfied the infection was present prior to the birth of baby Lily. Further, in the absence of such infection there is no explanation for the maternal and foetal inflammatory responses.

39. The fact that Ms Irwin may not have displayed clinical signs of infection did not detract from Dr Talia's findings as she stated it is widely accepted that chorioamnionitis[17] can exist without any clinical signs, especially in a young fit woman. Dr Talia also explained that Staphylococcal aureus was a particularly virulent bacteria which could lead to severe and profound infection more quickly than other bacteria.

40. Due to the lack of autopsy (or foetal blood culture), foetal sepsis could not be definitively established, however, Dr Talia was able to determine the foetal immune response by examination of the umbilical cord and chorionic plate[18]. Even in the absence of foetal infection, the inflammatory response can itself act as a disease mechanism similar to sepsis and damage the foetus. This is a phenomenon known as foetal inflammatory response syndrome (FIRS) which occurs because the immaturity of the foetal immune system can lead to an exaggerated and disproportionate response to a toxic stimulus, such as amniotic infection. FIRS is diagnosed by the presence of acute funisitis[19] and chorionic vasculitis[20], both of which were observed by Dr Talia. Given the presence of FIRS, Dr Talia considered the question of whether baby Lily in fact had sepsis was a moot point.

41. Because maternal acute inflammation can exist without any foetal response, Dr Talia was of the view that the intensity and severity of the maternal and foetal inflammation in this case, indicated a maternal infection of at least some hours. Amniotic infections can either cause, or result from, premature rupture of the membranes. According to Dr Talia, the extent of maternal and foetal inflammation was consistent with the infection developing around the time Ms Irwin's membranes ruptured. She cited literature correlating the severity of the maternal inflammation with an infection of at least 36 hours.

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[17] Inflammation in the placental membranes usually caused by infection of the amniotic fluid.
[18] The membrane via which the umbilical cord attaches to the placenta.
[19] Inflammation of the umbilical cord.
[20] Inflammation of foetal blood vessels in the chorionic plate.

42. In any event, Dr Talia was of the view the infection and associated inflammatory responses were well established prior to the delivery of baby Lily. She was fortified in that view by the results of baby Lily's blood analysis which were shown to her in the witness box.[21] Dr Talia explained that it was not possible for the inflammatory changes she observed to have continued after delivery of the placenta as blood flow is required to mediate active inflammation.

43. During her pathological examination, Dr Talia observed pigment consistent with meconium exposure in the placental membranes. Whilst meconium is implicated as a cause of foetal hypoxia,[22] Dr Talia was of the view its presence in this case was likely the result of the chorioamnionitis. She also noted that meconium exposure must be of at least one hour duration before it is visible in the membranes, in this case meaning exposure occurred prior to about 1.20 am.[23]

44. In her report, Dr Talia concluded that the presence of FIRS would have significantly compromised baby Lily and diminished her ability to cope with the subsequent complications of her delivery and to respond to resuscitation attempts. In short, it was a major contributing factor to her death.

45. In Court, Dr Talia said there was evidence of profound established sepsis in baby Lily and agreed with Dr Henschke's opinion that baby Lily was likely to have been infected with Staphylococcus aureus. She stated the most likely cause of death was sepsis.

46. Dr Talia explained that without the sepsis (and I take her to mean FIRS) the baby may have coped with the complications of her birth. She could not say if any interventions would have made a difference to the outcome.

Dr Baber

47. Dr Baber independently reviewed the placental histology results. Essentially Dr Baber's interpretation of the histology was the same as Dr Talia's. In particular, she was of the view that baby Lily would have been compromised by her response to the maternal infection. She confirmed that the acute maternal and foetal inflammatory response could only have occurred prior to delivery.

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[21] Page 100 of the Coronial Brief.
[22] By stimulating umbilical vessel constriction.
[23] Baby Lily was born at 2.18 am and the placenta was delivered at 2.23 am.

48. She cited literature that a single loop of umbilical cord around a baby's neck was unlikely to have had any significant effect. A few minutes of reduced supply of oxygen rarely has an effect on an otherwise well baby. She also did not think a displaced endotracheal tube was significant in the context of a baby already seriously compromised. The baby would have been very difficult to resuscitate anyway.

49. In her report,[24] Dr Baber gave a *possible* cause of death as perinatal asphyxia in the setting of ascending maternal genital tract infection. In evidence she maintained that in the absence of autopsy she could say no more than that, given she could not exclude other potential factors unrelated to the maternal infection, for example metabolic disease, other infections or congenital abnormality. She explained that the asphyxia encompassed all events surrounding baby Lily's birth which may have caused a deprivation of oxygen. Whilst deferring to Dr Talia's expertise in placental histology, she did not think Dr Talia was in a position to give a cause of death.

50. Dr Baber said this was a multifactorial situation and she suspected baby Lily would have survived the other complications of birth if not for the maternal infection and her immune response.

Dr Henschke

51. Like Dr Baber, Dr Henschke independently reviewed the laboratory and histopathology reports of the placenta and umbilical cord. He also reviewed the medical records, statements from treating practitioners and correspondence from Ms Irwin. His report was dated 7 May 2013.

52. Dr Henschke also concluded the laboratory and histopathology results indicated acute bacterial chorioamnionitis and funisitis secondary to Staphylococcus aureus infection. He did not consider that foetal hypoxia or meconium staining on their own explained the inflammatory response.

53. Significantly, he also analysed the pathology results of the blood sample taken from baby Lily and concluded the results were "*strongly suggestive*" of the baby being infected herself with Staphylococcus aureus. Whilst he considered it likely the baby was herself actively infected, rather than just responding to the mother's infection, he agreed with Dr Talia that it mattered little, as it is the inflammatory response that causes the profound cardiovascular disturbance.

[24] This report was undated but was uploaded onto the VIFM computer database on 7 June 2013.

54. In his report, Dr Henschke stated:

> *"It is my experience that Staphylococcus aureus is a particularly aggressive pathogen in the newborn infant. In the newborn infant, this bacterial infection can cause profound cardiovascular disturbances and severe acidosis similar to the clinical findings encountered in Baby Lily Irwin around the time of her delivery, and such infections can be ultimately fatal despite intensive care support and aggressive antibiotic therapy. In contrast, it is my experience that short lived acute hypoxic-ischemic injury of several minutes duration is very unlikely to cause such profound cardiovascular disturbances that the infant cannot be resuscitated at delivery despite prolonged and aggressive interventions."*

55. For essentially the reasons given by Dr Talia, he was also satisfied the Staphylococcus aureus detected in the placenta and on baby Lily, was not the result of contamination in the course of delivery. Rather, he considered the infective processes developed after Ms Irwin's membranes ruptured and prior to the birth of Lily. He also noted that histopathological proof of chorioamnionitis in the absence of clinical signs is well documented in the medical literature.

56. Dr Henschke regarded it as highly significant that reduced variability of heart rate on CTG monitoring and meconium staining both occurred prior to the application of forceps. These findings indicated that baby Lily was already compromised by the time delivery commenced, either from unrecognised hypoxia or Staphylococcus aureus. Further, the fact the baby did not respond to ventilation, intubation and chest compressions indicated she was severely compromised at birth.

57. Dr Henschke considered the blood gas lactate level of greater than 19.9[25] in the sample of blood taken from baby Lily during the attempted resuscitation[26] indicated the baby had suffered a significant protracted period of oxygen deprivation to her tissues, well beyond an hour.[27] The fact the cord lactate was also greater than 20 meant this high level was reached prior to and was not affected by anything that happened during the resuscitation

[25] Millimoles per litre (mmol/L), although the unit of measurement was not referred to in discussion.
[26] Dr Henschke stated the abnormality was so dramatic that whether the blood sample was arterial from the hand or venous was of no consequence.
[27] Dr Yeoh gave evidence that a reading of greater than 20 indicated a period of hypoxia of at least a couple of hours.

efforts.[28] According to Dr Henschke the infective process in baby Lily would have caused tissue hypoxia and could entirely account for this reading.

58. In his report, Dr Henschke stated that the single most important contributing factor to the death of baby Lily was the presence of the bacterial infection causing chorioamnionitis and the spread of the infective process to the baby. In evidence, he stated it was extremely unusual for a baby to die from unrecognised hypoxia or shoulder dystocia or resuscitation complications. He thought it very unlikely that the umbilical cord wrapped around baby Lily's neck would have caused major distress. A single wrapping of cord is very common and on its own is not associated with poor condition of the baby upon delivery[29]. He did not consider the 3-minute delay between delivery of head and body to be significant, nor the fact the endotracheal tube was in the oesophagus for some time.[30]

59. He stated:

> *'I've been doing this job for a very long time and I can't think of a time when I've been unable to resuscitate a baby as a consequence of shoulder dystocia, or a baby born alive with a heart rate who's been asphyxiated prior to delivery.'*[31]

60. Dr Henschke agreed with Dr Baber that in the absence of an autopsy it was not possible definitively to exclude other causes of baby Lily's hypoxia. However, he was of the view that as there was such strong evidence of the infective process, and no evidence of any separate process explaining the hypoxia, the likely cause of death was sepsis. Further, he noted that metabolic abnormalities normally only manifest themselves in the hours to weeks after birth.

61. As Coroner, my duty is to determine cause of death on the balance of probabilities. I accept Drs Henschke and Talia's opinions that it is likely that baby Lily had developed sepsis. Given that this sepsis fully accounts for both her condition at birth and the failure of all reasonable resuscitation efforts, I am satisfied that the likely cause of her death was indeed sepsis. The possibility that there was a separate undetected process also causing

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[28] In a document completed at least 20 minutes after birth, Ms Peters noted venous cord lactate was ">20". She could not remember who called it out to her and she did not know if the procedure was correct. According to Dr Henschke, a delay in taking the cord lactate would not account for such an abnormal reading. This would seem especially so, given that the venous cord reading coincides with baby Lily's blood lactate reading.

[29] Multiple wrappings do have an association with poor condition at birth, but even then, the babies usually recover.

[30] Dr Henschke had successfully resuscitated a baby with an endotracheal tube in the wrong place for 15 minutes.

[31] Transcript page 502.

hypoxia cannot be discounted. However, in terms of probabilities, I think the coincidence is unlikely.

Finding

I therefore formally find the cause of death of baby Lily to be sepsis.

CIRCUMSTANCES IN WHICH DEATH OCCURRED

62. At the outset, it is important to acknowledge the grief suffered by Tanya and Luke Irwin at the loss of their first-born child. It is also important to acknowledge that baby Lily's death would have been upsetting to all health practitioners involved in her delivery and attempted resuscitation. The emotional impact on the various parties was obvious during the Inquest. The fact that an Inquest must necessarily involve a clinical and detached assessment of the facts does not mean the profound loss at its core is forgotten.

63. Whilst I am obliged to examine the circumstances in which baby Lily died, this is not in order to cast blame or moral obloquy on any individual or institution. Rather, it is to determine causal factors and identify any systemic failures with a view to preventing, if possible, deaths from occurring in similar circumstances in the future.

64. The Inquest examined the appropriateness of the choices made by Ms Irwin as to the management of her labour; whether her choices were fully informed; whether more could or should have been done to counsel her against those choices; and whether those choices affected the outcome.

65. It is trite to say that no health practitioner could do anything to Ms Irwin without her permission. Ms Irwin's evidence was that she wanted to minimise unnecessary intervention in childbirth because she thought it best for her and the baby. She agreed that she was familiar with all relevant Eastern Health Guidelines and the reasons for them. She knew she was not acting in accordance with hospital policy by declining antibiotics and CTG monitoring and in using the bath in the setting of prolonged rupture of membranes, but "*was happy for intervention should the clinician have had any concern*". Further, as the medical staff knew of her decisions and did not discuss them with her, she took this to mean her "*requests were reasonable and there was no concern that they were against hospital policy*". In evidence she stated she was fully informed and not critical of any of the midwives.

66. As AUM, Ms Irwin was more senior within the hospital than her KYM midwife, Ms Peters. Ms Peters stated she knew Ms Irwin's views as to various procedures and practices from previous discussions as work colleagues. She knew that Ms Irwin understood the various hospital guidelines and the reasons for them. Accordingly, rather than try to persuade her to a point of view, she would just ask Ms Irwin whether she wanted a particular intervention or procedure and respect her wishes.

67. Ms Stegman was the AUM up until her shift finished at 10.15 pm. After that she stayed on as unpaid overtime until 11 pm and then as a support person for Ms Irwin. She said it was not her role to discuss medical intervention with Ms Irwin as she was not the primary midwife. She also believed Ms Irwin knew of all hospital guidelines and the reasoning behind them. Ms Stegman said she was aware from past conversations that Ms Irwin favoured a more natural delivery, though she did not know how that would translate to her own situation.

68. Ms Stegman said that in accordance with hospital policy when a patient refused any treatment recommended by the hospital guidelines the matter should be "*escalated*", meaning referred to the medical team. She said there was an "*expectation*" that the Registrar would then counsel the patient.

69. In fact, at the time, the relevant policy 'Expected Pathways of Care for Pregnant Women'[32] did not require 'escalation' where a patient acted against medical advice *during labour*, as opposed to at an earlier stage of pregnancy.[33] Nevertheless, the policy did require an assessment of Ms Irwin by a medical registrar because her PROM was over 18 hours.

Issues

70. In the course of the investigation, the following specific issues arose as potentially relevant to the circumstances of death.

    a) The declining of the GBS swab;

    b) The declining of prophylactic antibiotics;

    c) The preference for intermittent Doppler auscultation over continuous CTG monitoring;

[32] Version 4 dated 22/08/2012, Exhibit J.

33 I was advised during the Inquest that this anomaly has now been corrected.

d) The use of water immersion as pain relief;

e) Whether the doctors should have been more interventionist;

f) Whether the delivery was managed appropriately; and

g) Whether the resuscitation efforts were appropriate.

I shall consider each of these matters separately.

The declining of the GBS swab

71. Eastern Health 'Group B Streptococcus Prevention & Management' policy[34] states that swabs for GBS should be taken at 35 to 37 weeks gestation. The PROM policy states that if GBS status is unknown then screening is appropriate.

72. Ms Irwin's GBS status was unknown when her membranes ruptured and according to the PROM policy, she should have been screened. According to Ms Peters, Ms Irwin's reason for declining the swab was that she knew it was likely her labour would commence prior to the result of any swab, she would be given intravenous antibiotics in any event and if the swab was GBS positive then it could result in unnecessary testing of the baby.

73. It is speculative as to whether, if Ms Irwin had consented to this swab, it would have been tested for anything other than GBS. Drs Fitzgerald, Yeoh and White said it depended on what tests were requested by the doctor and conducted by the pathologist. Theoretically, Ms Irwin might have had a positive result to this test resulting in an earlier induction of labour or treatment with antibiotics which coincidentally were effective to treat or prevent Staphylococcus aureus.

74. Examination of Ms Irwin's placenta did not reveal infection with GBS. This made it somewhat less likely a swab would have returned a positive result for GBS[35]. It is also speculative whether a swab soon after Ms Irwin's membranes ruptured would have detected Staphylococcus aureus. The infection may not have been present at that stage or the tests performed may not have tested for it. Given the variables, I am not satisfied that having a GBS swab would have made any difference in this case.

[34] Policy Number 1811 last reviewed 1/1/2007.
[35] Ms Irwin and Dr Yeoh indicated that it is possible for infection with GBS to come and go.

The declining of prophylactic antibiotics

75. The pre-labour rupture of Ms Irwin's membranes increased the risk of amniotic infection and neonatal sepsis.

76. Following the Inquest the Coroners Prevention Unit reviewed the literature in relation to this increased risk and the use of antibiotics and advised as follows:

- The risk of sepsis increases with increasing time from rupture of membranes to delivery.[36]
- A study of term neonates born to women with a history of prolonged rupture of membranes of at least 24 hours duration identified that 8.2% had positive blood cultures for organisms including GBS and Staphylococcus aureus, compared to 0.1% of neonates without prolonged rupture of membranes.[37]
- Both RANZCOG and the United States Centre for Disease Control identify rupture of membranes of greater than 18 hours with unknown GBS status as a risk factor for early onset sepsis and an indication for the administration of intrapartum antibiotics, particularly to reduce the risk of GBS disease.[38] [39]
- A Cochrane review of two studies comparing antibiotic use in prolonged rupture of membranes found a significant reduction in chorioamnionitis and endometritis, and reduced neonatal length of stay.[40]

77. The PROM policy states the risk of a serious neonatal infection with term PROM doubles from 0.5% to 1.0%. The policy did not advocate routine use of antibiotics in the absence of signs of infection, even for PROM of over 24 hours. However, the policy did recommend intravenous antibiotics once labour commenced for PROM of over 18 hours. Ms Irwin's labour commenced at 10 pm on 23 September[41], which was 29 hours after her membranes ruptured.

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[36] Herbst A and Kallen K. 'Time between membrane rupture and delivery and septicaemia in term neonates. *Obstet Gynaecology* 2007 Sep; 110(3): 612-618.
[37] Marlowe SE, Greenwald J, Anwar M, Hiatt M and Hegyi T, 'Prolonged rupture of membranes in the term newborn. *American Journal of Perinatology.* 1997 Sep; 14(8): 483-486.
[38] RANZCOG College Statement, 'Maternal Group B Streptococcus in Pregnancy: screening and management. Current November 2012. Available online at https://www.ranzcog.edu.au/college-statements-guidelines.html (Accessed 4 June 2014).
[39] Centres for Disease Control and Prevention. 'Prevention of perinatal group B Streptococcal disease – revised guidelines from CDC, 2010. *MMWR Recoomm Rep.* 2010; 59 (RR-10): 1-36.
[40] Flenady V, King JF, 'Antibiotics for prelabour rupture of membranes at or near term (Review).' *The Cochrane Library.* 2002, Issue 3.
[41] When asked if she considered that she was then in labour, she said she hoped so.

78. According to Ms Irwin she asked not to receive prophylactic antibiotics when she was admitted at 4.20 pm on 24 September (48 hours after her membranes ruptured) because she was allergic to erythromycin, had had a severe reaction to penicillin and was unsure how she would react to the proposed antibiotic. In her statement she said "*I didn't want the first dose in labour unless clinically indicated.*"

79. Given the absence of any signs of infection and her stated allergy/adverse reaction to penicillin and erythromycin, the recommended antibiotic according to the PROM policy was clindamycin. Drs Fitzgerald and Yeoh both confirmed they would have prescribed clindamycin. The policy provided for 600 mg of intravenous clindamycin every 8 hours throughout labour.

80. The particular strain of Staphylococcus aureus that had infected Ms Irwin was not tested for sensitivity to clindamycin, however according to Dr Henschke Staphylococcus aureus is generally sensitive to clindamycin. Further, the hospital records indicate Ms Irwin was treated with clindamycin for her episiotomy wound, it would seem successfully.

81. According to Dr Fitzgerald, whilst she was considering which antibiotics to administer to Ms Irwin following her admission to Birralee, she was informed by Ms Peters that Ms Irwin had declined antibiotics altogether. Dr Fitzgerald did not follow her usual course of informing Ms Irwin of the risks involved in this course because she believed Ms Irwin would be aware of the risks and that Ms Peters would also reinforce this. Dr Fitzgerald did not see Ms Irwin at all.

82. According to the Expected Pathways of Care for Pregnant Women policy Dr Fitzgerald should have '*assessed*' Ms Irwin upon her admission, because of her prolonged ruptured membranes. It was contended by Dr Fitzgerald that speaking to Ms Peters was sufficient to amount to an assessment. Whilst acknowledging the policy document is unclear, it would have been preferable if Dr Fitzgerald had personally attended Ms Irwin and discussed Ms Irwin's choices with her. Dr Fitzgerald explained that she worked in a collaborative environment and she trusted Ms Peters, and for that matter Ms Irwin, who were both very capable and very experienced midwives.

83. Despite the pathology and neonatal expert evidence in this case that it was widely accepted that chorioamnionitis can occur without maternal clinical signs, all midwives, including Ms Irwin, stated they were unaware of this fact. Indeed Ms Peters and Ms

Occleshaw gave evidence that they had discussed the issue with midwife colleagues subsequently and all were unaware.

84. On the other hand, all doctors involved in the case did appreciate there was a subclinical phase of infection. Dr Fitzgerald stated she was surprised at the midwives' evidence as she understood the purpose of prophylactic antibiotics was to treat subclinical infections as well as to prevent infections. This accords with Dr Henschke's understanding of obstetric protocols.

85. Although she knew it was against hospital policy, I accept that Ms Irwin did not fully appreciate the risk of declining antibiotics in the setting of prolonged rupture of membranes, in particular that she could develop a serious infection without displaying symptoms. This is borne out by her communications with the Court wherein she strongly contested the cause of death being sepsis on the basis "*there was never any sign of infection*". Of significance in this regard is the fact that active labour can mask the symptoms of chorioamnionitis and make its detection more difficult.[42]

86. Whilst it seems surprising that there was not more of an appreciation amongst the midwives of the full rationale for prophylactic antibiotics, it is notable that the PROM policy does not advert to the possibility of subclinical infections, nor that symptoms of chorioamnionitis might be obscured in active labour. Since I have no evidence to the contrary, I accept the evidence of the midwives about their lack of knowledge at the time.

87. Dr Yeoh gave evidence that if he had known of Ms Irwin's presence and situation at his ward round at 7.30 pm on 24 September, he would have spoken to her about antibiotics and the CTG. He would have reassured her that it was unlikely she would have an adverse reaction to clindamycin. As noted above clindamycin was ultimately administered to Ms Irwin, with no recorded adverse reaction.

88. Dr Yeoh stated that generally antibiotics need 4 to 6 hours to work. In his report Dr Henschke stated it was not possible to claim with any certainty that prophylactic antibiotics would have prevented baby Lily's death. He had personal experience of newborns dying from overwhelming infections despite the use of prophylactic antibiotics. However, in evidence he explained that the earlier antibiotics are administered, the better the outcome as a well-established infection can progress despite the use of antibiotics.

[42] According to Dr White, an independent obstetrician gynaecologist who provided a report to the Court and gave evidence in the case.

Whilst there was insufficient data relating to Staphylococcus aureus, studies of GBS (also an aggressive infection), indicate that administration of more than two doses of prophylactic antibiotics dramatically reduce the risk of the newborn infant developing GBS or being significantly compromised. The introduction of the GBS swab reduced the rate of babies dying from GBS infection by 90%.

89. If Ms Irwin had accepted antibiotics upon her admission to hospital at 4.20 pm on 24 September, it is likely she would have received clindamycin shortly thereafter. This would have been around 7.5 hours prior to the observation of meconium and 48 hours after her membranes ruptured. I am unable to conclude on the evidence that this would have made a difference to the outcome, as it is possible the infection was too entrenched at that stage. For the same reason, I am unable to conclude that it would have made any difference had she taken antibiotics around 7.30 pm (Dr Yeoh's ward round) or 11 pm (Dr Swanson's first attempted consultation).

90. On the other hand, if Ms Irwin had been administered antibiotics when she began having regular painful contractions (10 pm on 23 September), there is an increased chance the antibiotics would have been effective in preventing the infection developing in baby Lily. At 3 pm on that day, the CTG trace indicated the baby was not compromised and it was not for another 27 hours that meconium was observed. Assuming Ms Irwin was in labour at that time, this is in fact when the PROM policy indicated intravenous antibiotics should have been administered. However, at this time Ms Irwin was still at home. She did not present to Birralee until 4.20 pm the next day.

<u>The preference for intermittent Doppler auscultation over continuous CTG monitoring</u>

91. Once Ms Irwin went into labour continual CTG monitoring was indicated by both the PROM policy and RANZCOG[43] guidelines. Both protocols recommend continual CTG monitoring in a spontaneous labour more than 24 hours after membrane rupture. The RANZCOG guidelines further specify that electronic monitoring is required after one hour of active pushing. In this instance, continual CTG monitoring did not occur until Ms Irwin had been actively pushing for almost 3 hours.

[43] Royal Australian and New Zealand College of Obstetricians and Gynaecologists.

92. Ms Irwin declined continual CTG monitoring because it was uncomfortable and restrictive. She wanted to remain active and use the bath, which was not possible with the equipment available.[44]

93. Both Ms Peters and Ms Stegman said that *'research'* showed the use of continual CTG increased the chances of medical intervention such as a caesarean section, without a corresponding increase in survival. In fact, both the 2008 PROMPT course manual[45] and the RANZCOG guidelines[46] make the point that interpretation of the scientific evidence is not so simple and that the lack of documented improvement in perinatal outcome could be the result of insufficient sample size, human error in interpreting CTGs or human error in failing to act upon poor CTGs. Nevertheless, Dr White[47] agreed that CTG monitoring might lead to unnecessary medical intervention.

94. Dr Henschke stated that the presence of normal heart rate variability[48] was the best single assessment of foetal wellbeing and reduced variability was an indicator of foetal hypoxia or acidosis. According to Drs Yeoh, Henschke and White intermittent Doppler auscultation of the foetal heart is not as reliable for detection of loss of foetal heart rate variability as continuous CTG monitoring.

95. All three doctors were shown the partogram[49] in which Ms Peters recorded the results from her monitoring of the foetal heart rate (including the range) and all agreed that the absolute figures were normal and that the partogram on its own was not cause for concern. Further, by recording the range, Ms Peters had shown an appreciation of the importance of heart rate variability.

96. However, the evidence established that the most important indicator of foetal wellbeing, being heart rate variability, is the very thing that intermittent Doppler auscultation measures most poorly. This inadequacy is manifest once the partogram is compared to the CTG trace. The last foetal heart rate recorded on the partogram was at 1.40 am and was 138 to 146, an apparently normal result. At 1.45 am meconium staining was observed and at 1.49 am CTG was commenced and indicated a lack of variability and

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[44] Evidence of Ms Irwin and Ms Peters.
[45] 'Practical Obstetric MultiProfessional Training' manual used in Eastern Health in the training of its hospital midwives and junior medical practitioners, an extract of which was tendered as Exhibit M.
[46] Intrapartum Fetal Surveillance Clinical Guideline. I have had regard to the Third Edition which was published post the death of baby Lily.
[47] The independent obstetrician gynaecologist who provided a report to the Court and gave evidence in the case.
[48] Variability describes heart rate changes of 3 to 5 cycles per minute above and below the baseline heart rate. Normal baseline variability is defined as fluctuations around the baseline in the range of 5 to 25 beats per minute.
[49] Pages 146 – 147 of Coronial Brief.

foetal compromise from the outset.[50] Given the evidence as to the duration of foetal hypoxia, it is unlikely this lack of variability only commenced between 1.40 and 1.49 am. Whilst continual CTG monitoring might cause false alarm, the danger of intermittent Doppler auscultation is that it can give false reassurance, as happened here.

97. Dr Yeoh's evidence was that the CTG trace was such that he considered the baby should come out sooner rather than later, but not that it was a medical emergency. Dr Henshke agreed that it would be quite normal for an obstetrician faced with this trace to attempt an instrumental delivery and for the only consequence to be that the baby would come out crying.

98. There was a conflict in the evidence about whether Dr Fitzgerald knew that Ms Irwin was not having CTG monitoring and intended to use the bath. If Dr Fitzgerald knew about the bath, she would also have known there was not continual CTG monitoring. Dr Fitzgerald said she was not informed of these things and if she had known about the lack of CTG she would have had a higher level of concern and would have seen Ms Irwin.

99. Ms Peters asserted that she did tell Dr Fitzgerald about use of the bath and lack of CTG. There is support for this assertion in the evidence of Ms Stegman, who said that Ms Peters reported that she had told Dr Fitzgerald about the lack of antibiotics, that there was no CTG and the use of the bath, because they were all contrary to hospital guidelines.

100. On the other hand the progress notes completed by Ms Peters at the time, only note "Reg aware" next to a note that Ms Irwin declined antibiotics[51]. There is no mention of the lack of CTG. Further, whilst Ms Peters' statement clearly indicates she told Dr Fitzgerald about the proposed use of water immersion, it does not mention telling her about the CTG[52]. In evidence Ms Peters could not recall when she told Dr Fitzgerald about the proposed water immersion. She described having a conversation with Dr Fitzgerald about Ms Irwin's progress in an area between the bathroom and room 2, whilst Ms Irwin was in the bath vocalising with her contractions. She said she did not, at that time, tell Dr Fitzgerald that Ms Irwin was in the bath, however Dr Fitzgerald commented '*She sounds good*'[53]. Dr Fitzgerald's evidence was that she presumed that Ms Irwin was in room 2 (not the bath) at that time. Ms Peters accepted she could be mistaken about

[50] Ms Stegman said that her glance at the CTG indicated the foetal heart rate was normal, however I accept the evidence of Drs Yeoh, Henschke and White.
[51] P 150 of Coronial Brief.
[52] The word "wishes" in paragraph 11 I am satisfied refers to Ms Irwin's desire to use the bath.
[53] Transcript pages, 102, 105, 133 and 134.

actually telling Dr Fitzgerald that Ms Irwin was intending to use water immersion therapy.[54]

101. Given the concessions made by Ms Peters in evidence, the lack of documentary evidence to support the proposition and the strong denial by Dr Fitzgerald that she was so informed, I am not satisfied that Ms Peters did tell Dr Fitzgerald that Ms Irwin had declined CTG monitoring and was using the bath. It is possible that Ms Peters only believed she had told Dr Fitzgerald of these matters and assumed that Dr Fitzgerald knew Ms Irwin was in the bath during their conversation outside the bathroom.

102. The fact that if Dr Fitzgerald had personally assessed Ms Irwin she would have become aware of the lack of CTG monitoring and possibly the use of the bath serves to illustrate that it would have been preferable had she done this. If she had, she could have then sought to persuade Ms Irwin as to the benefits of CTG monitoring. She would have appreciated the need for closer monitoring and referral to Dr Yeoh.

103. Dr Swanson took over from Dr Fitzgerald as obstetric and gynaecology registrar at 9.30 pm. Her evidence was that at handover she was told that Ms Irwin had prolonged rupture of membranes and had declined antibiotics, but not about the lack of CTG monitoring. I accept this.

104. Ms Stegman said that she told Dr Swanson of the situation in relation to antibiotics and foetal heart rate monitoring at 11 pm. Dr Swanson denied this. Whatever may be the case at that time, Dr Swanson certainly knew there was no CTG monitoring when she examined the baby at 1.13 am, as she wrote in the progress notes "*continue intermittent auscultation*". She gave evidence that at that time she did not turn her mind to the significance of the lack of CTG. At that late stage, I am satisfied Dr Swanson's failure to take up the issue made no difference.

105. Dr White stated:

> *"it is difficult to say whether, had continuous electronic fetal monitoring been used throughout the labour ... this would have shown an abnormality that would have led to the delivery being sooner."*

106. I am satisfied that if continual CTG monitoring had occurred from the outset the fact baby Lily was compromised would have been detected at an earlier stage, however the

[54] Transcript page 103.

state of the evidence is such that I cannot be satisfied that it would have made a difference to the outcome.

The use of water immersion as pain relief

107. The evidence is that after commencement of labour Ms Irwin spent many hours in a bath. This occurred both at her home and at hospital. Hospital records show her in the bath between 5.15 pm and 6.40 pm (temperature 37 degrees) and again between 7.55 pm and 9.45 pm (temperature 36 degrees). It would appear she did not remain in the bath for the whole of these periods.

108. Ms Peters' evidence was that Ms Irwin "was insistent" on using water immersion for pain relief, even though she knew it was against hospital guidelines. As previously discussed, I am not satisfied that Dr Fitzgerald knew that Ms Irwin had been using the bath. Dr Swanson said she was told at about 11 pm when she was looking for Ms Irwin that she might be in the bath (she was not), but otherwise did not know that Ms Irwin had been using the bath. I accept this.

109. According to the Eastern Health 'Immersion in Water for Labour and Birth' (Water Immersion) policy[55], Ms Irwin should not have used the bath because of her prolonged rupture of membranes and the fact that continual CTG was indicated. There was no mention in this policy of an increased risk of infection in the case of ruptured membranes. Indeed the PROM policy stated "*bathing or showering are not associated with an increase in infection*".

110. Both Ms Irwin and Ms Stegman thought the only reason not to use water in the case of PROM was because CTG monitoring could not occur whilst a patient was in the bath. Ms Peters and Dr Swanson, on the other hand, said it was contraindicated in the case of PROM because of an increased risk of infection. Dr Yeoh and Dr White[56] said there was some evidence of an increased risk of an ascending vaginal infection from bacteria in warm water.

111. Once again, although Ms Irwin knew she was acting contrary to hospital guidelines she did not understand that there was some evidence that using the bath increased her risk of infection. The evidence as to whether there was an increased risk of infection is not clear

[55] Exhibit H. In its written submissions Eastern Health advised that its Water Immersion policy has now been amended to indicate the increased risk of infection and the fact chorioamnionitis may be asymptomatic. No mention was made of any corresponding amendment to the PROM policy.
[56] Dr Fitzgerald also had that understanding, without knowing the evidence.

and I am not satisfied that Ms Irwin's use of the bath was the source of her infection. However, given her PROM status and the uncertainty in the evidence as to the risk of infection, it would have been wise for her to avoid it.

Whether the doctors should have been more interventionist

112. At the Directions Hearing Ms Irwin raised this as an issue. She indicated that if she had been told that she needed to take antibiotics or have CTG monitoring, she would have agreed. As noted previously Ms Irwin says she took the silence of the doctors as an indication her choices were reasonable and that she would have accepted intervention if the clinician had any concern.

113. Ms Irwin also stated she had a good professional relationship with Dr Yeoh and never said to anyone she did not want him involved and if he needed to be, that was fine. Ms Peters and Ms Stegman also denied they were deliberately keeping the doctors at bay.

114. I am not satisfied that Ms Irwin was as willing to accept the advice and involvement of the doctors as she contends. The objective evidence suggests that there was a desire to minimise the involvement of the doctors in her labour and birth. This evidence is as follows.

- Ms Irwin was placed in one of two 'overflow' birthing rooms (room 2), which were in the postnatal ward, rather than in the normal labour ward. It was Ms Stegman's decision as to where to place Ms Irwin. Despite saying in evidence that the reason she put Ms Irwin in room 2 was because it was close to a bath, in her statement, she said it was because it was a quieter area. Ms Peters also indicated that room 2 was used to give Ms Irwin privacy from the rest of the staff.

- Ms Irwin's name was not written on the labour ward Journey Board as would normally occur. At that time the Journey Board was located in the tearoom of the labour ward and was used by staff as a convenient way to check on the location and labour status of patients. It was Ms Peters responsibility to add Ms Irwin's name to the Journey Board and she claimed, in essence, that she forgot to do it. Ms Adams noticed that Ms Irwin's name was not there, did not ask anyone why not, but assumed it was for confidentiality.

- Dr Yeoh, the on call consultant obstetrician was not told of Ms Irwin's admission when he came into the hospital to do a ward round at about 7.30 pm. Dr Yeoh said that because of her PROM status she was a high risk pregnancy and he would have expected to have been informed of her presence. Dr Yeoh did not learn of Ms Irwin's presence until about 1 am when he was in theatre just about to commence a caesarean section on another patient and Dr Swanson told him of the difficulties in Ms Irwin's second stage. It was fortuitous that Dr Yeoh was in the hospital at 1 am, as he had only come in because of the other patient.

  It is difficult to accept that Dr Fitzgerald simply forgot to mention Ms Irwin at the ward round, as she claimed. There were only 6 to 10 labouring women in hospital at that time and Ms Irwin's admission was not routine. Dr Fitzgerald knew Ms Irwin was a PROM delivery who had declined antibiotics. Ms Irwin was also a colleague and a popular person in the hospital. Further, only half an hour before the ward round Dr Fitzgerald spoke to Ms Peters about Ms Irwin's progress. Finally, Dr Fitzgerald did tell Dr Swanson about Ms Irwin at their handover at 9.30 pm and even stayed back past her shift in case an instrumental delivery was required. After she left the hospital at around 10.30 pm she called Dr Swanson from home to update her on Ms Irwin.

- In her statement (dated 10 January 2013) Dr Swanson said that at the handover with Dr Fitzgerald she was told that Ms Irwin "*was labouring on the postnatal ward as she was "hush, hush under the radar" "*. She also stated that '*It was Dr Fitzgerald's impression that Ms Irwin did not want the consultant on call (Dr Chester Yeoh) to be involved.*' Notes made by Dr Swanson at 3.30 am on 25 September also stated that Dr Fitzgerald was '*waiting around in case instrumental delivery required as patient does not wish for consultant to be in attendance'*.[57] In evidence, Dr Swanson adopted the explanation just given by Dr Fitzgerald in evidence[58] that she [Dr Swanson] might have misinterpreted the reason for Dr Fitzgerald's offer to stay back, which was only as a courtesy to prevent Dr Yeoh being called in unnecessarily. It was my impression that Dr Swanson was seeking to resile

[57] At that time Dr Fitzgerald was able to perform instrumental deliveries on her own, whereas Dr Swanson, being more junior, would have required consultant supervision.
[58] Dr Fitzgerald was the preceding witness to Dr Swanson.

from the clear words in her statement and notes so as not to cause trouble for Dr Fitzgerald. From the start, Dr Swanson demonstrated she was concerned as to how her evidence might affect others and apologised more than once for possibly causing offence.[59]

- When Dr Swanson first attended room 2 at 11 pm to assess Ms Irwin's progress she knocked on the door and Ms Stegman came out and closed the door behind her. Closing the door was unusual and Dr Swanson got the distinct impression that she was not welcome. She did not enter the room, but she did have a discussion with Ms Stegman about Ms Irwin, the precise details of which are in dispute. Suffice to say that Dr Swanson was reassured that there were no concerns in relation to Ms Irwin. Despite Dr Swanson advising Ms Stegman to allow for 2 hours of active pushing, Ms Stegman told her "*we allow 3 hours*".

- According to Ms Stegman's statement, at 12.30 am although progress was slow Ms Irwin '*wasn't ready to accept medical intervention at that stage*'.

- In her statement Ms Peters said prior to 1 am, she '*gained consent from the patient to request medical assessment and intervention*'.

- Once the doctors became involved, by way of Dr Swanson being paged to do an assessment at around 1 am, the midwives continued to dictate the terms of this involvement. Dr Swanson was only a junior registrar and had only been working at the hospital for a month. Her assessment that the position of the baby could not be determined and that Ms Irwin should be conveyed to theatre for an attempted forceps delivery was challenged by the 4 midwives present in the room (including Ms Irwin), both as to the accuracy of her assessment and as to the need to go to theatre. It is clear that Dr Swanson felt outnumbered and intimidated. Even Dr Yeoh, having been told by Dr Swanson that Ms Irwin insisted he attend to her in the labour ward, acceded to this demand.

115. Ms Irwin and her attending midwives should have been more amenable to medical involvement. As Counsel for Dr Swanson observed in his written submissions, it was a curious situation that in a tertiary hospital, the midwives needed formally to obtain Ms Irwin's consent before requesting medical assessment and intervention.

[59] Transcript pages 356 358.

116. I accept there were practical difficulties in conveying a pregnant woman to theatre and that the midwives genuinely disagreed with Dr Swanson's assessment, but there were sound reasons why any trial of forceps should occur in theatre, rather than the ward. As Dr Swanson explained, if the trial did not work and a caesarean section was necessary it was desirable that the patient already be in theatre.

117. As previously discussed, it would have been preferable for Dr Fitzgerald to have assessed Ms Irwin in person. However, if she had, I am not convinced that Ms Irwin would have changed her mind about what treatment she would accept. Ms Irwin believed her decisions were well informed. Further, even if she had acceded to continual CTG monitoring and antibiotics at that stage, as already discussed I am not satisfied it would have changed the outcome.

118. Dr Swanson attempted to see Ms Irwin at the first opportunity and she cannot be criticised for failing to give her advice in the circumstances. Similarly, Dr Yeoh's involvement was far too late for him to be giving advice.

119. For completeness I note that whilst the request of Ms Irwin (whether forceful or not[60]) that she be assessed by Dr Yeoh in the ward did cause unnecessary to-ing and fro-ing by Dr Swanson, it only caused a slight delay (if any) in assessment by Dr Yeoh and the forceps delivery was successful. Dr Henschke was of the view any delay in medical intervention was unlikely to have substantially contributed to baby Lily's death and I accept his opinion.

Whether the delivery was managed appropriately

120. Several midwives were of the opinion Dr Yeoh did not follow accepted protocols for shoulder dystocia as set out in the PROMPT manual. In particular, he did not attempt any internal manouvres, rather he applied traction and continually rotated the baby's head. During the delivery, Ms Stegman called out to Dr Yeoh to obtain the posterior arm but he did not attempt to do so.

121. Apart from noting that an earlier delivery may have been indicated if continual CTG monitoring had occurred, Dr White was not critical of the course or method of delivery. In particular she was not critical of Dr Yeoh's manoeuvres and considered a 7 minute delay between application of the forceps and birth to be reasonably quick in the circumstances.

[60] Midwife Annette Adams used the word forceful in her statement but resiled somewhat in her evidence.

122. I accept Dr White's evidence and am satisfied Dr Yeoh's technique was appropriate. Further, I accept the evidence of Drs Yeoh and White, that although the delivery of the shoulders was difficult, this was not a true case of shoulder dystocia.

Whether the resuscitation efforts were appropriate

123. Ms Irwin complained there was a delay in calling a code blue. She called out twice for someone to do that. Ms Stegman left the room and got one of the nurses to call it. If there was a delay, for reasons already explained I am satisfied it was of no consequence.

124. It was originally contended on behalf of the midwives that a suggested misplacement of the endotracheal tube by Dr Yeoh may have contributed to the baby Lily's death. According to Dr Imeri's statement equal air entry was heard on auscultation of the baby's chest, indicating that the endotracheal tube was probably correctly positioned. Dr Swanson also stated there was rising of the chest wall. According to Dr Henschke the combination of auditory and visual observations meant the tube was inserted correctly by Dr Yeoh and I accept this. I am satisfied that at some point prior to Dr Bangia checking its position it became displaced so that he observed it to be in the oesophagus. Dr Henschke gave evidence that this was entirely possible.

125. As to the resuscitation efforts generally, Dr Henschke stated:

> *"I can find no indication in the documentation that would indicate there was any omission of appropriate resuscitation measures or any interventions that I would consider to have been potentially harmful under the circumstances. ... It is my opinion that Baby Lily's failure to respond to the resuscitation attempts of the doctors attending her does not reflect any inadequacies of management on their part but rather was a direct consequence of Baby Lily's severely compromised state at the time of her delivery."*

126. In evidence, he went further and commended the efforts of those involved in the attempted resuscitation. In particular he said the obstetric staff [Dr Yeoh and Dr Swanson] showed a level of skill well above what would normally be expected of them and Dr Bangia's re positioning of the endotracheal tube in only 5 to 10 seconds was an exceptional effort.

127. I am satisfied nothing that happened during the resuscitation efforts contributed to baby Lily's death. To the contrary, the management of her attempted resuscitation by all medical staff was entirely appropriate.

CONCLUSION AS TO CONTRIBUTING FACTORS

128. Because of the number of variables involved in this case, it is impossible to be certain whether anything would have changed the outcome for baby Lily. I am not satisfied that the actions or inactions of any person involved in the care of Ms Irwin contributed to the death of baby Lily.

129. I am satisfied, however, that had Ms Irwin observed all the applicable hospital policies she would have optimised the chance of survival for baby Lily.

COMMENTS

Pursuant to section 67(3) of the Coroners Act 2008, I make the following comment(s) connected with the death:

1. All patients have the right to refuse medical treatment and intervention, but it is important to ensure such decisions are fully informed.

2. Although the risk of ascending infection or sepsis from pre labour rupture of membranes is low in absolute terms, the consequences of infection may be devastating. Adherence to guidelines is important in ensuring optimal outcomes. The various Eastern Health policies, whilst generally outlining appropriate management, tended not to adequately explain the reasons for it.[61] It is trite to say that adherence to policies is more likely if their rationale is understood.

3. Baby Lily's death highlights the dangers associated with the blurring of professional boundaries and loss of objectivity inherent in treating friends and colleagues. Ms Irwin gave birth at her place of work amongst her work colleagues and friends. Her status as a respected midwife meant others were reluctant to challenge her about her decisions, as they believed she was fully informed and entitled to choose for herself. Further, the familiarity between Ms Irwin, the midwives and Registrar Fitzgerald meant that there was a degree of apprehension about causing offence and an eagerness to oblige.

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[61] Eastern Health advised of an amendment to its Water Immersion Policy post Inquest, but it would be wise if the PROM policy was correspondingly amended.

4. It was understandable in the circumstances that Ms Peters, Ms Stegman and Dr Fitzgerald did not seek to challenge Ms Irwin's choices; however, the assumption that Ms Irwin was fully informed was not correct. She knew about the relevant hospital policies, but she did not appreciate fully the reason for them, nor the potential serious consequences of disobeying them. She did not know that using the bath with ruptured membranes potentially increased her risk of infection. It appears she did not know the precise benefits of CTG monitoring over intermittent auscultation. She did not know that chorioamnionitis could be asymptomatic. She did not know that declining intravenous antibiotics meant that a serious infection could develop undetected.

5. Unfortunately, the midwives involved in Ms Irwin's care were no better informed than she. If they had been, they may have counselled her against her choices. If the reasons for the hospital policies, and the risks of disobedience had been explained to Ms Irwin, she may have made better choices. Although Dr Fitzgerald was better informed, she had the mistaken belief that Ms Peters and Ms Irwin's knowledge mirrored her own.

6. Health professionals treated in settings where they are well known should be treated the same as any other patient. They should be advised to submit to standard treatment guidelines for that institution and assumptions should not be made about their state of knowledge. Women who decline interventions demonstrated to reduce neonatal sepsis should be informed that their choices place their baby at increased risk of serious infection and death. These discussions should be documented in the medical record and audited to ensure that dissenting patients are appropriately counselled and informed.

7. It may be that best practice should require health professionals to seek treatment in independent facilities. If Ms Irwin's pregnancy and labour had been managed in a different hospital, where she was not known and had no influence, it is possible the attending midwives and doctors may have been more forthright and Ms Irwin may have acceded to hospital protocols.

8. According to the Australian Health Practitioner Regulation Agency (AHPRA) Code of Conduct for registered Health Practitioners.[62]

[62] Australian Health Practitioner Regulation Agency (APHRA) Code of Conduct for registered Health Practitioners, March 2014, 3.14 Understanding Boundaries.

9. *'Good practice includes recognising the potential conflicts, risks and complexities of providing care to those in a close relationship, for example close friends, work colleagues and family members and that this can be inappropriate because of the lack of objectivity, possible discontinuity of care and risks to the practitioner or patient'. When a practitioner chooses to provide care to those in a close relationship, good practice requires that:*

   - *adequate records are kept*
   - *confidentiality is maintained*
   - *adequate assessment occurs*
   - *appropriate consent is obtained to the circumstances which is acknowledged by both the practitioner and patient or client*
   - *the personal relationship does not in any way impair clinical judgement, and*
   - *at all times an option to discontinue care is maintained.'*

RECOMMENDATIONS

Pursuant to section 72(2) of the Coroners Act 2008, I make the following recommendation(s) connected with the death:

1. That the Victorian Department of Health Chief Nurse and Midwifery Officer, the Midwifery Board of Australia and AHPRA each consider using the death of baby Lily (de-identified) as a case example to highlight the importance of health professionals maintaining professional boundaries.
2. That the Victorian Department of Health Chief Nurse and Midwifery Officer, the Midwifery Board and AHPRA each consider ways to raise awareness amongst midwives of the possibility of serious subclinical infections in the case of PROM.
3. That Eastern Health consider using the death of baby Lily (de-identified) as a case example to its staff to highlight the importance of safe practice and maintaining professional boundaries.
4. That Eastern Health consider whether there is a need to establish protocols for the obstetric management of colleagues or friends.

5. That relevant Eastern Health policies should be amended to explain the importance of prophylactic antibiotics, both in preventing infection and in treating subclinical infections.

6. That Eastern Health's Expected Pathways of Care for Pregnant Women policy should be amended to explain what is required by way of 'assessment'.

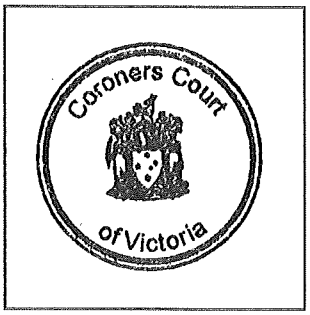
7. That relevant Eastern Health policies should be amended to explain the reason why continual CTG monitoring is preferred over intermittent auscultation, in particular its greater capacity to detect reduced foetal heart rate variability.

8. That the PROM policy should be amended to align with the already amended Water Immersion Policy to explain that bathing in the case of PROM possibly involves an increased risk of infection.

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

The Family of Lily Irwin;
Interested parties;
The Victorian Department of Health – Chief Nurse and Midwifery Officer;
Midwifery Board of Australia; and
Australian Health Practitioner Regulation Agency.

Signature:



ROSEMARY CARLIN
CORONER
Date: 28 August 2014