STATE CORONER'S COURT
of NEW SOUTH WALES

Inquest:	Inquest into the death of **Elsie COGHILL**
Hearing dates:	30 November – 4 December 2015
Date of findings:	11 March 2016
Place of findings:	State Coroner's Court, Glebe
Findings of:	Deputy State Coroner HCB Dillon
Catchwords:	**CORONERS** – Cause and manner of death – Death of infant – Whether antenatal arrangements were appropriate – Whether augmentation of labour was appropriate – Whether an operating theatre should have been made available during labour – Whether a paediatrician should have been present at birth – Whether immediate postnatal care was appropriate
File numbers:	2013/164090

Representation:	Mr A Casselden (Advocate Assisting) instructed by Mr J Herrington, Crown Solicitor's Office
	Ms K Nomchong SC with NV Broadbent instructed by William Allan, CCC Law (Coghill family)
	Ms J Lonergan SC instructed by Ms M Nicolle, Meridian Lawyers (Dr D Levy)
	Mr M Lynch instructed by Ms A Rogerson, HWL Ebsworth (Dr H Ward)
	Ms K Burke instructed by Ms K Donnelly, Meridian Lawyers (Dr McAuley)
	Mr P Rooney instructed by Ms D Kelly, Curwoods (Mid-North Coast Local Health District & Dr D Ramjan)
	Ms K Doust, NSW Nurses and Midwives Association (Registered Nurses Newcombe, Humphreysl, Greig, Little)
Findings:	I find that Elsie Coghill died on 27 May 2013 at Coffs Harbour Health Campus, as a result of hypoxic ischaemic encephalopathy caused by multiple factors including a lung abnormality caused by antenatal distress, a sudden unexpected and, for a period undetected, apnoeic episode while being transferred to intensive care and undiagnosed bilateral tension pneumothoraces.

Recommendations:

I make the following recommendation to the Minister for Health and the Local Health District:

1. That consideration be given, in cases of unusual and unexpected deaths of newborn children in regional hospitals in New South Wales, to having autopsies conducted by specialist perinatal / paediatric pathologists or that deaths of such deceased newborn children be investigated medically by forensic pathologists and a specialist perinatal / paediatric pathologist together in whatever way is appropriate in all the circumstances to establish (if possible) the cause and manner of death.

2. That the Local Health District consider introducing a protocol that if a newborn baby is unstable with low to intermediate APGAR scores at five minutes, a MET team be placed on immediate alert to attend the birthing unit to assist.

3. That the Local Health District consider developing from its current protocols a short checklist of matters that must be attended to in cases of instrumental deliveries with a clear delineation of responsibility for carrying out the listed tasks. One person, such as the Registered Nurse or Midwife responsible for maintaining observations, should be nominated as being responsible for ensuring that the checklist is followed.

I make the following recommendation to the Coffs Harbour Centre for Women's Reproductive Care:

1. That the Centre revise its forms and protocols to ensure that instructions given by or plans made by Dr Ward or other clinicians for their patients are followed. A clear form with unmistakable plans and a chronology for follow-up may be an advisable tool to adopt.

REASONS FOR DECISION

Introduction

4. Elsie Coghill was a baby who died on 27 May 2013 at Coffs Harbour Health Campus (a public hospital) at the age of less than a day, following a difficult delivery in circumstances in which her mother was attempting a Vaginal Birth After Caesarean ('VBAC").

5. Although most of the hearing time during the inquest was spent exploring technical medical issues, Elsie is not a mere statistic or a symbol of tragedy. All who participated in this inquest recognise that she was a baby who left behind parents who loved her very much, who were excited by the prospects of raising her and who miss her and the potential life they would have had together.

6. This is, however, not merely a case of private loss and grief. Elsie's death raises questions of public interest. In broad terms, her death raises the question of whether we can make the public health system safer for babies like her.

The coroner's functions and the nature of the inquest

7. An inquest is an independent judicial inquiry by a coroner. A coroner investigates sudden and unexpected deaths to establish, if possible, the identity of the deceased person, the date and place of that person's death; and the manner and cause of the person's death. There is no controversy in this case as to identity, date, or place of death. In this case, the focus of the inquest has been on the cause and manner of Elsie's death.

8. At the conclusion of an inquest, if it appears necessary or desirable to do so, a coroner may also make recommendations to relevant persons or organisations.

The issues

9. During this inquest we have considered the following issues:

- Should arrangements have been made for a Caesarean Section during the antenatal care of Tamara Coghill?

- Was augmentation of Tamara's labour appropriate?
- Should arrangements have been made for an operating theatre to be made available during Tamara's labour?
- Was the manner and mode of the vacuum delivery appropriate?
- Should a paediatrician or neonatologist have been present at the delivery?
- Was the care and management of Elsie following her birth appropriate?
- What was the cause of death? Assuming that the cause of death was hypoxic ischaemic encephalopathy, was the hypoxia an antenatal or postnatal event?
- Are there recommendations which ought to be made which would reduce the likelihood of similar deaths occurring or otherwise contribute to an improvement in public health and safety?

The factual background

Antenatal care of Tamara Coghill

10. Tamara Coghill fell pregnant with Elsie at around the beginning of October 2012. The pregnancy followed the birth by caesarean section of her eldest child, Stella, in 2010.

11. While Tamara was reconciled to the fact that she may ultimately need to deliver her baby by caesarean section, she was very keen to attempt a vaginal birth because she felt she had been pressured into a caesarean section during Stella's birth.

12. After undertaking her own research and discussion with her general practitioner, Tamara formed the view that she could probably attempt a VBAC safely. She engaged a doula, Jessica Nash, to support her during the pregnancy and delivery. She also made enquiries and found that Dr Harvey Ward (head of the obstetrics department at Coffs Harbour Health Campus and the Director of the Centre for Women's Reproductive Care in Coffs Harbour) was the only obstetrician in the Coffs Harbour area who was prepared to manage VBACs.

13. VBACs carry increased risk for mother and child. Although serious complications are quite rare, when complications arise they can have dire consequences. In particular, there is a risk of uterine scar rupture which can result in serious blood loss for the

mother and brain injury or even death for the infant.[1] It was therefore critical that Tamara's VBAC delivery be carefully managed.

14. Tamara took steps to be referred to Dr Ward. She saw a general practitioner, Dr Stephen May, who worked closely with Dr Ward. After two consultations she became uncomfortable with what she felt was Dr May's overly pessimistic outlook on her chances of having a successful VBAC. She left his care and attended the hospital's Pregnancy Care Services Clinic ("PCSC") for care by midwives as a patient in Dr Ward's pool.

15. From 18 January 2013, Tamara saw various midwives at the PCSC five times and Dr Ward three times. Dr Ward was in high demand. She reported that her appointments with him were sometimes two to three hours late.

16. She and Charles first saw Dr Ward at the PCSC on 18 April at 36 weeks' gestation. On that occasion, Tamara signed a VBAC Discussion Checklist confirming that certain topics had been discussed with her and was provided with a copy of the Royal Australian and New Zealand College of Obstetricians and Gynaecologists VBAC Patient Brochure.

17. Dr Ward's evidence was that, following the checklist, he had discussed augmentation with Syntocinon if the labour was not progressing, and its risks. He also discussed the possibility of foetal distress necessitating an emergency caesarean section. And he said that he had specifically told Tamara, 'that there is virtually nowhere in the world where a theatre can be guaranteed to be free in an acute emergency'. He also stated that he had expected her baby to be larger than average for maternal size but said that this did not exclude her from having a VBAC.

18. On that day Tamara consented to a VBAC. She and Charles also provided a written birth plan to Dr Ward setting out their preferences.

19. The birth plan included a request that 'labour be allowed to progress in the most natural way possible without unnecessary inducement or intervention to "hurry things along" unless there is a medical indication or emergency' and a request that 'why and what intervention may be required' be discussed with them, time permitting. It was also stated that they would provide complete cooperation in the event of a medical emergency.

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[1] Royal Australian and NZ College of Obstetricians and Gynaecologists *Birth after Previous Caesarean Section* July 2015 p.3

20. Tamara's expected date of confinement was 15 May. She saw Dr Ward again on 9 May (at 39 weeks' gestation). Dr Ward advised that she should be booked for an elective caesarean section if she had not gone into labour by their next appointment on 16 May. Tamara attended the next appointment (not having gone into labour) and found that Dr Ward was unavailable.

21. On this occasion, she was seen by a Dr Carl, an obstetrician. Tamara recollected that Dr Carl had said to her that 'I think you are fine not to book in yet, you can go another week.' Tamara said that she asked him whether he was sure about his advice and he affirmed it.

22. The medical notes of this consultation included a notation that Tamara was 'well' and that she 'remains keen for VBAC'. She says that she expressed her concern to a midwife after the appointment but was told that she should be happy that she had 'scored some extra time'. No appointment was made for Tamara to have a caesarean section.

23. Tamara next attended the hospital on 22 May as she was concerned that the baby was moving less. A foetal cardiograph was performed which returned normal results.

24. She saw Dr Ward the following day. Dr Ward was surprised that she had still not delivered nor been booked for an elective caesarean section. He planned to arrange for an ultrasound on 25 May to check Tamara's fluid levels and to book her in for a Foley induction on 26 May. He scheduled a caesarean section for 27 May.

25. Tamara attended the Hospital again on 25 May. She had an ultrasound scan performed by obstetric registrar Dr Don Ramjan. She says that he advised her that everything was fine and the baby was in posterior position. Tamara says that this was the first time she was told about posterior positioning. Tamara states that she was never told that the fetus was large. According to Dr Ramjan the only observation he made at the time of the ultrasound was that the baby was large. Obviously these accounts do not sit well together. This is not to say that either gave a dishonest account but it seems likely that one or other is mistaken or that there was a failure in communication. Given that Tamara was keen to proceed with the VBAC and was confident in Dr Ward, and also that Dr Ramjan would not have been able to say from the ultrasound whether Elsie weighed more than four kilograms, no alarm bells rang during that consultation.

Labour

26. Rupture of membranes occurred at about 9.00pm on 25 May 2013. Tamara and Charles stayed at home until the following morning. Ms Nash arrived to support them at 4.00am on 26 May 2013. They headed to the Hospital at almost 6.00am and by 6.45am Tamara was admitted.

27. Tamara was attended upon by Registered Midwife Belinda Newcombe from about 7.40am. Tamara was being continuously monitored by cardiotocography[2] ('CTG') pursuant to Dr Ward's recommendations for the management of a VBAC. She was given any pain relief at this time. RN Newcombe informed the obstetric registrar on call, Dr Don Ramjan, of Tamara's admission. She requested that Dr Ramjan insert an intravenous cannula because Tamara was fearful of needles, having previously had a traumatic experience.

28. Dr Ramjan arrived at about 9.00am and saw Tamara. Tamara had declined a vaginal examination until about the same time that Dr Ramjan attended because she was concerned that she would be seen to have not progressed (thereby increasing the chances that a caesarean would be recommended). It was then that Tamara was informed that her progress was indeed very slow as she was only 'one finger dilated' (i.e. about lcm). She underwent a second vaginal examination at about 1.15pm at which time it was discovered that she had progressed only to 2cm. Tamara was resigned to the likelihood that she would require a caesarean section.

29. At around 2.30pm, Dr Ramjan suggested that Tamara augment labour with Syntocinon. He suggested this following consultation with Dr Ward. Tamara agreed to its administration with some trepidation as she was aware that it was to be used with caution in attempted VBACs. She states that she started to panic. Syntocinon was administered at around 3.30pm following the administration of an epidural, which required a number of attempts.

30. Unfortunately, during this period, Tamara felt unsupported by Dr Ramjan and the anaesthetist who administered the epidural. She was, of course, in a great deal of pain, was anxious and was very tired due to her experience. This probably affected the way she perceived Dr Ramjan's approach to her. Nevertheless, she found Dr Ramjan's bedside manner unsympathetic. She was therefore relieved when Dr Ward

[2] CTG is a technical means of recording the fetal heartbeat and the uterine contractions during pregnancy. The machine is commonly known as an electronic fetal monitor (EFM).

reviewed her at 4.00pm. She states that she queried whether Dr Ward had agreed to the administration of Syntocinon, and he confirmed that he had. Dr Ward conducted a vaginal examination and found Tamara to have progressed to 3 to 4cm dilation. He planned to reassess her at 6.30pm to check her progress and spoke to Tamara about the possible need for a caesarean section.

31. The epidural provided inadequate pain relief and by 5.30pm or 6.00pm, Tamara was exhausted and distressed. At about this time, Dr Ramjan spoke to Tamara and Charles about whether she wished to continue the vaginal delivery. Although the accounts of Charles, Tamara and Dr Ramjan vary, it is undisputed that he spoke to them about going to theatre for a caesarean section and that due to other demands for the theatre, there was only a limited opportunity for them to decide whether to proceed to caesarean section or to continue with vaginal delivery.

32. Tamara's and Charles's perceptions are that Dr Ramjan was advocating going on with the VBAC delivery and that the discussion about this took up the limited time available to them to decide whether to proceed to a caesarean section. Dr Ramjan's account is that he laid out the facts concerning both alternatives and left the decision for them to make. The difference in the two versions may arise from the fact that, even if the theatre had been available at the time, a decision to switch to caesarean section was by no means a self-evident one. To carry out that procedure at that stage in the delivery carried its own risks.

33. Although recollections of the conversation have undoubtedly been affected by the passage of time and the emotionally traumatic outcome, it seems very likely that Dr Ramjan would have outlined the difficulties and risks of a caesarean section undertaken at that stage in the labour. This may have resulted in the perception that he was advocating continuation of the VBAC delivery. In any event, it is unnecessary to decide this controversy because, unfortunately, by the time they had decided to proceed to a caesarean section, the operating theatre was in use for an emergency appendectomy on a septic patient.

Delivery of Elsie

34. Dr Ward saw Tamara at 6.40pm. He was aware that the operating theatre was in use and was advised that the theatre staff could not provide an estimate as to when it might be available. It would have taken 20 to 30 minutes to assemble a second theatre team. On examination, Dr Ward found Tamara to be fully dilated and assessed the baby to be tolerating labour well and showing no signs of distress or

asphyxia in utero. He was satisfied that Tamara met the criteria for an attempted instrumental vaginal delivery. He says that he discussed the common risks and function of the Ventouse and obtained Tamara's consent to proceed.

35. Dr Ward was very experienced with this method of delivery. He estimated that he had performed more than 800 Ventouse deliveries prior to the delivery of Elsie.

36. In Elsie's case, delivery proved to somewhat difficult although well within the range of Dr Ward's experience and competence. Dr Ward initially used one type of vacuum device (a 'Kiwi Omni Cup'), changed to another (a 'Mityvac') and then went back to the original device. At one point the device 'popped off' the baby's head and was re-placed. Dr Ward states that equipment failure caused the 'pop off'. This is not uncommon.

37. The baby's head was eventually delivered but complete birth was delayed when the baby's shoulders became stuck. Ward performed the manipulations required in the circumstances and made an episiotomy (a surgical cut to the perineum).

38. Elsie was finally delivered at about 7:25pm on 26 May 2013. Her birth weight was 4.310 kilograms.

Attempted resuscitation of Elsie

39. Elsie was not crying shortly after her birth. Her Apgar scores [3] were 5 at one minute, 6 at five minutes and 6 at ten minutes. These scores were not disastrous but indicated that she required urgent medical attention.

40. Dr Ramjan attended on Elsie. He used a Neopuff[4] to resuscitate Elsie. Dr Ward attended on Elsie at about 7.35pm. He advised Dr Ramjan to request the on-call paediatrician, Dr Deborah Levy, to assist.

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[3] The Apgar test is usually given to a baby twice: once at one minute after birth, and again at five minutes after birth. Sometimes, if there are concerns about the baby's condition or the score at 5 minutes is low, the test may be scored for a third time at 10 minutes after birth. Five factors are used to evaluate the baby's condition and each factor is scored on a scale of 0 to 2, with 2 being the best score:

1. **A**ppearance (skin color)
2. **P**ulse (heart rate)
3. **G**rimace response (reflexes)
4. **A**ctivity (muscle tone)
5. **R**espiration (breathing rate and effort)

41. Dr Levy believes that she was notified of Elsie's condition by telephone at 7.36pm. She stated that she would have expected to be notified sooner for an instrumental delivery so she could be present at the birth. Although she was informed that Elsie was having mild respiratory difficulties and there were no serious concerns, Dr Levy went directly to the hospital and arrived approximately 15 minutes later.

42. Meanwhile, Elsie was transferred to the hospital's Special Care Nursery. It was there at 7.45pm, when a nurse unwrapped Elsie to be weighed, that it was discovered that she was apnoeic[5]. The medical records and statements are silent as to the level of observation, if any, of Elsie between 7.36 or 7.37pm (when it was clear that her condition at least warranted the attention of Dr Levy) and 7.45pm.

43. Active cardiopulmonary resuscitation was started immediately and a MET call[6] was initiated. A MET team comprised of Dr Jurgen Mross, anaesthetist Dr William MacAuley, registrar Dr Amit Kapoor, Registered Nurse Leerah Benson, and Registered Midwives Little, Greig and Carlon attended. At 7.54pm, Dr MacAuley intubated Elsie.

44. Dr Levy arrived at 7.55pm and attended upon Elsie. She observed Elsie to have no signs of life. She assisted with the resuscitation efforts. As she was uncertain whether Dr MacAuley tube had been properly placed, she re-placed but without any improvement. At 8.10pm, she advised Charles that Elsie was seriously unwell and suggested that Tamara attend. By that point, she anticipated that Elsie would not survive.

45. Although resuscitation continued for some time, at 1.40am on 27 May 2013 Elsie was extubated after being administered a low dose morphine infusion for 40 minutes. She was privately nursed by Tamara and Charles and died at approximately 3.30am on 27 May 2013.

Should arrangements have been made for a caesarean section during the antenatal care of Tamara Coghill?

46. At the inquest, Tamara and Charles gave evidence to the effect that they would have elected for a caesarean section if they had known Elsie was a large baby. Dr Ward

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[4] An infant resuscitation machine.
[5] A temporary suspension of breathing, occurring in some newborns (infant apnea) and in some adults during sleep (sleep apnea)
[6] When a hospital patient's vital signs 'crash', a call for assistance is made to a Medical Emergency Team. This is known as a MET call.

commented that he had told them that Elsie 'wouldn't be six pounds' (like Tamara's first child, Stella). Dr Ramjan had also noted Elsie's large size before the labour. Dr Ramjan recalled that he discussed the planned VBAC with Dr Ward, who agreed it was safe to attempt. Dr Ward recalls that they 'recognised her desire to deliver vaginally and noted that her baby felt larger than normal but due to the engagement of the baby's head, I honoured her request to attempt a vaginal delivery in the safest way possible and was reassured by Dr Ramjan's assessment of foetal wellbeing'.

47. While a macrosomic[7] baby may be a contraindication for VBAC, it is only one of several deciding factors. VBAC births are also commonly known as 'trial of scar' because of the acknowledged possibility that an instrumental or caesarean delivery may be necessary in the event of slow progress or other problems. The expert obstetricians who reviewed the case and gave evidence, Dr Robert Lyneham and Dr Andrew Child felt that planning for a VBAC was appropriate in Tamara's situation.

48. It is difficult to understand, however, why the plan made on 9 May was not followed. No satisfactory explanation has been given for the failure to do so. Dr Ward was plainly surprised by Dr Carl's non-performance of the plan. Had Dr Ward's plan been followed and Tamara booked in for a caesarean section at the planned time, Elsie would have been born about 10 days earlier than she was by VBAC. While we can only speculate as to whether this would have made a difference, a caesarean section at that time may have obviated the development of the lung abnormality which appears to have been the root cause of the fatal train of events.

49. Another thing that may have been different if the planned caesarean procedure had proceeded in the usual way during normal operating hours is that that Dr Levy or another expert in infant resuscitation would have been more immediately available to manage Elsie once she was born.

Was augmentation of Tamara's labour appropriate?

50. Dr Lyneham and Dr Child agreed that the augmentation of Tamara's labour with Syntocinon was appropriate in the circumstances, as she was slow to progress, had

[7] The term macrosomia is used to describe a newborn with an excessive birth weight. A diagnosis of foetal macrosomia can be made only by measuring birth weight after delivery; therefore, the condition is confirmed only retrospectively, ie, after delivery of the neonate. Foetal macrosomia is encountered in up to 10% of deliveries. Attempts at perinatal diagnosis of macrosomia have proven difficult and are often inaccurate. Source: http://emedicine.medscape.com/article/262679-overview

been informed of the risks and the CTG was not displaying any signs of foetal distress. I accept their opinion.

Should arrangements have been made for an operating theatre to be made available at any time during Tamara's labour?

51. The RANZCOG guidelines for VBAC delivery[8] which were extant in 2013 stated, among other things:

> *All women electing to labour after a previous caesarean section should have ready access to obstetric, neonatal paediatric, anaesthetic, operating theatre and resuscitation services (including the availability of blood products) should complications arise (eg, uterine rupture).*
>
> *Where, by virtue of remote location, such on-site services cannot be provided, patients should be informed of the limitations of services available and the implications for care should a rupture occur. In most circumstances, this will result in either an Elective Repeat Caesarean Section or alternatively antenatal transfer to a centre with more comprehensive services for a Trial of Labour.*

52. That advice remains current. Ideally, a theatre would be available for all mothers attempting a VBAC delivery. The reality is otherwise. Operating theatres and teams are in limited supply, especially in country towns, but virtually anywhere.

53. The unfortunate timing of events meant that at the point Tamara and Charles had definitively communicated to Dr Ramjan their desire to have a caesarean section, the theatre was occupied. Various accounts were given as to how long they were given to make up their minds before the window of opportunity closed and how that time was spent.Evidence differed as to the actual length of the 'ten minute gap' offered by Dr Ramjan for them to make their decision. It seems very possible that the urgency of the case of the septic patient with appendicitis may have accelerated a decision taken elsewhere in the hospital, overriding the offer to Dr Ramjan. In any event, the chance was lost.

54. Dr Child did not feel it was unreasonable for a regional hospital like Coffs Harbour Health Campus not to have a theatre available at all times throughout the labour of a

[8] "Planned Vaginal Birth after Caesarean Section (Trial of Labour)" C-Obs 38 (July 2010) p.3

patient. Importantly, he did not think that the availability of a theatre would have changed the outcome.

55. Tamara spoke of her feeling of being 'tortured' and 'ignored' by Dr Ramjan when she asked for a caesarean section throughout the afternoon. Dr Child commented that 'it is well known that about 30% of mothers who go on to have a vaginal birth will request a caesarean section at some stage'. Tamara's experience of labour was slow and agonizing. She not relieved, as most mothers are, by the joy of having a new, living baby to care for. The heartbreaking loss she and Charles suffered must inevitably have influenced her recollections of her experience of delivery. While I have no doubts about the honesty of her perceptions, it seems very unlikely that Dr Ramjan was deliberately unkind or uncaring.

56. Unfortunately, for whatever reason, the Coghills and Dr Ramjan do not seem to have established a close rapport and this contributed to the frustration and distress Tamara and Charles felt during their experience. Unfortunate as this was, it seems probable that Dr Ramjan was making a sincere attempt to give Tamara a chance to opt for a caesarean section and that, through no fault of his, or theirs, the opportunity was lost.

Was the mode and manner of the vacuum delivery appropriate?

57. A Ventouse delivery is a technique used to assist delivery of a baby if the second stage of labour is not progressing adequately. It may be an alternative to a forceps delivery or caesarean section. The term comes from the French word for "suction cup." The device, which looks something like a plunger, is placed on the top of the baby's head, creating a vacuum and suction effect. The obstetrician then pulls on the handle to move the baby down the birth canal. The RANZCOG Guidelines recommend that clinicians perform 'no more than' three pulls with a Ventouse, unless the baby's head is progressing downwards well. They recommend that there be no more than three 'pop-offs' [9] and they also suggest that a maximum of 20 minutes should be allowed for a vacuum delivery. Once the vacuum was applied, Elsie's delivery took 24 minutes.

58. The evidence is somewhat unclear as to how far Dr Ward exceeded the recommended number of Ventouse pulls. Apart from Dr Ward himself, a number of witnesses gave evidence of observing Dr Ward exert several pulls with the Ventouse. Dr Ward stated that Elsie was delivered after five pulls and several 'pop-offs'. Midwife Greig stated

[9] A 'pop-off', as the name implies, is a malfunction of the vacuum device due to a loss of suction.

that she had recorded 'at least' five and possibly up to nine or 10 pulls. Jessica Nash, who had not seen a Ventouse delivery before, estimated that there had been at least five pulls and at least three 'pop-offs'. RM Humphreys, who was assisting Dr Ward, was unsure how many pulls and 'pop-offs' there had been and was unsure how accurate her retrospective notes are.

59. Although Dr Ward's delivery of Elsie did not conform with the RANZCOG guidelines, it is important to note that they are not strict laws but are the College's advice as to general best practice. While they constitute guidance, or even perhaps a general default position, they do not apply rigidly. Appropriate clinical judgment must be exercised in the circumstances by the clinician. Both Dr Lyneham and Dr Child viewed Dr Ward's use of vacuum during the delivery as appropriate, given the slow progress. They did not view adherence to the guideline as a key indicator of competent instrumental delivery – and in fact did not consider counting the number of traction pulls with the vacuum device as always necessary. Instead, they considered the suitability of continuing with a vacuum delivery as dependent on the resulting descent of the baby and any signs of excessive maternal or foetal distress.

60. Both independent experts supported Dr Ward's written comments on the dangers of attempting a caesarean section once a baby is fully engaged within the pelvis, believing it would be considered wrong and potentially indefensible to abandon instrumental delivery for a considerably more complex procedure like caesarean section.

61. In my view, the evidence of Drs Lyneham and Child was compelling. It seems clear that the risks to mother and child of going to a caesarean section delivery once the baby was progressing down the birth canal were so much greater than the risks of continuing the Ventouse delivery that there was, in reality, only one rational choice for Dr Ward to make and he made it correctly.

Should a paediatrician or neonatologist have been present at the delivery?

62. Expert opinion on this question was divided. In Dr Levy's opinion, it is best practice for a paediatrician or neonatologist to be called for any instrumental delivery.

Although the Local Health District neonatal resuscitation guidelines[10] advise that 'a person trained in Neonatal Resuscitation should be available for normal low-risk deliveries and someone trained in advanced resuscitation should attend all deliveries considered at high risk for neonatal resuscitation', which, for the purposes of the guidelines, includes a Ventouse delivery, Drs Child and Lyneham did not think that an advanced paediatrician or neonatologist is generally needed for a relatively straightforward Ventouse delivery.

63. In their opinions, signs of foetal distress, or a difficult instrumental delivery, would have been the trigger to call for an advanced paediatrician or neonatologist to be present at the birth. In this case, there was no meconium staining and no sign on the CTG of foetal compromise. Although the Ventouse delivery exceeded the guidelines for time and number of pulls, Dr Ward had obtained good descent through the birth canal using that method. While this was not an easy delivery, in their opinions it did not appear to have been so difficult as obviously to have called for the presence of a neonatologist or advanced paediatrician.

64. Drs Child and Lyneham also thought that Dr Ward's choice of instrument was appropriate given his experience and training in the use of the Ventouse method.

65. Professor Nick Evans, a consultant neonatologist, and Dr Peter Campbell, also a consultant neonatologist, also gave evidence on this question. Dr Campbell stated that the general standard of care is to have someone – often a paediatric registrar – capable of carrying out resuscitation in such a situation. He said that he would also expect an obstetrics registrar to learn advanced resuscitation skills, including intubation.

66. Professor Evans was of the view that, ideally, at all instrumental deliveries a person trained in advanced resuscitation skills should be present. He noted, however, that in practice there is a systemic difficulty for trained people in maintaining their advanced resuscitation skills. In his view, at the very least an expert in resuscitation should be called when there is evidence of foetal distress or a premature baby is being delivered.

67. Leaving aside the local guidelines, there were few indicators before her delivery that Dr Ward and Dr Ramjan should asked Dr Levy to come to the hospital urgently. Beyond the fact that the delivery was instrumental and Elsie was a large baby, there

[10] Mid-North Coast Local Health District "Neonatal resuscitation" Procedure Statement Ch-fc-ob-07, October 2012 pp 2-3. I note that Dr Ward was one of the Visiting Medical Officers consulted by the authors of this policy statement.

were no other suggestions – such as CTG readings showing foetal distress – that advanced neonatal resuscitation skills would be needed immediately upon her delivery.

68. This, however, brings into question the status of the guidelines. While they are not mandatory, they presumably reflect what the Local Health District and its advisers thinks is best practice. Given Dr Ward's status as the head of obstetrics at the hospital and his high reputation, it seems odd that he and his registrar did not follow the guidelines which Dr Ward advised should be implemented at his own hospital. It was an unfortunate oversight that neither requested Dr Levy's presence at the delivery.

69. Sadly, however, the Coghills and those others who are involved in Elsie's must be left with the lingering question of whether, had the guidelines been followed, and Dr Levy been present when Elsie was born, she would have survived. I consider this question further below.

Was the care and management of Elsie following her birth appropriate?

70. This appears to be the crucial issue in understanding Elsie's case.

71. Dr Ramjan removed Elsie from Tamara's chest shortly after delivery. He commenced suction of her airways and then applied the Neopuff. Dr Lyneham expected that the need for 'a relatively mild degree of resus[citation]' as a result of Ventouse and shoulder dystocia was 'not surprising'.

72. Dr Peter Campbell, a consultant paediatrician and neonatologist, diagnosed Elsie's death as resulting from brain hypoxia due to inadequate resuscitation secondary to a failure to diagnose and treat bilateral tension pneumothoraces. His diagnosis was based on the autopsy of Dr Allan Cala, forensic pathologist, whose histological examination of Elsie's lung suggested that she had aspirated foetal squamous (skin) cells in utero. In Dr Campbell's view, this indicated that she may not only have been breathing in utero but gasping.

73. His theory, therefore, was that Elsie initially responded to resuscitation but then rapidly deteriorated due to bilateral tension pneumothoraces. As positive air pressure was applied with the Neopuff, 'the likely scenario is that the squamous cells may have acted as a ball valve causing air trapping and subsequent air leaking between the lungs and the parietal pleura. This would cause the lung to collapse, causing pressure on the heart and the great [blood] vessels causing decreased cardiac output.' In his

view, the constant air pressure applied by Dr Ramjan may have contributed to the development of bilateral pneumothoraces.

74. Professor Nick Evans, however, did not think that it was possible to say definitively whether the pneumothoraces were the cause of Elsie's post-natal deterioration or were the result of the resuscitation efforts intended to address that deterioration. He stated that it would be 'difficult to generate excessive positive pressure with the Neopuff'. On the other hand, he stated that this could easily be done accidentally done during the secondary resuscitation with accompanying endotracheal intubation performed by Dr MacAuley in the SCN.

75. In Professor Evans's view, the issue of causation is not straightforward. While he accepted that there was some evidence of sub-acute foetal distress, and that this may resulted in partial hypoxia, for a number of reasons he thought that that the evidence of post-natal hypoxia was considerably stronger. First, Elsie's CTG had been normal. Second, she also had a normal cord blood gas which is inconsistent with severe hypoxia in the period leading up to delivery. Third, the brain histology, in his view, was not indicative of sub-acute antenatal hypoxia. Fourth, there was a recognized postnatal hypoxic ischaemic event which was of sufficient duration and severity to cause hypoxic ischaemic brain injury. Fifth, the blood gas immediately after recovery from that event showed severe acidosis. Sixth, after the hypoxic event, abnormal neurological signs were observed that had not been seen before the event. Seventh, the brain histology changes were consistent with the timing of the hypoxic event in the SCN.

76. Critically, both Professor Evans and Dr Campbell were of the view that Elsie was born with abnormal lungs. Professor Evans said that he had not seen this sort of outcome in a baby with normal lungs. Both agreed that Elsie would not have developed bilateral tension pneumothoraces but for the abnormality of her lungs at birth and that this was a very rare event.

77. There is a paucity of observations recorded between 19:35 and 19:47, when Elsie arrived at the SCN. Given the gap in the observations, Professor Evans suggested that there were two available scenarios to explain what had happened: first, that Elsie had developed the pneumothoraces during the first resuscitation following her birth or, second, that she had spontaneously stopped breathing during the transfer to the SCN. In his view, the more likely scenario was the latter. While he thought it was possible that the Neopuff was implicated, he thought it unlikely because the pressure is gentle and it is difficult to over-inflate the lungs.

78. Both Professor Evans and Dr Campbell thought that the underlying abnormality of Elsie's lungs was the start of the causal pathway. This abnormality had begun to develop pre-labour and had not been caused by the delivery.

79. In Professor Evans's view, the pneumothoraces developed during the second resuscitation effort in the SCN. Neither he nor Dr Campbell were critical of the resuscitation team in the SCN, however. For Elsie to have survived, the pneumothoraces had first to be recognized then drained. A chest x-ray would have revealed the pneumothoraces but it was not available at the time the MET call was made. How long Elsie had been apnoeic by the time this was observed in the SCN is uncertain but the time available for a successful resuscitation must have been desperately short. In the circumstances, both consultants thought that the team attempting to resuscitate Elsie had acted reasonably.

80. One of the problems in understanding Elsie's death is that we do not know with any precise detail what happened during her transfer to the SCN. As Professor Evans remarked during his evidence, if there were key issues in the care provided to Elsie at the hospital, they were issues of monitoring and maintaining observations at that time. He acknowledged that keeping good observations in such circumstances can be difficult but he stressed their critical importance, noting that the best guide to the state of a newborn infant in such a situation is the baby's colour.

81. If there was a significant shortfall in Elsie's care and treatment following her birth, the apparent failure to maintain close observations of her respiration for the entire period of her transfer was probably it. In fairness to the medical and nursing people involved, the course of Elsie's deterioriation was, as Professor Evans observed, very unusual. A mask was being held over Elsie's face to provide her with air. Paradoxically, as well as providing some confidence that she was getting air, it may have also masked her colour and the fact that she stopped breathing, until she reached the SCN. Nevertheless, Professor Evans's point is an acute one.

82. Neither Professor Evans nor Dr Campbell could say with any certainty that the outcome for Elsie would have been different had Dr Levy been in attendance at the birth. While the answer to that question is uncertain, common sense suggests that had Dr Levy been present at the delivery and managed Elsie's resuscitation from the outset, her chances of survival, however slim they may have been, would have been optimized.

What caused Elsie's death?

83. While the ultimate cause of Elsie's death was hypoxic ischaemic encephalopathy, the precedent causes of this condition are difficult to establish.

84. Subgaleal haemorrhage was initially suspected as a potential cause of Elsie's death. A subgaleal haemorrhage is bleeding into the space between the skull and the fibrous band extending over the cranium. This is a rare but serious event and can be difficult to detect. In a baby, the blood lost can constitute a significant proportion of their comparatively low blood volume and can lead to hypoxic brain damage. The incidence of subgaleal haemorrhage is higher in vacuum-assisted births, as the vacuum exerts force on the baby's skull and scalp.

85. Dr Cala, who conducted the autopsy, initially stated that he believed a subgaleal haemorrhage had occurred. However, at the hearing, he deferred to Dr Susan Arbuckle, a consultant perinatal and paediatric pathologist on this question. She was adamant in her evidence that a subgaleal haemorrhage would be visually distinct from the more common and less serious scalp haemorrhage that frequently occurs as a result of vacuum delivery. In her view, Elsie's consistent blood gas haemoglobin results from delivery through the subsequent hours suggested that a significant haemorrhage had not occurred. Those results indicated no more than a minor haemorrhage within the tissue of the scalp. Although Dr Cala accepted that a subgaleal haemorrhage had not caused Elsie's death, he maintained that the scalp haemorrhage that she sustained during delivery may have contributed to her death.

86. In Dr Campbell's opinion, the most likely cause of the hypoxia leading to death was 'inadequate resuscitation secondary to failure to diagnose and treat bilateral tension pneumothoraces'. A pneumothorax occurs when air leaks into the pleural space outside the lung, causing it to collapse. The collapsed lung shifts in the chest, causing pressure on the heart and the great vessels resulting in interrupted venous circulation. As discussed above, however, this diagnosis, with which Professor Evans agreed, raises the question of the cause of the pneumothoraces.

87. Dr Arbuckle and Dr Cala both discovered the presence of squamous, or skin, cells inside the alveoli of Elsie's lungs after death. This can be caused by antenatal hypoxic gasping or during the application of positive pressure to the airways (e.g. when a baby is being mechanically ventilated).

88. Dr Arbuckle's view that the extent of the squamous cell penetration was less than 20 per cent of the tissue she examined. But she noted that she only had access to a limited number of slides to review in developing her opinion.

89. Dr Cala, on the other hand, gave evidence that though the lungs were architecturally normal, there were sections of the upper airways in which squamous cells were packed in to quite severely. In his view, his must have had some effect on gas exchange in the lungs but he was uncertain as to what extent. He agreed with other experts that this indicated antenatal foetal distress but the cause of that distress he was unable to identify.

90. As we have noted previously, Dr Campbell believed that the pneumothoraces had potentially been created when squamous cells in Elsie's lungs 'acted as a ball valve, causing air trapping and subsequent air leak between the lungs and the parietal pleura.'

91. While Dr Arbuckle, on the other hand, was sceptical about the seriousness of the aspiration of squamous cells, she was unable find a satisfactory explanation of Elsie's sudden apnoea. In her view, something had happened shortly after the birth but what exactly was unclear. She speculated that Elsie may have spontaneously reverted to foetal circulation again, a syndrome that can lead to hypoxia, but could not take this hypothesis any further.[11]

92. As discussed above, the bilateral pneumothoraces could have worsened when Elsie was intubated by Dr MacAuley during the MET call response. Upon her arrival at the SCN, Dr Levy believed that the ETT tube may have been misplaced, given there was little improvement in Elsie's condition after intubation and ventilation. Even if correctly placed, the mechanical ventilation had the potential to exacerbate an undiagnosed pneumothorax, as significant pressure can be exerted on the lung.

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[11] Persistent fetal circulation (PFC), also known as persistent pulmonary hypertension of the newborn, is defined as postnatal persistence of right-to-left ductal or atrial shunting, or both in the presence of elevated right ventricular pressure. It is a relatively rare condition that is usually seen in newborns with respiratory distress syndrome, overwhelming sepsis, meconium and other aspiration syndromes, intrauterine hypoxia and ischemia, and/or neonatal hypoxia and ischemia. Source: Chrysal D'cunha, MD and Koravangattu Sankaran, MD FRCPC FCCM "Persistent fetal circulation" Paediatr Child Health. 2001 Dec; 6(10): 744–750 http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2805987

93. Dr Evans stated that there was some evidence of subacute antenatal hypoxia. Dr Campbell suggested that the presence of the squams suggested potential hypoxic foetal 'breathing or gasping' in utero. Despite the normal CTG readings through the course of the delivery, Dr Cala noted that the inhalation of squamous cells as a result of hypoxic gasping may not have affected this reading. Dr Arbuckle commented that the blood gases at birth were 'only mildly abnormal', suggesting a level of hypoxia that was not severe at that stage. Dr Cala and Dr Arbuckle agreed that there had been no meconium staining of the liquor (a sign of foetal distress in utero).

94. Dr Arbuckle's opinion, like that of Professor Evans, was that a prolonged respiratory and cardiac arrest that occurred sometime between birth and Elsie's arrival at the Special Care Nursery was 'probably a major significant contributor' to Elsie's death. Dr Evans agreed that this 'severe postnatal hypoxia' was the more likely cause of death.

95. The immediate cause of Elsie's death was clearly an acute hypoxic ischaemic brain injury. A major contributory factor to the fatal brain injury appears to have been a sudden respiratory and cardiac arrest during Elsie's transfer to the SCN. Because we do not know when she stopped breathing, we cannot know how much damage was done to her brain during the transfer and how much the later resuscitation procedures may have contributed to the insult to her brain. Nor does the evidence enable me to determine whether her apnoea was caused by preceding bilateral pneumothoraces induced by a lung abnormality which was in turn caused by the aspiration of squamous cells during a period of unidentified antenatal distress or, alternatively, whether it was due to lung abnormality, and possibly some other unidentified event, which conditions were then exacerbated by undiagnosed bilateral tension pneumothoraces induced by secondary resuscitation.

Should more be done?

96. Dr Theresa Beswick, the General Manager of Coffs Harbour Health Campus and Network Co-ordinator of the Coffs Clinical Network, gave evidence at the end of the inquest about the response to Elsie's death and subsequent changes to health services delivery in the NSW Mid North Coast area.

97. A statutory review (2013) and clinical review (2014) were undertaken following Elsie's death. It is unnecessary to outline the detail of these reviews. Suffice it to say here that Elsie's death caused considerable anxiety at the hospital concerning its

systems and protocols and has considerably sharpened the consciousness of those managing the hospital of the need to maintain and encourage compliance with best practice protocols.

98. With hindsight, a number of recommendations propose themselves. First, during the course of this inquest it became obvious that Dr Susan Arbuckle's expertise as a perinatal and paediatric pathologist added significantly to the analysis of the case. I propose to recommend that in cases such as this, that autopsies be conducted either by specialist perinatal/paediatric pathologists or that such specialists work with forensic pathologists to establish (if possible) the cause and manner of death.

99. Second, I suggest that the Local Health District consider implementing a protocol that if a newborn baby is unstable or has low to intermediate APGARS at five minutes, that the MET team be placed on immediate alert to attend the birthing unit.

100. Third, I suggest that, from its current protocols, the Local Health District develop a short checklist of matters that must be attended to in cases of instrumental deliveries with a clear delineation of responsibility for carrying out the listed tasks. One person should be nominated as being responsible for ensuring that the checklist is followed. This is intended to prevent the accidental omission of, for example, a call being made to the consultant neonatologist or paediatrician to attend the delivery.

101. Fourth, the procedures or paperwork at the Coffs Harbour Centre for Womens Reproductive Care may be in need of revision to ensure that instructions given by or plans made by Dr Ward or other clinicians for their patients are followed. A clear form with unmistakable plans and a chronology for follow-up seems to be a basic tool for the prevention of the type of slip-up that occurred in Tamara's case when she attended on 16 May 2013.

Conclusions

102. There are few more tragic and distressing experiences that human being suffer than to see their children die before them. Such deaths are especially traumatic if the parents are left with the question of whether the deaths are preventable. Unfortunately, while it is evident that some aspects of Elsie's antenatal and postnatal care could have been better performed, it is not possible to confidently answer the question whether Elsie's death was preventable or not.

103. With hindsight we can now see that a number of factors subtly altered the course of events from that which might otherwise have led to a perfect outcome: the deviation from Dr Ward's original plan to book Tamara in for a caesarean section if she had not given birth naturally by 16 May; the apparently premature closure of the window of opportunity to go to theatre; the omission of a call to Dr Levy when Dr Ward decided to undertake an instrumental delivery; the absence of observations of her colour during Elsie's transfer to the SCN; and the undiagnosed development of bilateral pneumothoraces along with the possible contribution of the secondary resuscitation effort. It is very unfortunate that the Coghills are left with so many "what ifs".

104. The fact that there are so many is not only a tragedy for them but is a harsh lesson for the clinicians all of whom, I believe, are dedicated, hard-working professionals who had the best interests of Elsie and Tamara at heart. While their sense of failure can on no measure be equated with the loss and distress experienced by Tamara and Charles, it was very obvious during the inquest that it was deeply felt.

105. Elsie's death has obviously had its deepest effect on Tamara and Charles. Their experience was not only sad but deeply frustrating because of their complete reliance on the skill and experience of the clinicians involved in this case. Sometimes people who have undergone such an experience become deeply pessimistic. The coronial team and I hope, however, that despite their distressing experience they will recognize that such an event is a very rare one and that they can both live through this experience and find joy in raising their daughter and living fruitful lives together. We offer Tamara and Charles our sincere condolences.

Findings

106. I find that Elsie Coghill died on 27 May 2013 at Coffs Harbour Health Campus, as a result of hypoxic ischaemic encephalopathy caused by multiple factors including a lung abnormality caused by antenatal distress, a sudden unexpected and, for a period undetected, apnoeic episode while being transferred to intensive care and undiagnosed bilateral tension pneumothoraces.

Recommendations

107. I make the following recommendation to the Minister for Health and the Local Health District:

- That consideration be given, in cases of unusual and unexpected deaths of newborn children in regional hospitals in New South Wales, to having autopsies conducted by specialist perinatal / paediatric pathologists or that deaths of such deceased newborn children be investigated medically by forensic pathologists and a specialist perinatal / paediatric pathologist together in whatever way is appropriate in all the circumstances to establish (if possible) the cause and manner of death.

- That the Local Health District consider introducing a protocol that if a newborn baby is unstable with low to intermediate APGAR scores at five minutes, a MET team be placed on immediate alert to attend the birthing unit to assist.

- That the Local Health District consider developing from its current protocols a short checklist of matters that must be attended to in cases of instrumental deliveries with a clear delineation of responsibility for carrying out the listed tasks. One person, such as the Registered Nurse or Midwife responsible for maintaining observations, should be nominated as being responsible for ensuring that the checklist is followed.

108. I make the following recommendation to the Coffs Harbour Centre for Women's Reproductive Care:

- That the Centre revise its forms and protocols to ensure that instructions given by or plans made by Dr Ward or other clinicians for their patients are followed. A clear form with unmistakable plans and a chronology for follow-up may be an advisable tool to adopt.

Magistrate Hugh Dillon
Deputy State Coroner