FORM 37

Rule 60(1)

FINDING INTO DEATH WITH INQUEST

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

Court reference: 3652/06

Inquest into the Death of CARA GRACE ZAMBELLI

Place of death:	Royal Womens Hospital, Grattan Street, Parkville 3050
Hearing Dates:	25, 26 & 27 October 2010
Appearances:	Senior Constable King Taylor, PCSU[1] - Assisting the Coroner Mr John Constable of Counsel, on behalf of the family (Maurice Blackburn) Mr Michael Wilson of Counsel, on behalf of Box Hill Hospital (Minter Ellison)
Findings of:	AUDREY JAMIESON, Coroner
Delivered On:	11 July 2011
Delivered At:	Melbourne

[1] PCSU = Police Coronial Support Unit

FORM 37

Rule 60(1)

FINDING INTO DEATH WITH INQUEST[2]

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

Court reference: 3652/06

In the Coroners Court of Victoria at Melbourne

I, AUDREY JAMIESON, Coroner

having investigated the death of:

Details of deceased:

Surname: ZAMBELLI
First name: CARA
Address: 92 Weeden Drive, Vermont South, Victoria 3133

AND having held an inquest in relation to this death on 25, 26 & 27 October 2010

find that the identity of the deceased was CARA GRACE ZAMBELLI

and death occurred on 8 August 2006

at Royal Womens Hospital, Grattan Street, Parkville 3050

from:

1(a) HYPOXIC ISCHAEMIC ENCEPHALOPATHY DUE TO TRUE KNOT IN CORD

in the following summary of circumstances:

1. Cara Zambelli was born at Box Hill Hospital (BHH) at 40 weeks + 3 days gestation following spontaneous rupture of membranes and labour. Problems occurred in the 2nd stage of labour and delivery was assisted by ventouse extraction. She required resuscitation at birth, was intubated and transferred to the Neonatal Intensive Care Unit (NICU) at the Royal Women's Hospital (RWH) but died 2 days later. The cause of death on the death certificate was recorded as Hypoxic Ischaemic Encephalopathy due to a true knot in cord.

2. The death of Cara was reported to the Coroner on 23 September 2006, by her parents Richard and Glenys Zambelli. They raised concern about the delay in delivery after detection of foetal

[2] The finding does not purport to refer to all aspects of the evidence obtained in the course of the Investigation. The material relied upon included statements and documents tendered in evidence together with the Transcript of Proceedings and submissions of legal representatives/Counsel. The absence of reference to any particular aspect of the evidence, either obtained through a witness or tendered in evidence does not infer that it has not been considered.

bradycardia, the use of vacuum extraction rather than forceps, that Cara's brain damage was caused at the time of birth and that there was delay in appropriate resuscitation techniques.

3. The State Coroner (at the time) Mr Graeme Johnstone, accepted the report.

JURISDICTION:

4. At the time of Cara Zambelli's death, the *Coroners Act* 1985 (the old Act) applied. From 1 November 2009, the *Coroners Act* 2008 (the new Act) has applied to the finalisation of investigations into deaths which occurred prior to the new Act commencement.[3]

5. In the preamble to the new Act, the role of the coronial system in Victoria is stated to involve the independent investigation of deaths for the purpose of finding the causes of those deaths and to contribute to the reduction of the number of preventable deaths and the promotion of public health and safety and the administration of justice. Reference to preventable deaths and public health and safety are referred to in other sections of the new Act.[4]

6. Section 67 of the new Act describes the ambit of the coroner's findings in relation to a death investigation. A coroner is required to find, if possible, the identity of the deceased, the cause of death and, in some cases, the circumstances in which the death occurred.[5] The 'cause of death' generally relates to the *medical cause of death* and the 'circumstances' relates to the *context* in which the death occurred.

7. A coroner may also comment on any matter connected with the death, including matters relating to public health and safety and the administration of justice.[6]

8. A coroner may also report to the Attorney General and may make recommendations to any Minister, public statutory authority or entity, on any matter connected with a death which the coroner has investigated, including recommendations relating to public health and safety or the administration of justice.[7]

BACKGROUND CIRCUMSTANCES:

9. Mrs Glenys Zambelli was 29 years of age in 2006. She had one previous pregnancy with twins in 2004. The twins were born at 32 weeks.

10. Mrs Zambelli's pregnancy with Cara was uncomplicated. She was considered a healthy multiparous patient. Her last antenatal visit was two (2) days past term at which stage her pregnancy appeared to be progressing normally. There was no indication for immediate admission and/or induction. A plan was put in place that she was to return for cardiotocography

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[3] Section 119 and Schedule 1 - *Coroners Act* 2008

[4] See for example, sections 67(3) & 72(1) & (2)

[5] Section 67(1)

[6] Section 67(3)

[7] Section 72(1) & (2)

(CTG)[8] monitoring five (5) days past term and induction of labour was planned for eight (8) days past term.

SURROUNDING CIRCUMSTANCES:

11. On 5 August 2006, at approximately 22:30 hours, Mrs Zambelli telephoned BHH to advise that she was in the early stages of labour. Her membranes were still intact. She was advised to remain at home until her contractions became more frequent, her membranes ruptured or she became concerned.

12. On Sunday, 6 August 2006, at 0040 hours, Mrs Zambelli presented with spontaneous rupture of membranes producing clear liquor. She was 40 + 3 weeks gestation. A CTG performed at 0040 hours appeared normal/showed no concerning features. At 0116 hours an Obstetrics and Gynaecology (O&G) locum Medical Officer, Dr Vladamir Caric, performed a vaginal examination which revealed dilatation of the cervix of 7-8 cm. The first stage of labour progressed normally lasting approximately three (3) hours.

13. The second stage of labour lasted one (1) hour and 31 minutes. From 0100 hours the foetal heart rate (FHR), was listened to and recorded at 15 minute intervals by the midwives. From approximately 0300 hours, Mrs Zambelli was encouraged to push actively. From 0308 hours the FHR was recorded every four to six minutes and remained normal. At 0330 hours the partogram records that Mrs Zambelli is "not pushing effectively". The FHR is recorded as 152 bpm. At 0350 hours, after Mrs Zambelli had been pushing for approximately 1 hour, Midwife Judith Barker contacted Dr Caric because she was concerned about maternal exhaustion. At 0400 hours Dr Caric performed a vaginal examination and found the cervix fully dilated with the head 1 cm below the ischial spine. The FHR was recorded as 90 bpm, recovering to 110 bpm. At approximately 0410 hours,[9] Dr Caric contacted the on-call senior Obstetric Registrar, Dr Kate McIlwaine, to advise of the maternal exhaustion and seek advice. Dr McIlwaine instructed Dr Caric to prepare Mrs Zambelli for assisted instrumental delivery and she would come into the hospital. Preparations were made for delivery pending the arrival of Dr McIlwaine. The paediatric resident was also called. At this stage there were no particular concerns about the baby's wellbeing.

14. From 0334 the FHR was at times recorded to be between 88 - 110 bpm. From 0400 the FHR is recorded as being between 80 -118 bpm. At 0418 hours, the FHR dropped to 60 bpm. Dr Caric telephoned Dr McIlwaine again to advise of the change in the babe's condition. Dr McIlwaine indicated that she was still 10 minutes away. Dr Caric returned to the birthing room and as he was concerned about foetal distress, he decided to proceed with an assisted vaginal delivery using a ventouse (vacuum-assisted delivery). Upon delivery, the umbilical cord was found to be around Cara's neck. The cord was lifted over her head and delivery of her body was facilitated at 0431 hours. The paediatric resident was present for the delivery. Dr Caric and Midwife Barker later recorded that there was a true knot in the umbilical cord. Dr McIlwaine arrived shortly after Cara's delivery stating:

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[8] Cardiotocography (CTG) is a technical means of recording (-graphy) the foetal heartbeat (cardio-) and the uterine contractions (-toco-) during pregnancy, typically in the third trimester. The machine used to perform the monitoring is called a cardiotocograph.

[9] Exhibit 3 - Statement of Dr Vladamir Caric & Statement Dr McIlwaine also puts receipt of this call at approximately 0410 hours - Exhibit 1 & Transcript of proceedings @ p. 10 & 14.

The babe was on the resuscitation cot being attended to by the paediatric RMO and the attending midwife.[10]

15. Cara was in poor condition. Her Apgar scores[11] were zero (0) at one minute, zero (0) at five minutes, zero (0) at ten minutes and zero (0) at 15 minutes. Resuscitation with bag and mask and cardiac compression started within thirty (30) seconds. A neonatal Code Blue was called at 0433 hours. Cara was intubated by the Anaesthetic Registrar, Dr Cook, at 0438 hours. Endotrachael (ET) adrenalin was administered at 0444 hours with no response. The Consultant Pediatrician, Dr Lobo, was called upon Cara's delivery and arrived at 0450 hours. A further dose of ET adrenalin was administered at 0452 hours resulting in the return of cardiac output with a heart rate of 100bpm. Cardiac compressions were ceased. Cara was also administered normal saline, sodium bicarbonate and 10% dextrose via an umbilical venous catheter that had been inserted during resuscitation. The RWH transport team - NETS[12] - was also contacted. At approximately 50 minutes of age, Cara was transferred to the Special Care Nursery. The third stage of labour was uncomplicated, the placenta was delivered at 0444 hours and Dr Caric repaired a second-degree tear.

16. At approximately 0730 hours seizure activity was recorded and treated with phenobarbitone and pheytoin. Cara's transportation to the RWH was facilitated at 0955 hours. Mrs Zambelli was also transferred to the RWH.

17. At the RWH, Cara continued to demonstrate severe encephalopathy with no spontaneous movement. She continued to suffer from seizures treated with a midazolam infusion. She showed evidence of multi-organ hypoxic injury. A period off the ventilator was unsuccessful.

18. On 8 August 2006, an MRI scan of the brain provided evidence of severe hypoxic ischaemic cerebral insult and it was noted that if she survived she was at high risk of spastic quadriplegia, ongoing seizures and possible cognitive deficit. In other words, Cara's prognosis was considered to be extremely poor. After consultation with Mr and Mrs Zambelli a decision was made to provide palliation. Cara was extubated at 2135 hours and died at 2240 hours. Cara's parents consented to an autopsy.

INVESTIGATION:

19. A formal identification of Cara was not a matter capable of coronial investigation as her body was never in the care of the Coronial Services Centre. Similarly, the date and place of her death were not in dispute and required no additional coronial investigation.

The medical investigation:

20. An autopsy was performed at the Royal Women's Hospital on 10 August 2006. The summary of the post mortem findings indicate that Cara was a normally formed, term, female infant. The brain showed histological features consistent with acute to sub-acute hypoxic episode which caused damage sometime in the interval 1-3 days before death. There were no other

[10] Exhibit 1 - Statement of Dr Kate McIlwaine dated 11 September 2008

[11] APGAR SCORE - a numerical expression of the condition of a newborn infant, usually determined at 60 seconds after birth, being the sum of points gained on assessment of the heart rate, respiratory effort, muscle tone, reflex, irritability and colour. (Source: Dorlands Illustrated Medical Dictionary - 30th Edition, 2003, Philadelphia: Saunders)

[12] NETS - New Born Emergency Transport Service

factors identified as contributing to death. The placental histopathology report shows that there was no infection present and the placenta showed infarcts of various duration occupying less than 10% of the placental volume. The placenta and cord as received by the RWH did not show a true knot.

Clinical Liaison Service review:

21. On accepting the report of Cara's death, the Clinical Liaison Service (CLS)[13] (as it then was) was requested to review the medical management of Mrs Zambelli and the delivery of Cara. The CLS assisted in the obtaining of statements and expert opinion in consultation with the coroner.

22. The investigation raised a number of issues which warranted the exercise of my discretion to hold an Inquest.[14] A Directions Hearing was held on 6 November 2009 and the matter was listed for inquest in February 2010. This date was subsequently vacated and was relisted for October 2010.

INQUEST:

23. At the outset of the Inquest the issues that had been identified for further exploration were:

- Whether there was a delay in notifying the On-call Senior Registrar of changes in the foetal heart rate.
- Whether there was a delay in the delivery of Cara following the detection of foetal bradycardia.
- The use of ventouse.
- Rostering practices which enabled the senior obstetric registrar to be off site.
- Whether there was a delay in initiation of resuscitation of Cara and if so, whether this contributed to her brain injury.

24. *Viva voce* evidence was obtained from the following witnesses:

- Dr Kate McIlwaine - Senior Registrar in Obstetrics and Gynaecology (at the time)
- Registered Midwife Judith Barker
- Dr Vladimir Caric - locum medical officer in Obstetrics and Gynaecology (at the time)
- Dr Malcolm Barnett - Director of Obstetrics at Box Hill Hospital
- Dr Maryanne Lobo - Paediatrician
- Dr Michael Harbord - Paediatric Neurologist

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[13] The role of the CLS was to assist the Coroner's investigation into the nature and extent of deaths, which occurred during the provision of healthcare, and identify potential system factors in healthcare related deaths. CLS personnel were comprised of practising Physicians and Clinical Research Nurses who drew on their medical, nursing and research experiences, skills and knowledge to independently evaluate clinical evidence for the investigation of reportable and reported healthcare deaths and to assist in identifying remediable factors that may assist in prevention and risk management in health services settings. The CLS was replaced with the Health and Medical Investigation Team (HMIT) in 2010. HMIT sits within the Coroners Prevention Unit (CPU), which was established in 2008 to strengthen the prevention role of the coroner. The unit assists the coroner in relation to the formulation of prevention recommendations, as well as assisting in monitoring and evaluating the effectiveness of the recommendations.

[14] Section 52(1) a coroner may hold an inquest into any death that the coroner is investigating.

- Dr Andrew Child - Specialist Obstetrician and Gynaecologist (provided expert opinion to the Court)
- Professsor Nick Evans - Neonatal Paediatrician (provided expert opinion to the Court)
- Dr Bernadette White - Gynaecologist (provided expert opinion to BHH)

FINDINGS, COMMENTS & RECOMMENDATIONS:

CTG Monitoring:

- **The first stage of labour:**

25. The issue of the adequacy of CTG monitoring was explored with particular reference to whether there were clinical indicators that continuous CTG monitoring should have been in place.

26. Dr Childs stated:

> *The onset and progress of labour was very normal and straightforward with spontaneous rupture of membranes, clear liquor and good progress from the cervical dilatation point of view with the total length of the first stage being around three hours....*
> *As regards the use of a CTG for monitoring of this labour I do not think that it would be considered usual practice for someone at term with clear liquor and normal unassisted progression in labour.*[15]

27. Similarly, Dr White stated:

> *Given that everything was progressing normally at this stage, there was no indication for continuous CTG monitoring.*[16]

28. I accept that the early stages of labour were uneventful and without any clinical indicies suggesting a need for continuous CTG monitoring.

- **The second stage of labour:**

29. Dr White described this stage as *an unusually prolonged second stage.*[17]

30. In respect of whether there was some critical identified event that subsequently should have resulted in the utilisation of continuous CTG, Dr McIlwaine agreed with the proposition that continuous CTG monitoring was an option of monitoring the FHR that could have been utilised if there had been concerns. She also agreed that it is a means of providing more information compared with isolated FHR readings every four to five minutes.[18]

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[15] Exhibit 8 - Report of Dr Andrew Childs dated 12 May 2008

[16] Exhibit 10 - Report of Dr Bernadette White dated 14 September 2010

[17] Transcript of Proceedings @ p.255

[18] Transcript of Proceedings @ p.13

31. Dr White stated that the second edition of the RANZCOG[19] Guidelines on Intra-partum Fetal Surveillance, issued in May 2006,[20] contains a comprehensive list of antenatal and intra-partum risk factors which are indications for continuous electronic monitoring in labour.[21] She stated that according to the Guidelines there was no indication for continuous monitoring following Mrs Zambelli's admission CTG however,

> *....the Guideline does suggest that continuous monitoring be considered after an hour of active pushing in the second stage where delivery is not imminent. On that basis there may have been an indication for continuous monitoring at 0400 hours when Mrs Zambelli had been pushing for an hour.*[22]

32. Dr White went on to qualify - in part - her opinion when she stated:

> *However, at that stage, the resident and the registrar had both been contacted with a view to assisting delivery, and the fetal heart was being recorded by intermittent auscultation every 4-5 minutes. Had continuous electronic monitoring been commenced at 04:00 it may have shown a concerning pattern and it is possible that it may have led to Dr Caric performing a Ventouse delivery earlier than 04:30. I cannot say whether this would have made a difference to the outcome.*[23]

33. Dr White explained in her viva voce evidence that what one really wanted to know about FHR in the second stage of labour is *how's the baby's heart rate responding to a contraction...does it pick up again after a contraction.*[24]

34. Dr White also pointed out that it is not always possible to get an accurate CTG trace in the second stage of labour[25]. She also had reservations about its accuracy, overuse and was not advocating continuous CTG monitoring in all labours but the use of the RANZCOG Guidelines which she opined were well thought out on what the appropriate indicators for continuous CTG monitoring were.[26]

35. **I accept** Dr White's comments that there is a limit to how much information can be obtained from intermittent auscultation - that it is not as good a method of monitoring FHR as a continuous electronic monitor.[27] However, the question remains whether there was sufficient evidence at the time to the clinicians that should have alerted them to the need for the application

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19 RANZCOG = The Royal Australian and New Zealand College of Obstetricians and Gynaecologists.

20 Exhibit 14

21 Exhibit 10 - *ibid* - @ p.5

22 *ibid*

23 *ibid* @ pp5-6

24 Transcript of Proceedings @ p.250

25 Transcript of Proceedings @ p.254

26 Transcript of Proceedings @ p.272-273

27 Transcript of Proceedings @ p.253 & 264

of the more accurate recording method and if they had done so, would it have changed the outcome. I will return to this later in the Finding.

Delivery Plan & Notifying the On-call Senior Obstetric Registrar:

36. The Maternity Services at BHH had a Maternity Handbook for its staff.[28] In the Chapter titled *Management of Intrapartum Care* in the section that deals with *Second Stage of Labour* there are three instructions on when to notify the RMO:

- 1 hour of effective pushing in nulliparous women
- **30 minutes of effective pushing in multiparous[29] woman**
- Foetal distress

- **FHR Recordings**

37. Dr Caric was not notified when Mrs Zambelli had been pushing for 30 minutes. At 0350 hours Midwife Barker reported to Dr Caric her concern about maternal exhaustion. Mrs Zambelli had been pushing for approximately 1 hour. Dr Caric performed his own assessment and considered it was time to deliver and reported the same to Dr McIlwaine who in turn instructed that Mrs Zambelli be prepared for assisted instrumental delivery. Dr Caric had considerable overseas experience in obstetrics but was not permitted to perform unsupervised deliveries in Victoria.

38. Dr Child stated that it was *very appropriate to plan to assist the delivery on the basis of failure to progress and this management was underway*[30]. Dr White was also of the opinion that it was appropriate obstetric management to this stage.

39. The question whether there was a delay in notifying Dr McIlwaine relies on an interpretation of the significance of the decelerations of the FHR prior to Dr Caric's first telephone call to Dr McIlwaine at 0400 hours. The second part to the question of delay of notification is whether there was any indication that Dr Caric should have rung Dr McIlwaine at sometime earlier to his second call to her at 0418 hours, given that she had already indicated that she would make her way into the hospital.

40. Dr White stated that FHR changes are common in the second stage of labour:

> *..in particular early decelerations where the foetal heart rate slows during a contraction and recovers following the contraction are common and not an indication of foetal compromise.*[31]

41. Dr White went on to say that although it was not clear on the information she had to hand when writing her report at what point the FHR was considered abnormal, if the earlier drops to

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[28] Exhibit 4

[29] A woman who has already borne one or more children

[30] Exhibit 8 - Report of Dr Andrew Childs dated 12 May 2008

[31] Exhibit 10 - Report of Dr Bernadette White dated 14 September 2010

80-90 bpm subsequently improved and were thought to be early decelerations, it was not necessary to expedite delivery.

42. When asked by Mr Constable about the concerning nature of a drop of FHR to 88 from about 140 bpm at 0345, Dr McIlwaine said:

> *If it was during a contraction or while she was pushing and the heart rate was normal between contractions that would be within normal limits in a term pregnancy with clear liquor (sic).*[32]

43. Dr McIlwaine later agreed with Mr Wilson that it was her evidence that if the recovery was prompt or quick then there would not be any concern for the health of the baby.[33]

44. And although Dr McIlwaine agreed with Mr Constable that there was a change in the baseline of the FHR around that time, Dr McIlwaine said it was not always a cause for concern - it would depend on the situation. Mr Constable highlighted that the situation before us was a multigravida[34] mother pushing for an hour and that there had been a change in the foetal heart rate and then asked Dr McIlwaine again whether these were indicators that something might not be right, Dr McIlwaine responded:

> *Potentially, yes, and plans were made to deliver this baby.*[35]

45. Dr Caric's telephone call to Dr McIlwaine at approximately 0410 hours was because of a prolonged second stage of labour and concerns of maternal exhaustion. Dr McIlwaine stated that Dr Caric also told her that the FHR was within normal limits at that time. She stated:

> *He told me that she had been pushing for over an hour, to my recollection, and that she was exhausted and that the foetal heart rate was within normal limits at the time.*[36]

46. **I find** that there were no significant clinical indicators of foetal compromise that would have warranted a telephone call to discuss assisted instrumental delivery prior to 0345 hours. **I accept** that the periodic drops to FHR prior to that time were appropriately interpreted as early decelerations, which recovered promptly. At 0345 hours there is a drop in FHR to 88 bpm but it still recovers to within a normal range to 120 bpm. From each subsequent recording there is a noticeable lowering of the FHR although it is still recovering to within an acceptable normal range, albeit lower than prior to 0345 hours. Dr White stated:

> *In retrospect, maybe there was an indication that the foetal heart was not recovering well. At the time should they have picked it up in a multiparous (sic) healthy patient who there was no other indication of a problem? Look, as I say, that's why I think this was unexpected. These changes in foetal heart rate in the second stage of labour, they are*

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[32] Transcript of Proceedings @ p.10

[33] Transcript of Proceedings @ p.22

[34] A woman who has had one or more previous pregnancies

[35] Transcript of Proceedings @ p.12

[36] Transcript of Proceedings @ p.10 & 20 & Exhibit 1 - Statement of Dr Kate McIlwaine dated 11 September 2008

common and you think that's a bit slow, but for most women it's not a sign of anything being wrong, the baby comes out, the baby is fine. It's just unfortunate in this case, looking at it (sic) all from the other end, it probably is significant. Whether you would have picked it up at the time - look, I think you would get a better - more information talking to the midwives who are there but looking at that set of figures written on that piece of paper, can I say they should have? I don't think you can say that.[37]

47. Dr White also stated that a change to the base rate to something that might still have been normal, i.e. between 110 and 120, doesn't automatically mean there is a problem[38] and that what is really important are decelerations and how they correlate to the timing of contractions, not changes in the base rate.[39]

48. I accept that neither Midwife Barker, an experienced midwife or Dr Caric, an experienced doctor in O&G, did not have any concerns for the babe's wellbeing at the time of this first call to Dr McIlwaine. I accept that they did not think the babe was compromised and I accept Dr White's opinion that the FHR recordings were not of themselves significant enough to make them think that the babe was compromised.[40]

49. In relation to the second period in time that is, between 0400 hours and 0418 hours, I again set out the recorded events:

- 0400- 0410 hours Dr Caric rang Dr McIlwaine. The reason for the call is maternal exhaustion. Dr McIlwaine informed Dr Caric to prepare Mrs Zambelli for an instrumental delivery and she would come into the hospital.
- 0405 hours - FHR recorded at 88 recovering to 118
- 0409 hours - FHR recorded at 80 recovering to 102
- 0413 hours - FHR recorded at 90 recovering to 110
- 0418 hours - FHR recorded at 60
- 0420 hours - Dr Caric rang Dr McIlwaine informing her of the drop in FHR. She informs him she is still approximately 10 minutes away from the hospital. Dr Caric decides that the delivery cannot wait for her arrival.
- 0431 hours - Dr Caric delivers Cara.

50. Dr White stated that *it was appropriate to expedite delivery when there was persisting foetal bradycardia, which did not recover.*[41]

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[37] Transcript of Proceedings @ p. 264

[38] Transcript of Proceedings @ p. 265

[39] Transcript of Proceedings @ p. 269

[40] Transcript of Proceedings @ p. 271

[41] Exhibit 10 - Report of Dr Bernadette White

- **Application of Maternity Handbook**

51. It nevertheless remains necessary to comment that the guidance on notification to the RMO provided in Maternity Handbook was not followed. The handbook states that one of its purposes is *to detect and act on any deviations from the normal.* The deviation from normal in the second stage of labour was, according to the handbook, 30 minutes of effective pushing. If the guidelines had been followed, Dr Caric could have been notified approximately 20 minutes earlier. Earlier notification to Dr Caric may have led to earlier notification to Dr McIlwaine and indeed an earlier delivery time. Although I cannot be definitive that this would have altered the outcome for Cara there was an opportunity to put the delivery plan into progress which may have averted the maternal exhaustion and minimised the period of changes to the FHR that occurred from 0345 hours and 0418 hours. However, I can only put this propsition as a potential opportunity lost as it is not possible to be definitive that in the absence of other indicators of maternal exhaustion and foetal distress at the 30 minute mark, any different plan would have occurred or been implemented.

Ventouse assisted delivery:

52. Dr Child questioned the choice of vacuum assisted delivery in the circumstances.[42] Dr Child was of the opinion that most experienced Obstetricians would use forceps to assist delivery in like circumstances because the procedure from initiation to delivery is quicker.

53. Dr White on the other hand expressed the opinion that it was for the doctor to use which ever method they were most familiar with and she did not agree that Ventouse delivery was likely to take longer.[43]

54. Dr Caric who had considerable obstetric experience, stated that he had performed thousands of instrumental deliveries and considered himself skilled and experienced in vacuum extractions.[44]

55. **I find** that the use of Ventouse assisted delivery was reasonable and appropriate in the circumstances. Dr Caric was more familiar with its application and use than he was with forceps. There is no evidence that its use delayed the delivery of Cara once the decision was made by Dr Caric to proceed in the absence of Dr McIlwaine. The evidence is that he delivered Cara using this method after only two pushes by Mrs Zambelli. There is no evidence that the use of ventouse contributed to Cara's insult.

The presence of a true knot in the umbilical cord:

56. There is no evidence of a knot in the cord in the autopsy report or the placental histopathology report.

[42] Exhibit 8 - Report of Dr Andrew Child

[43] Exhibit 10 Report of Dr Bernadette White

[44] Exhibit 3 - Statement of Dr Vladimir Caric

57. Midwife Barker entered in her notes that a true knot was present but she gave evidence that she did not see it herself. She relied on the observations of the other midwife present at the birth to make her notes who had assured her a true knot was present.

58. Dr Caric stated that he was shown the knot by a staff member while he was attending to Mrs Zambelli.[45] Dr Lobo also saw the knot.[46]

59. Dr McIlwaine noted a true knot in the cord on her arrival at the hospital.[47] She made an entry in the Progress Notes later that morning - *probably after 5.00am.*[48] The entry has the appearance of an afterthought but I attach no significance to this and have no reason to not accept Dr McIlwaine's evidence that all of her notes were made contemporaneously and not added onto at some later date.

60. Dr Child stated that even in the absence of the pathologist noting a true knot in the cord, there was strong evidence that there was a true knot present. He said it was quite likely that one of the clinical team undid the knot prior to it being sent to Pathology and there was no evidence on histopathology of a long standing tight knot and the presence of a true knot could explain *this severe and sudden episode of foetal distress in an otherwise healthy baby and the mechanism is that the knot becomes tighter as the baby descends through the birth canal.*[49]

61. Dr White agreed with Dr Child's comment that a knot in the cord provides an explanation for Cara's severely compromised state at birth.

62. **I find** that there is sufficient compelling evidence that a true knot was present. There is recordings/documentation of its presence but it is less than satisfactory that it was not well documented and left intact when the placenta was transferred to RWH. An understandable consequence was to create doubt about its existence in the minds of Mr and Mrs Zambelli. In the absence of clear, concise, contemporaneous documentation by nursing and medical staff of a patient's management but in particular, the management in critical events and adverse outcomes, medical and nursing staff effectively deny themselves an accurate legal document and an *aide memoir.* They also remove from families and loved ones the trust and confidence most have, or want to have in their health professionals.

63. In addition in this case, a true analysis of the circumstances has been compromised by the action of untying the knot and/or not sending that part of the cord and not documenting the same for forensic pathology purposes. I note however, that the hospital has now conceded its shortcomings in this regard.[50]

64. The Maternity Handbook, although comprehensive in its guidance including a section on *Adverse Outcomes* and the *Management of Stillbirths,* there is no specific reference that I have identified or been directed to, that emphasises the importance of recording accurately the state of

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[45] *ibid* @ p.5

[46] Transcript of Proceedings @ p.141

[47] Exhibit 1 - Statement of Dr Kate McIlwaine & Transcript of Proceedings @ p. 14

[48] Transcript of Proceedings @ p. 23

[49] Exhibit 8 - Report of Dr Andrew Child dated 12 May 2008 @ pp. 2 & 3

[50] Transcript of Proceedings @ p.298

the placenta and cord when an adverse event has occurred and pathology and histopathology is to occur.

65. **I recommend:** that the Maternity Handbook be reviewed and amended to provide specific direction about the care, retention and documentation of the placenta and cord in any circumstances where pathology and histopathogy is warranted. The instruction should also emphasise the importance of maintaining the placenta and cord intact. I also **recommend** that the taking of photographs of the placenta and cord be included as routine in all obstetric adverse outcomes.

Delay in initiation of resuscitation:

66. I do not accept that there was any delay in the resuscitation attempts of Cara. There was a "delay" in intubation pending the arrival of the Anaesthetic Registrar but Cara was receiving ventilation via a bag and mask and cardiac compressions by trained medical and nursing personnel. The second dose of adrenalin was not administered in accordance with accepted guidelines, until Dr Lobo arrived, but although cardiac output was achieved I am not able to find on the evidence that it would have changed the outcome. The fact remains that Cara's Apgar score at 15 minutes remained at zero (0) which indicates that her outcome was going to be poor.

67. According to Dr Lobo, resuscitation commenced in the first minute of Cara's life and the neonatal Code Blue called at two (2) minutes past delivery.[51] According to Associate Professor Evans, the delay in intubation and receipt of adrenalin was not an important determinant of her outcome.[52]

68. **I find** that the resuscitation process was both timely and rigorous.

Causation:

69. Paediatric Neurologist, Dr Harbord, was of the opinion that Cara was likely to have suffered a cardiac arrest soon after 0420 hours rather than just prior to delivery. He based his opinion on the length of time it took to restore Cara's cardiac output after her delivery,[53] interpretation of the MRI scan results and autopsy findings.[54]

70. Associate Professor Nick Evans stated that at birth:

> *...she was in complete cardiac arrest and the brain injury would have been established. I would guess (as one can never be sure) that the point at which her brain injury became irreversible would have been during the 10 to 20 minutes prior to delivery.*[55]

[51] Exhibit 6 - Statement of Dr Maryanne Lobo dated 17 April 2009

[52] Exhibit 9 - Report of Associate Professor Nick Evans dated 24 February 2009 @ p.5

[53] Exhibit 7 - Report of Dr Michael Harbord dated 20 April 2010 @ pp. 5-6

[54] *ibid* @ pp.7-8

[55] Exhibit 9 - Report of Associate Professor Nick Evans dated 24 February 2009 @ p.3

71. On whether an earlier delivery would have improved Cara's chances of a normal outcome, he stated:

> *It is not possible to be definitive but this would have improved her chances. In fetuses with a fixed bradycardia, the shorter the time to delivery, the better the chances of normal outcome. However this needs to be tempered by the fact that between normal outcome and death, is survival with disability and such disability after birth asphyxia can be severe. So while earlier delivery may have increased her chances of the normal outcome, it would also have increased her chances of survival with a lifetime disability.*[56]

On-call rostering arrangements at the time:

72. The weekend on-call rostering arrangements at the time required that registrars be at the hospital on the Saturday between the hours of 0800-1200 hours only. In the absence of any need to attend the hospital, they would return on Monday morning.

73. Dr McIlwaine lived approximately 30 minutes from the hospital and this was known and accepted by the hospital. It took Dr McIlwaine approximately 20 minutes to arrive at the hospital, on 6 August 2006. She conceded that if she had been at the hospital, the baby could have been delivered 20 minutes earlier but on reviewing the partogram at Mr Wilson's request, she also said that she could not see any acute precipitating event that would have led her to interfere in the labour.[57]

74. Nevertheless, I find that the absence of the Obstetrics Registrar influenced the delivery plan. The plan albeit in place at 0400 hours or 0410 hours when Dr McIlwaine received the call and set off for the hospital, could have been instigated immediately and before the profound bradycardia, if the hospital had had a Registrar on the premises. Whether it would have definitively altered the outcome requires a greater degree of speculation. As such, I cannot make a finding in this regard.

75. In 2006 BHH was a Level 2 obstetric hospital and had 2,028 deliveries but they did not have 24 hour, 7 days per week Registrar cover on site. Mr Wilson submitted[58] that in 2006 the hospital complied with its peer group hospitals but Dr Child was of the opinion that a hospital with over approximately 1500 births per year should have a doctor at Registrar level present at the hospital.[59] I accept that following Cara's death a review of its obstetric service, the hospital had intended to have 24 hour cover by 2009. However, at the time of the Inquest they still had not achieved this. The weekends were still not covered by a Registrar on site.

76. **I recommend** that BHH continue in its endeavours to secure 24 hour per day, 7 days per week on site obstetric Registrar cover and to report in its response pursuant to section 72(3) and sub-section (4) to this recommendation, the steps they have taken to achieve this outcome since the close of evidence in this Inquest to date and their strategic plan for the future in this regard.

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[56] *ibid* @ p.4

[57] Transcript of Proceedings @ p.22

[58] Transcript of Proceedings @ p. 300

[59] Transcript of Proceedings @ 200

CONCLUDING COMMENTS & FINDINGS:

77. The death of a full term babe following an uncomplicated pregnancy in a healthy mother is a tragedy and intuitively difficult to comprehend. It is understandable that Mr and Mrs Zambelli's grief is unabating.

78. However, the making of adverse comment or adverse findings of individuals working in their professional capacity is not to be done lightly.[60] The consequences for the individual's professional status and position can be grave and far reaching. The overall impression I obtained from the obstetric witnesses was that the outcome would not have been predictable. There was no real criticism of the obstetric management even with their "benefit of hindsight" examination of the records. My role is not to attribute blame but to establish cause.

79. I also **accept** Mr and Mrs Zambelli's frustration that due to credentialling requirements imposed on doctors with overseas qualifications, Dr Caric was meant to await supervision before performing an instrumental delivery. I accept that raises all the possible scenarios of a potentially better outcome but the whole issue of the appropriateness of the credentialling system has not been explored in this Inquest and is arguably beyond my jurisdiction. In *Harmsworth v State Coroner*, Nathan J warned that unless a coroner confines an inquest using principles of remoteness and causation, then:

> *Such an inquest would never end, but worse it could never arrive at the coherent, let alone concise, findings required by the Act, which are the causes of death....*[61]

80. I make **no adverse finding** against individuals involved in the birth of Cara Zambelli.

81. And **I further find** that although the investigation identified shortcomings in adherence to guidelines, documentation and the adherence of the integrity of the true knot in the cord, there is no causative relationship between these shortcomings and Cara's death on 8 August 2006.

82. I accept and adopt the medical cause of death as identified on the Perinatal Death Certificate and **find** that Cara Grace Zambelli died from hypoxic ischaemic encephalopathy due to a true knot in the cord.

Pursuant to section 73(1) *Coroners Act* 2008, this Finding will be published on the Internet in accordance with the Rules.

Signature:

AUDREY JAMIESON
CORONER
Date: 11 July 2011

Coroners Court of Victoria

[60] *Briginshaw v Briginshaw* (1938) 60 CLR 336

[61] *Harmsworth v The State Coroner* [1989] VR 989 at 996.

Distribution of Finding:

- Mr Richard & Mrs Glenys Zambelli
- Ms Mandy Bede, Maurice Blackburn Lawyers
- Director of Medical Services, Eastern Health
- Ms Lisa Ridd, Minter Ellison Lawyers
- Consultative Council of Obstetric and Paediatric Mortality and Morbidity
- Minister for Health