



CORONERS COURT OF QUEENSLAND

FINDINGS OF INQUEST

CITATION: Inquest into the death of Archer Langley

TITLE OF COURT: Coroners Court

JURISDICTION: Brisbane

FILE NO(s): 2014/2710

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FINDINGS OF: John Lock, Deputy State Coroner

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REPRESENTATION:

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Glossary of terms

Amniotic fluid aspiration

According to the evidence of Dr Nicole Graf, amniotic fluid aspiration occurs when a fetus takes deep gasping breaths in-utero that result in the amniotic fluid (which contain desquamated skin cells) going deep into the lungs. Under normal conditions, amniotic fluid is present in the upper airways at the time of birth but significant amounts are not present in the lung alveoli. This fluid is usually readily expelled at delivery. However, it is known a fetus will make deep gasping in utero as a response to an acute stress event resulting in aspiration of amniotic fluid. A finding of amniotic fluid aspiration can only be identified at autopsy, as distinct from a clinical finding, and does not give any indication as to the cause or precise timing of the stressful (usually hypoxic) event. Amniotic fluid aspiration in the absence of meconium contamination is only very rarely attributed as a cause of death.

Cardiotocography (CTG Tracing)

CTG tracing is a device which is attached to the mother as a screening tool for the purpose of intrapartum fetal monitoring. It records the fetal heartbeat and uterine contractions. CTG tracing is an important tool to assist in clinical decision making about fetal condition. The purpose of such monitoring is to prevent fetal morbidity due to reduced oxygen levels to the fetus (hypoxia). It is not required for low risk pregnancies.

There are five elements, which need to be assessed in the course of interpreting CTG tracing including the baseline, accelerations, variability, decelerations and the duration and frequency of contractions.

Definitions in relation to fetal monitoring of the fetal heart rate ("FHR") are contained in Appendix E of the Royal and New Zealand College of Obstetrics and Gynaecology (RANZCOG) guidelines.

The RANZCOG guideline notes as a good practice for women receiving continuous electronic fetal monitoring, the CTG should be reviewed at least every 15 – 30 minutes. It should be regularly recorded, either by written or electronic entry, in the medical record that the CTG has been reviewed.

The RANZCOG guideline contains the following good practice note for assessing CTG's:

The normal CTG is associated with a low probability of fetal compromise and has the following features:

- Baseline rate 110 – 160
- Baseline variability of 5 – 25 bpm
- Accelerations 15bpm for 15 seconds
- No decelerations

All other CTG's are by this definition abnormal and require further evaluation taking into account the full clinical picture

The following features are unlikely to be associated with significant fetal compromise when occurring in isolation:

- Baseline rate 100 – 109
- Absence of accelerations
- Early decelerations
- Variable decelerations without complicating features

The following features may be associated with significant fetal compromise and require further action, such as described in Guideline 10:

- Fetal tachycardia.
- Reduced baseline variability.
- Complicated variable decelerations.
- Late decelerations
- Prolonged decelerations

The following features are very likely to be associated with significant fetal compromise and require immediate management , which may include urgent delivery:

- Prolonged bradycardia (<100 bpm for > 5 minutes)
- Absent baseline variability
- Sinusoidal pattern
- Complicated variable decelerations with reduced baseline variability

See Appendix E for definitions

A deceleration is not automatically a cause for alarm and it happens particularly in labour when the baby is being squeezed by the uterus.

The RANZCOG guideline number 11 notes that in clinical situations where the FHR is considered abnormal, immediate management includes: identification of any reversible cause of the abnormality and initiation of appropriate action (eg., correction of maternal hypotension, cessation of oxytocin) and initiation or maintenance of continuous electronic fetal monitoring. Consideration of further fetal evaluation or delivery should occur if a significant abnormality persists.

The RANZCOG guideline also recommends using fetal blood sampling (“FBS”) to reduce the rates of increased intervention associated with electronic fetal monitoring.

Fetal Blood Sampling

Fetal Blood Sampling is a procedure used during labour to confirm whether fetal oxygenation is sufficient. It is performed by creating a shallow cut to the scalp and taking a blood sample. Two constituents that are commonly tested by this procedure are pH and lactate. A low pH and high level of lactate indicate there is acidosis, which is associated with hypoxia.

Syntocinon

Syntocinon is a synthetic form of oxytocin, a natural hormone released in large amounts during labor, facilitating birth. The synthetic version is used for labour induction

Introduction

1. Archer Langley, baby of Karen and David Langley, died shortly after his birth on 25 July 2014 at the Royal Brisbane and Women's Hospital (RBWH).
2. Archer's mother, Karen, had gone into an induced labour at a gestational age of 39 weeks and six days. However, Karen's labour failed to progress from that time, and some changes were noted on the cardiotocogram (CTG), indicating possible concerns for the health of the fetus.
3. A decision was made for an emergency caesarean section due to failure to progress. During this surgery signs of obstruction were noted, including impaction of the baby's head in the pelvis, however Archer was easily delivered at 1840 that evening.
4. Archer had poor tone and poor colour on delivery and initially had no discernible heart rate or oxygen saturation levels. Attempts were made to ventilate Archer with a bag with some difficulties. The decision was then made to intubate him. He was then provided high levels of oxygen and high pressure ventilation, however Archer's oxygen saturation levels did not improve and there was minimal chest wall movement. He was re-intubated twice but showed no significant improvement. Archer continued to deteriorate and despite cardiopulmonary and other resuscitation efforts, his condition remained extremely dire and he was declared deceased at 1947.
5. The cause of Archer's death was not immediately apparent to those involved in his care. It was not until autopsy that it was revealed Archer had suffered severe amniotic fluid aspiration, with a significant amount of fluid found in his lungs, which would have caused respiratory distress and ultimately his death. The forensic pathologist noted that this finding was consistent with the clinical history of Archer's death occurring shortly after delivery, and the difficulty ventilating Archer with a bag and endotracheal tube. No other findings to account for death were identified at autopsy.
6. The forensic pathologist was unable to provide an explanation as to the cause of the severe aspiration of amniotic fluid. He noted that there were no congenital abnormalities to predispose Archer to amniotic fluid aspiration. The forensic pathologist did offer that the failure of labour to progress, necessitating an urgent caesarean section, possibly predisposed Archer to amniotic fluid aspiration.
7. Amniotic fluid aspiration at birth is considered to be a very rare outcome but is seen more often in stillbirths.
8. RBWH commissioned a Root Cause Analysis (RCA) review of Archer's death. The RCA concluded that whilst there were delays in identifying obstructed labour and proceeding to a caesarean section, there were no clear links between these delays and the amniotic fluid aspiration. As such, the RCA report found it was not clear whether an earlier caesarean section and/or absence of obstructed labour would have resulted in a different outcome for Archer.
9. Given the uncertainty as to the underlying cause of Archer's amniotic fluid aspiration, a number of expert reports were commissioned by the Coroners Court, RBWH, the legal representatives of the family and other medical staff who were separately represented.

10. By way of summary, there was expert consensus in these reports that Archer's death from amniotic fluid aspiration was probably not linked to the obstructed labour and associated failure of labour to progress.
11. The experts agreed that amniotic fluid aspiration was rare and very little was known about the condition and why or how it occurs. The perinatal expert commissioned by RBWH offered two possible mechanisms, one being a failure of Archer's lungs to stop secreting fluid (a process that happens in utero) when he was born, thereby preventing his airways filling with air. The other mechanism the expert identified was possible gasping at or prior to birth, resulting in amniotic fluid being aspirated back into Archer's lungs.
12. The independent expert commissioned by the Coroners Court, whilst having some criticisms in relation to the clinical management of Karen's labour, stated that none of these factors were obviously linked to the catastrophic outcome for Archer, and it could not be said that an earlier caesarean section would have resulted in a better outcome. Similarly, the perinatal expert was unable to identify any clear links between how the labour and delivery progressed and the amniotic fluid aspiration.
13. From all these reviews, it appears there was a consensus view that Archer may have died from amniotic fluid aspiration even without the delays and obstructed labour.
14. However, RBWH, through its RCA process, acknowledged there were deficiencies evident in Archer's case that warranted some response. RBWH has subsequently made a number of changes to systems and processes, with evidence of these changes being provided to the Coroners Court during the course of the investigation.
15. Having regard to this acknowledgement by RBWH that the care Archer and his mother received may not have been the best possible care available to optimise the chances of Archer being born without any adverse health outcomes, it was determined there should be a further examination of the circumstances of Archer's death by way of inquest. The inquest was to hear from key staff involved in Archer's birth about any deficiencies and contextual factors that contributed to those deficiencies, some of which may not have been identified through the RCA process.
16. Archer's parents also requested that an inquest be held, to address their own personal questions and concerns about Archer's death. It was hoped the inquest would give Karen and David some answers to those questions and a better understanding of the circumstances of the death of their son.
17. There was also another obstetrics-related death of an infant, Nixon Tonkin, at the same hospital within the two months prior to Archer's death. A decision was made to hold inquests into both Nixon's and Archer's death, and to convene these two inquests close in time, such that any preventative recommendations can be made in a more holistic way taking into account learnings from each death.

List of issues

18. A pre-hearing conference was held on 9 December 2016 and the following issue were determined for the inquest:

Findings of the inquest into the death of Archer Langley

- a. The findings required by section 45(2) of the *Coroners Act 2003*; namely the identity of the deceased, when, where and how he died and what caused his death.
- b. Whether key staff involved in the clinical management of Archer's mother's labour from 25 July 2014 can offer any further insight in relation to the deficiencies identified within the Root Cause Analysis Report commissioned by the Royal Brisbane and Women's Hospital, and factors that contributed to those deficiencies.
- c. Whether there are any matters about which preventative recommendations might be made pursuant to section 46 of the *Coroners Act 2003*, having regard to the changes that have already been implemented at the Royal Brisbane and Women's Hospital since Archer's death.

List of witnesses

19. The following witnesses were called to give evidence:
 - a) Dr Lee Minuzzo, Obstetric Consultant, RBWH
 - b) Dr Renuka Sekar, Staff Specialist, Maternal Fetal Medicine, RBWH
 - c) Dr Bart Schmidt, Consultant Obstetrician, RBWH
 - d) Dr Matthew Smith, Obstetrics Registrar, RBWH
 - e) Ms Elisha Swift, Clinical Midwife, RBWH
 - f) Ms Helen Sheppard, Registered Nurse and Midwife, RBWH
 - g) Dr Catherine Dash, Gynaecological Registrar, RBWH
 - h) Ms Christine Farbrace, Clinical Midwife, RBWH
 - i) Dr Helen Barrett, Acting Clinical Director
 - j) Dr Andrew Bisits, Staff specialist in Obstetrics and Gynaecology, Royal Hospital for Women, Sydney
 - k) Dr Robert Lyneham, Consultant Obstetrician and Gynaecologist
 - l) Dr Peter Campbell, Paediatrician and Neonatologist, Prince of Wales Private Hospital, Sydney
 - m) Professor Paul Colditz, Consultant Neonatal Paediatrician, RBWH
 - n) Dr Nathan Milne, Forensic Pathologist
 - o) Dr Nicole Graf, Head of Histopathology, The Children's Hospital at Westmead

Root Cause Analysis

Short Summary

20. In the RCA summary and findings it was stated that Karen's pregnancy was identified and managed appropriately in the ante-natal period as high risk due to her pre-existing diagnosis of systemic lupus erythematosus (SLE) .
21. Signs of obstructed labour were documented at 1515 on 25 July 2014 and concerns were appropriately escalated to medical staff. A decision was made to continue with the induction of labour and review at two hours post-epidural insertion.
22. The RCA report noted that retrospectively, it was clear the induction was not progressing as would be expected with a third pregnancy with cervix dilation at 8cm after five hours. A decision should have been made at 1515 to progress to a Caesarean section.

23. The RCA team discussed the risk of reduced awareness of a patient's high risk status when the CTG and other signs appear reassuring and the pregnancy had been largely uneventful. When the presentation begins to change, as it did at around 1515, this should have perhaps prompted the treating team to review her again in the context of a high risk patient.
24. Once in the operating theatre, the Caesarean section progressed in a timely way and Karen had an uneventful recovery.
25. Archer was born with a heart rate of 120 bpm but was not breathing. Despite resuscitative efforts, staff were unable to obtain successful ventilation. He died at approximately one hour of age.
26. With a lactate of 6 on cord gases, the RCA team considered that resuscitation should have been effective for this baby and they were unable to clearly identify why he was unable to be ventilated. It is noted that the RCA team did not have the benefit of a final autopsy report.
27. Several issues were identified in relation to communication, clinical handover, supervision, escalation and documentation. Support from senior medical staff was not readily available due to the high activity in the birth suite on the day. The covering consultant was not on birth suite to offer additional support, however, there is no documented evidence that consultant input was requested until the board round at around 1600. The RCA team could not definitively assert that Archer would have survived with earlier progression to theatre and were unable to link the death to a definite root cause.

RCA Recommendations and Lessons Learnt and RBWH response

28. There were a number of recommendations and lessons to be learnt.

Recommendations

- i. Education should be provided to midwives and medical staff on an ongoing basis on the identification and management of an obstructed labour.
- ii. Consultant review of high risk patients must occur at the bedside, be clearly documented and involve the multidisciplinary team.

Lessons Learnt

- i. Documentation, escalation, communication and clinical handover:
 - Patients who are identified as high risk in the ante-natal period must remain high risk for the duration of the pregnancy and delivery. This status should be clearly documented in the Pregnancy Healthcare Record to ensure that clinical staff maintain awareness of the high risk status when planning care.
 - All fields of the intrapartum record must be fully completed.
 - Clinical concerns must be escalated and documented appropriately with reviews conducted and documented in a timely manner.
 - Medical staff must document all changes in plan of care and include a clear rationale for the change.

- Processes need to be identified to support medical and midwifery staff during busy times to ensure additional resources are available when required.
 - ii. The administration of tocolytics should be considered to cease contractions and reduce the risk of a ruptured uterus when a diagnosis of obstructed labour is made.
 - iii. All possible interventions as per the 'Intubated, can't ventilate?' poster should be utilised when unable to ventilate a successfully intubated neonate.
29. The Executive Director of RBWH, Dr Amanda Dines, agreed with the RCA report and the subsequent recommendations. In particular, she agreed there was an unnecessary delay in the diagnosis of obstructed labour and progression to theatre and that had there been bedside handover with the consultant and midwife along with subsequent consultant review, then earlier progression to theatre may have occurred. Dr Dines stated steps have already been taken to ensure an incident like this does not occur again.
30. RBWH's view, after receiving the autopsy report, was that the events of labour and delivery are unlikely to have caused or contributed to Archer's death. It was noted that the umbilical cord gases obtained at birth were not consistent with a degree of hypoxaemia that is injurious to tissues or organs, and the brain histopathology did not suggest any injury had occurred, other than in the period of severe hypoxaemia/ischaemia that occurred after birth and prior to death at age one hour.
31. Amniotic fluid aspiration is a very rare occurrence and the review indicated this was not related to birth trauma or a delay in delivery.

Evidence of staff relating to the management of labour

Antenatal care

32. Archer's mother, Karen, was 34 years old at the time of her pregnancy with Archer. Karen previously had two normal vaginal deliveries resulting in the birth of two healthy baby girls. In 2008 Karen had been diagnosed with Systemic Lupus Erythematosus (SLE) and antiphospholipid syndrome, both of which can lead to complications in pregnancy including pre-eclampsia, thrombosis, fetal growth restriction, fetal loss and fetal heart problems.
33. Karen was prescribed Plaquenil and Aspirin to manage symptoms associated with these conditions, and was identified and managed as a "high risk" patient from the time of her first antenatal visit at 16 weeks gestation. Dr Helen Barrett, the Acting Clinical Director of Obstetric Medicine at RBWH was asked to review the medical records and advise whether it was appropriate for Karen to be on Plaquenil and whether the dose was appropriate. Dr Barrett agreed that both propositions were appropriate. She stated there was extensive evidence about its use in pregnant women but more limited information on the significance to a baby.
34. The RCA noted Karen's SLE diagnosis and the high risk status associated with this was identified at the point of entry to the service and Karen was managed appropriately as a high risk patient in the antenatal period. Dr Robert Lyneham noted that Karen's SLE was carefully managed by the obstetric medicine team and Karen's physicians, and her pregnancy was otherwise uncomplicated with
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no abnormalities or concerns detected on any screenings, tests or scans. Dr Robert Lyneham commented that, on his assessment, all aspects of the antenatal care provided to Karen were consistent with proper professional standards. Dr Andrew Bisits agreed that Karen was managed appropriately as a high risk patient.

Decision for induction of labour

35. Karen otherwise had an uneventful pregnancy, with no major concerns noted. Karen was admitted on 24 July 2014 at 39 weeks 5 days gestation for induction of labour, the indication for which was her SLE. The RCA team noted the mother had indicated, and it was well documented, that she would prefer not to have an induction of labour. However, a decision was made to induce labour due to SLE and reduce the risk of complications of continuing pregnancy. The RCA team found the decision to induce labour was appropriate.
36. Dr Lyneham and Dr Bisits agreed that induction of labour just prior to term is generally recommended for women with SLE. Dr Lyneham noted that induction by term is also generally recommended for women with antiphospholipid syndrome. Dr Bisits considered the management of Karen's induction and labour was appropriate.
37. Induction of labour commenced by the administration of Prostin (a synthetic form of the hormone prostaglandin to assist in preparation for labour) at 19:00 hours on the evening of 24 July 2014. A vaginal examination was performed by a midwife at 0400 the next morning, at which time Karen's cervix was found to be 1cm dilated. She was then administered another application of Prostin. A CTG performed after this time showed a baseline of 130bpm, variability >5bpm, accelerations and one possible variable deceleration.
38. A review at 0930 on 25 July 2014 by a midwife noted that Karen was experiencing contractions, and the fetal heart rate was taken by a hand-held Doppler, showing it to be 150bpm.

Admission to birth suite

39. At 1000 on 25 July 2014 Karen was admitted to the birth suite under the care of Midwife Elisha Swift with ongoing contractions. The fetal heart rate was heard for one minute and a fetal heart rate (FHR) of 150-155bpm documented.
40. The other medical clinicians involved in the care that day were:
 - Dr Catherine Dash who was covering the Department of Emergency Medicine and the Obstetric Review Centre on the afternoon of 25 July 2014, and was the second point of call if assistance was required in the Birth Suite and the Birth Suite Registrar was unavailable.
 - Dr Matthew Smith who was the Obstetrics Registrar in Birth Suite for the morning shift on 25 July 2014. The shift was very busy with seven deliveries occurring in the operating theatre. Dr Smith stated that it turned out to be one of the busiest shifts he had experienced.
 - Dr Lee Minuzzo was the consultant covering the Birth Suite until she left the hospital later that morning visibly distressed. Dr Renee Sekar took over as consultant covering the Birth Suite at 13:00 but as Dr Sekar already had a full list performing and interpreting ultrasounds in the

Maternal Fetal Medicine Unit, she said she was happy to come down if she was needed. Dr Bart Schmidt took over as consultant covering Birth Suite at 1630.

41. The reality, and without question part of the problem, is the Obstetric Consultants had almost no involvement in the events of the day. The RCA team noted the consultant who was eventually covering Birth Suite (Dr Sekar) was in another clinic and was not visible or readily available to provide direct support and the senior registrar was busy at times with other cases in the operating theatre. The RCA team found it is essential that support from senior medical staff is available in Birth Suite during busy periods. This issue will be explored separately in this decision.
42. At 1030 Midwife Swift performed an abdominal and vaginal examination, confirming the position of the baby and assessing the cervix as being 4cm dilated, the presenting vertex at station -2, with no caput or moulding. Karen's membranes were ruptured artificially at this time, revealing clear amniotic fluid. Following the vaginal examination the fetal heart rate (FHR) was 140-150bpm. The plan documented by Midwife Swift was to continue to monitor contractions and fetal heart rate and for Karen to keep active.
43. At 1115 Midwife Swift heard a deceleration of the FHR down to 80 bpm during a contraction returning to a baseline of 140 bpm. She decided to apply a CTG with a Fetal Scalp Electrode (FSE) and Karen consented to this. This was applied by 1130. Midwife Swift assessed there were variable decelerations and abnormal but unlikely to be related to fetal compromise. Dr Lyneham agreed there are fleeting variable decelerations but there was good shouldering and the CTG was reassuring, notwithstanding the brief decelerations.
44. The RCA team considered that for a high risk patient the CTG should have been commenced on admission to birth suite. Dr Lyneham similarly agreed when he commented *CTG monitoring should have commenced earlier, once Karen was established in labour. This opinion is based on the fact that she was high risk due to her medical conditions, and labour was being induced. However, when the CTG was initiated there were no concerns about it, so no harm came to mother or infant as a consequence of not initiating CTG monitoring earlier.*
45. At 1240 Midwife Swift performed a vaginal examination and it was noted the cervix was 8cm dilated and swollen with no caput or moulding. Midwife Swift says she constantly assessed the CTG and progress. MW Swift explained there had been some involuntary pushing and if the cervix is not fully dilated it can swell and will not fully open. She discussed the options with the parents. The first option was to continue breathing techniques, lying in the right lateral position and commence using Entonox gas. The second option was to have an epidural to relieve the urge to push when not yet fully dilated. In line with Karen's preference for minimal intervention the first option was chosen.
46. The plan was well documented by Midwife Swift in the notes including to encourage breathing, maintain the quality of the CTG and watch for signs of second stage labour. Dr Lyneham stated that in his opinion this management decision was reasonable.
47. Midwife Swift continued to assess the CTG and noted variable decelerations between 1330 and 1430 and assessed these as abnormal but unlikely to be

related to fetal compromise. Dr Lyneham stated in his opinion the CTG would be considered no more than suspicious and in his view not suggestive of an infant who is hypoxaemic and acidaemic.

48. At 1330 Karen requested an epidural and Midwife Swift made contact with Dr Smith and he agreed to review Karen. Dr Smith attended at 1400, spoke about the epidural with Karen and her husband, considered the CTG, placed a cannula and made arrangements with the anaesthetic team to attend. Dr Smith did not perform a vaginal examination. Dr Smith discussed Karen's progress with Midwife Swift around 1430. This was when he first discovered Karen had been 8cm dilated since 1240.
49. Dr Smith considered the labour was most likely obstructed due to the swelling of the cervix, which on the basis of his training he thought could be reversed with an epidural. He planned to review Karen in two hours.
50. Midwife Swift was present and understood the plan was to wait two hours after the epidural had been in place. Midwife Swift understood this was a generally understood timeframe but in the meantime you would keep assessing any progress and the CTG.
51. Dr Smith was not aware there was a subsequent delay in the epidural being inserted due to theatre activity until about 1515. Dr Smith stated this was a long delay. The plan then became to reassess Karen at 1715. Dr Smith did not attend and review in the interim period, but it is apparent the Birth Suite was very busy and as well there was no consultant physically present.
52. Dr Smith stated that although Karen was a high risk on account of her SLE, he did not consider she was a high risk for an ongoing obstructed labour.
53. The RCA team considered a scalp lactate would assist with decision making if there were ongoing concerns about fetal wellbeing, which there were not in this case.
54. A plan had been made for a vaginal examination at 1430 but at this time Karen was being prepared for an epidural so the next VE occurred at 1515.

Events from 1515

55. The events from this point are crucial to an assessment of the critical decisions made or lack thereof with respect to the care provided. There is some inconsistency in the evidence as to who called whom and what conversations took place. Some of this inconsistency is not particularly problematic and does not need to be resolved and may be simply a result of the busy afternoon in Birth Suite. However, it is clear it was at this quite crucial stage that a number of communication breakdowns occurred.
56. Midwife Swift handed over to Midwife Sheppard at around 1515 as her shift ended at 1530. An indwelling catheter was inserted at 1515 by Midwife Sheppard and Midwife Swift noted in the records *a small amount of blood stained urine*. Midwife Sheppard performed the VE having noted prolonged variable decelerations on the CTG. Karen was still 8cm dilated. Midwife Sheppard noted on the Intrapartum Assessments, caput ++ and moulding+++ and the cervix was still 8cm dilated. These observations were not restated in the progress notes. Midwife Sheppard agreed with the suggestion this could

have been put in the progress notes as well, but she had used the purpose built form.

57. Dr Lyneham in his report stated that *Caput succedaneum refers to swelling, puffiness and bruising on the baby's head caused by prolonged pressure of the presenting part of the scalp against the dilating cervix. Moulding refers to the adjusting of the shape and size of the fetal head to the birth canal during labour; the skull bones may even overlap. Marked caput and moulding suggests cephalopelvic disproportion.*
58. Midwife Swift stated she rang Dr Smith on his mobile but was unable to reach him and left a voicemail message to come to Room 1. Midwife Sheppard states she paged Dr Smith but thought Midwife Swift had spoken to him and advised of these findings. Dr Smith stated he has no memory of receiving this telephone call or page. There was evidence he received an earlier page. Dr Smith stated there can be problems with mobile telephone coverage. Dr Smith stated that between 1500 and 1530 he was only a short distance away from the Birth Suite and no one approached him about any message that had been sent.
59. It is apparent that someone contacted the Team Leader Christine Farbrace. It was either Midwife Sheppard or Midwife Swift. TL Farbrace says the call came from Midwife Sheppard.
60. Whatever is the case, TL Farbrace attended Room 1. On entering the room she says Midwife Sheppard lifted the catheter bag bringing to her attention the blood stained urine. Midwife Swift also expressed her concerns to her including she wondered if there were signs of a Bandl's ring developing. TL Farbrace advised Midwife Smith to inform the registrar.
61. Midwife Sheppard thought Dr Smith had sent Dr Catherine Dash to Room 1. Midwife Swift thought TL Farbrace had called Dr Dash. TL Farbrace does not recall making a call but thought Midwife Sheppard had notified the registrar of her concerns prior to calling herself. Dr Dash simply recalls a call from midwifery staff.
62. In any event, Dr Catherine Dash attended. Dr Dash had not at this stage spoken to Dr Smith, consistent with Dr Smith's evidence he had not requested Dr Dash to attend nor had he received a message to attend himself.
63. TL Farbrace recalls Dr Dash attending and Midwife Swift referring to a Bandl's ring (which can be a sign of obstructed labour). She does not recall if the blood stained urine bag was pointed to but cannot imagine it was not. Whilst she was in the room TL Farbrace remembers gathering the necessary paperwork for a Caesarean section as she assumed this was now likely. TL Farbrace then left to attend another patient.
64. Midwife Swift states she verbally relayed her concerns to Dr Dash that Karen possibly had an obstructed labour. Midwife Sheppard also says she showed the blood stained urine bag to Dr Dash. Midwife Swift also said she would have mentioned this observation to Dr Dash and that Midwife Sheppard was holding the bag at the bed and Dr Dash would have seen it. Dr Dash does not recall the blood stained urine bag. Dr Dash said she was also not aware of the finding of caput and moulding. MW Sheppard agreed she possibly may not have mentioned caput and moulding to Dr Dash.

65. Dr Dash stated she had been asked to review the CTG at 1520 as Dr Smith was in theatre and she attended urgently. Dr Dash's evidence was she was not conducting a full assessment but just reviewing the CTG. Dr Dash stated that Dr Smith, as the senior registrar, had a plan to review after two hours of the epidural being in place and her job was to review the CTG and consider if there was any abnormalities such that they should depart from that plan. Dr Dash was aware from what she was told by the midwives that the general gist was the epidural was introduced so that labour could progress. She had not at that time spoken to Dr Smith. Dr Dash was aware a VE had been conducted at 1515 and did not consider she needed to do another one. She recalls palpating the abdomen and the midwife mentioning a Bandl's ring, which she understood can be a late sign of obstructed labour. Dr Dash thought the shape of Karen's abdomen was more to do with the OP position of the fetus and not a Bandl's ring.
66. Dr Dash says she reviewed the CTG which showed variable decelerations and was abnormal but appeared to be improving with the epidural. Dr Dash cannot be sure if she looked at the Intrapartum Assessments and has no memory of caput or moulding being mentioned. Dr Dash said if she had been aware of these features being present she would have told Dr Smith. Dr Dash said at the time she was junior to the senior registrar and was second cover for the Birth Suite and would have followed the registrar's plan. Dr Dash reiterated in evidence she was focused on the CTG and was not conducting a full review. She agrees she may have been requested by the midwife to sign the CTG trace.
67. Dr Dash stated the midwives mentioned the concern about lack of progress but she thought Dr Smith was aware of this. Dr Dash says she contacted Dr Smith after the review to make sure.
68. Dr Smith said in evidence that Dr Dash should not just have considered the CTG in isolation as CTGs must be assessed in the context of the patient and the patient's history becomes relevant.
69. Midwife Sheppard noted in the progress notes at 15:15 hours, and perhaps consistent with Dr Dash's view as to why she was there: *...registrar paged to review CTG. She then noted at 15:20 Seen by Dr Dash – CTG signed & happy to continue after discussion with Dr Smith.*
70. At 1530 Midwife Sheppard made the following progress note entry: *CTG abnormal/unlikely—baseline 126. Variable decelerations present accelerations nil. BP 85/48 Mainline infusion increased. Draining blood stained urine++, Dr Dash aware of same. TEDS applied.*
71. Midwife Sheppard says on leaving the room she saw Dr Dash speaking to Dr Smith in the corridor. The plan had been to wait two hours as the epidural had been inserted. She assumed Dr Smith would come in as she was not happy with that situation.
72. Midwife Sheppard says she spoke to TL Farbrace at around 1530 saying she was not happy waiting two hours. TL Farbrace does not recall this conversation or any conversation indicating further deterioration. She says she would have escalated the case if that had been indicated.

73. Midwife Sheppard also said in her evidence that she spoke to Dr Smith outside the room in strong terms suggesting she did not know why he was waiting and delivery needed to occur now. She says Dr Smith made no comment and walked away. Dr Smith does not recall that conversation and says if that conversation took place he would not have simply walked away. It is noteworthy this particular conversation was not recorded in the progress notes by Midwife Sheppard, and was not mentioned in Midwife Sheppard's written statement taken in January 2015. Midwife Sheppard stated she has been distressed over the tragic death and she was suffering from Post-Traumatic Stress Disorder for a time and had not recalled the conversation until shortly before the inquest.
74. Dr Smith stated that he did not become aware of Dr Dash's involvement until after Dr Dash had reviewed Karen. Dr Smith recalls he had a discussion with Dr Dash at the Birth Suite journey board at approximately 1530 and it was at this time he became aware there had been a delay with the placing of the epidural and that it had only recently been given. Dr Smith recalls the conversation was brief and to the effect that Dr Dash was aware of the plan to review two hours after the epidural had taken effect. He does not recall Dr Dash expressing any concerns with this plan or suggesting an alternative plan. He does not recall her raising any concerns regarding her review. He has no recollection of being told of significant caput or moulding or blood in the urine. Dr Smith says that if he had been told any of these things he would have wanted to know more as it would have raised the question as to whether there was another reason, apart from the swollen cervix, for the lack of progress. Dr Smith was not requested to review the mother at this stage. Dr Smith felt there was no reason to do so given Dr Dash had just reviewed her.
75. Dr Dash agrees she spoke to Dr Smith at the journey board and told him the CTG was abnormal but improving with the epidural seeming to be effective and Karen was still 8cm dilated. This appears to be consistent with Dr Smith's recollection that the conversation was brief. Dr Dash does not recall a conversation at the journey board involving Midwife Swift.
76. Midwife Swift left the ward at approximately 1530. Her statement suggested she spoke to Dr Smith and Dr Dash in the Birth Suite, but her memory now is it was on her way out and she passed the journey board where she had the brief conversation with Dr Smith, Dr Dash and another midwife about Karen's previous uncomplicated birth and her present clinical situation of no change to cervical dilation for four hours and what she observed to be signs of a possible obstructed labour. Midwife Swift's statement says that Dr Dash and Dr Smith were 'dismissive' of her concerns and the final comments made to her was that the labour was not obstructed and the epidural will allow the labour to progress.
77. In her evidence Midwife Swift gave some more context to the use of the word 'dismissive', and said she felt personally upset as she felt she had let the parents down because the birth had not gone to plan. She thought a Caesarean section was needed but knew the standard plan was to give two hours from an epidural so she did not feel so concerned she needed to say anything more. She left the decision in the hands of the doctors.

Should a caesarean section have been called earlier?

78. The RCA report considered signs of obstructed labour were documented at 1515 and concerns appropriately escalated to medical staff. The mother was still 8cm dilated. The midwife documented bloodstained urine ++, caput ++ and

moulding+++ . The RCA noted these factors in addition to the lack of progress would indicate an obstructed labour. A decision was made to continue with the induction of labour and review at two hours post-epidural insertion. Retrospectively, the RCA found it is clear that the induction was not progressing as would be expected with a third pregnancy with cervix dilation at 8cm for five hours. A decision should have been made at 1515 to progress to a caesarean section.

79. The RCA team discussed the risk of reduced awareness of a patient's 'high risk' status when the CTG and other signs appear reassuring and the pregnancy has been largely uneventful. When the presentation begins to change, as Karen's did at around 1515, this should have perhaps prompted the treating team to review her again in the context of a 'high risk' patient.
80. The RCA noted Karen was reviewed by a junior registrar (Dr Dash) and this review was documented by the midwife. It was understood the junior registrar discussed the case with the senior registrar at this point, though this was not documented. Midwifery staff began preparing the patient and paperwork for a Caesarean section.
81. The RCA team found there were several gaps in the documentation particularly relating to medical review; identification of the potential for obstructed labour (all of the signs and symptoms were listed but there was no documentation of the suspicion of an obstructed labour); intra partum assessment was not fully completed and written notes did not accurately reflect the clinical concerns verbally communicated within the team. The RCA noted clinical concerns must be escalated and documented appropriately with reviews conducted and documented in a timely manner.
82. The plan of Dr Smith had been to reassess Karen in two hours from the introduction of an epidural and the vaginal examination. The case was discussed with the consultant at a board round at around 1600 but not at the bedside. The RCA considered that had the handover with the consultant occurred at the bedside with the midwife present and the consultant reviewed the patient and the clinical record, then earlier progression to theatre might have occurred.
83. Midwifery staff contacted medical staff at around 1640 to review Karen but it does not appear that the registrar Dr Smith reviewed the CTG at this point or attended the patient up until around 1700. A category 2 was called at approximately 1715 due to failure to progress in labour and fetal distress with the booking form noting the booking time as 1740. The RCA recorded there were times when midwives sought medical review that did not eventuate.
84. Dr Lyneham stated *In my opinion a caesarean section was indicated from 1530 onwards, given the clinical evidence of obstructed labour and lack of progress notwithstanding Karen's good uterine contractions. The CTG abnormalities were a further indication although, as I have indicated, in my view the CTG was never suggestive of an infant who was significantly acidaemic and in whom urgent delivery was demanded.*
85. Dr Bisits stated *Most obstetricians would have recommended a caesarean be booked at around 1515 and should have been completed by 1615. A smaller body of responsible opinion amongst obstetricians would have waited another*

hour for progress and then ensure that the baby was delivered by caesarean section no later than 1715.

Review of CTG and management of labour from 1530

86. Dr Lyneham reviewed the CTG as it was recorded for the period from 1530 to 1700 and noted that *from 1600 the variable decelerations tend to become significantly more prolonged with some now clearly late decelerations lasting over a minute. At 1648 the decelerations are clearly late and prolonged. The CTG is now abnormal with features consistent with the possible development of fetal acidaemia.*
87. Dr Peter Campbell also comments on the CTG tracing (predicated on his opinion that Archer's amniotic fluid aspiration was associated with intrapartum asphyxia causing Archer to gasp): *In my opinion there was some concern over the CTG. I am not an expert on this area but I have read Dr Lyneham's report. In view of the fact that the labour was not progressing and there were variable decelerations throughout the day, I suspect that there were intermittent periods of hypoxic ischemia or asphyxia. At any time during the latter part of the labour, baby Archer may have had a significant episode that caused him to gasp and inhale the squamous cells.*
88. Dr Bisits opined the CTGs from 1400 to 1700 *were classified formally as abnormal but fetal compromise unlikely....At the time of the decision for the caesarean the CTG pattern is described as one with complicated variable decelerations, reflecting greater concern about the baby's oxygenation. From 1720-1740 there were no obvious decelerations however there are two decelerations, which appear late, from 1740 to 1750.*
89. Dr Lyneham stated *The pattern of atypical variable decelerations continues, with one prolonged deterioration lasting nearly 5 minutes at about 1710. However, once the CTG recovers from that deceleration, from 1720 the CTG improves significantly with only one typical variable deceleration apparent between 1720 and 1745. In my opinion it is unlikely that the infant was significantly acidaemic at this time.'*
90. Dr Bisits stated there was nothing seen in the CTG, which showed evidence of a significant hypoxic event. There was one area of tracing from 1640 to 1700 hours which was concerning and pathological but it then improves. Dr Bisits stated there could have been a hypoxic event and the baby recovered well but considered it unlikely, however could not rule out such an event caused the baby to gasp. Dr Bisits stated the hypoxic event that caused the aspiration could have occurred earlier, even before the CTG was applied and escaped diagnosis.
91. Dr Lyneham opined that management of Karen's labour prior to 1530 was reasonable and appropriate. Dr Lyneham's major concern relates to the management at about 1530, when the midwife documented clear evidence of obstructed labour being:
 - The infant's head remained in a deflexed left occipitoposterior position, meaning larger diameters of the fetal skull were presenting than would have been the case if the infant's head had rotated to an occipitoanterior position.

- Despite regular, moderate to strong contractions, there had been no progress in cervical dilation for 3 hours.
 - There had been no further descent of the head for over 4 hours.
 - There was caput+++ and moulding++.
 - There was haematuria (blood in the urine).
92. Dr Lyneham opined there were some concerns about the CTG, although he acknowledged the CTG abnormalities alone did not demand immediate delivery. Notwithstanding this clinical situation, the only medical input was Dr Dash signing off on the CTG and noting that she was happy for Karen's labour to continue. It was Dr Lyneham's view that at all times after 1530 medical review was required.
93. Dr Bisits said in evidence if the doctors were aware of the matters raised above then most obstetricians would look at prompt delivery. If they were not aware then doctors would be more likely to not think delivery needed to be done within the hour.
94. Dr Bisits' summary of the events was maintained by him in evidence and included that: *There was clinical disagreement amongst midwifery and medical staff about the recognition and management of obstructed labour in a multiparous woman (one who had no difficulties with the birth of her first two children). Experienced midwifery staff were concerned that because Karen's cervix remained at 8cm dilated for three hours that this was already an indicator of obstructed labour and therefore waiting another two hours would invite further problems, mainly the spectre of uterine rupture. The medical staff on the other hand felt that an epidural would stop the premature involuntary pushing and favour the possibility of a normal vaginal birth. They would have been encouraged in this view because of the two previous normal births that Karen had experienced. Both views are reasonable, however the more significant concern that needed to be addressed was the possibility of an obstructed labour and therefore this needed to be discussed between midwifery and medical staff and acted on sooner. I am not convinced that this would have made a difference to the outcome for Archer.*

Decision to proceed with caesarean section

95. Dr Smith reviewed Karen at 1715 after he had come out of the operating theatre. In his statement he said that the cervix remained at 8cm and there had been sufficient time for the epidural to take effect. At this point he was of the opinion that there was an obstructed labour that was not likely to be reversible and that a Caesarean section would be required. He performed a vaginal examination and did not consider the head was deeply impacted and considered delivery was not likely to be problematic or require more staff than ordinarily was required. The other significant and concerning change was the CTG trace now showed complicated decelerations. He stated this was the first occasion he was aware of these changes. Dr Smith says he informed the consultant Dr Bart Schmidt.
96. Dr Smith was informed by the midwife these decelerations seemed to commence when positioning was changed, which was not uncommon. He planned to reposition Karen and have Dr Dash review the CTG in 10 minutes and, if it had not improved, a scalp lactate would be performed. He then organised the Caesarean section.

97. At this time another expectant mother was in the operating theatre with pre-eclampsia. The anaesthetic had already been given and in those circumstances Dr Smith considered the delivery could not be delayed. Given the potential difficulties of stopping a procedure once the anaesthetic process had commenced, the RCA team found it was appropriate for the senior registrar to proceed with that case whilst a theatre was being sourced for Karen.
98. Dr Smith requested another operating theatre be opened. The reason for Dr Dash reviewing in 10 minutes was that if the CTG trace had not improved a decision would be made as to which operating theatre would be used. Dr Smith also considered Dr Dash was more than competent to perform the caesarean section, should it have been necessary. He also stated knew there was consultant assistance if required.
99. Dr Lyneham agreed with Dr Smith's assessment that Karen's CTG had improved before her transfer to the operating theatre (recorded by Dr Smith in his case note at 2000). At between 1720 and 1730 Dr Dash was contacted by Dr Smith. Dr Smith advised that he was about to start a caesarean for another patient but he had requested a second theatre be set up for Karen. Dr Dash was asked to attend the Birth Suite to check the CTG in 10 minutes and ensure a second theatre was still available.
100. Dr Dash attended at approximately 1740 and saw that Karen was being transferred to the operating theatre. Dr Dash reviewed the CTG and confirmed the trace should be taken with Karen to the operating theatre. Dr Dash informed Dr Smith the CTG had improved. Dr Smith said that he would be able to perform the Caesarean. Dr Dash left when Dr Smith arrived.
101. Concerning the CTG taken from 1808 to 1828 (whilst Karen was in the 'pre-op' room) Dr Lyneham commented that the *CTG trace continues to be improved, and the last 10 minutes of the trace is really quite normal.*
102. Karen was transferred to theatre at 1800. Dr Smith arrived at 1810 and noted the CTG had improved. The operation commenced at 1832. There were signs of obstruction but the delivery was not difficult. Dr Smith thought the baby had good colour with a normal heart rate but was not making any respiratory effort. Dr Smith noted in his operation surgeon report and retrospective notes there were signs of obstruction at surgery including a ballooned lower segment, bladder distension and haematuria. The fetal head was described as being *impacted in pelvis but easily delivered*, with the fetus in a deflexed occipitoposterior (OP) position.
103. The RCA noted the caesarean section commenced 85 minutes from the decision to proceed, which is outside of expected timeframes. The operation proceeded in a timely manner once in the operating theatre. The RCA noted there is no documented timeframe for progression of a category 2 patient to theatre but an acceptable time is considered to be within 75 minutes. The RCA team was advised that a protocol was currently being developed, which will include timeframes.
104. Regarding the timing of the caesarean section, Dr Lyneham said *...in my view medical assessment was indicated at 1530 and if that had been performed, it would have been apparent that caesarean section was indicated. However, it would not have been a caesarean section fitting within the most urgent category, and unless there was a significant deterioration in fetal condition, in*

my opinion within about 75-90 minutes would have been reasonable. Of course, it would have been necessary to insert an epidural and that would have taken some time to arrange, as well. Some three hours later, the infant was still only very mildly acidaemic so it is unlikely there was any degree of significant fetal hypoxaemia and acidaemia at 1530.

105. Regarding the timeliness of Karen's caesarean section procedure, Dr Bisits stated: *This should have been requested within the hour. This category was breached by 40 minutes. There were two indications for the caesarean, seemingly obstructed labour and the abnormal CTG. Using the Queensland Department of Health guidelines for the interpretation of CTG's: there were late decelerations but normal baseline and normal variability therefore this indicated 'abnormal – may be fetal compromise'. Having said this I do acknowledge that according to the then guidelines the agreed time for a Category 2 procedure was within 75 minutes.*
106. Dr Bisits also offered the following: *Given the clinical indications for the caesarean and the knowledge that the theatres were busy at the time I am surprised that a scalp lactate was not considered to aid in the management of the case. Having said this I do acknowledge that according to the Queensland Department of Health guideline on CTG interpretation, given that there was only one yellow feature a scalp lactate was not indicated. However as it says in the notes below the classification table the full clinical picture needs to be taken into account and in this situation the relevant clinical feature was obstructed labour.*
107. The RCA noted the administration of tocolytics should be considered to cease contractions and reduce the risk of a ruptured uterus when a diagnosis of obstructed labour is made. Dr Lyneham was less concerned about this as although there were signs of obstructed labour, they were only first apparent at 1530, it was not an augmented labour and in his view there was little risk of imminent uterine rupture.

Consultant involvement

108. Consultant involvement in the care of Karen was, for reasons as will be evident, almost absent as a physical presence, but it is also evident communication between consultants and staff was not particularly effective.
109. The RCA team found that despite the events occurring at 1530, the obstructed labour was not diagnosed and concerns were not clearly communicated or escalated. The consultant who was covering Birth Suite, Dr Sekar, was in clinic and was not visible or readily available to provide direct support and the senior registrar Dr Smith was busy at times with other cases in the operating theatre. The RCA team found it is essential that support from senior medical staff is available in Birth Suite during busy periods. The RCA team were advised that a DECT phone is now held by the consultant covering Birth Suite to ensure staff can readily contact them and the RCA team found this to be an acceptable solution.
110. Dr Lee Minuzzo was the Obstetric Consultant rostered to cover the Birth Suite from 0800 to 1630 on 25 July 2014. Dr Minuzzo received a handover with respect to Karen but did not review her personally and was not called on by midwifery staff or doctors to do so.

111. At around 12 noon Dr Minuzzo received an email from an internal investigator within Metro North Hospital and Health Service, advising her to attend a meeting the following Monday. Dr Minuzzo rang the investigator and was told the meeting was with respect to an investigation concerning her clinical practice. Dr Minuzzo says she became distressed at this news and took up an offer to meet the investigator that afternoon. They met shortly after and Dr Minuzzo was handed a letter advising the Director-General of Queensland Health had appointed an investigator due to concerns raised in a Public Interest Disclosure.
112. Dr Minuzzo felt so distressed at this development she spoke to the Acting Executive Director Dr Kennedy and said she did not think she could continue to work that day. Dr Minuzzo then contacted Dr Sekar and requested she cover for her despite Dr Sekar being involved in her own clinic. Dr Minuzzo went to the operating theatre and saw Dr Smith and told him Dr Sekar was to cover as consultant. Dr Minuzzo went home around 1330, and handed over cover for the Birth Suite to Dr Sekar. Dr Smith recalls Dr Minuzzo was visibly distressed about something although he does not recall her saying she would be leaving before the end of her shift. He found this out later from Dr Sekar.
113. Dr Renuka Sekar was Staff Specialist, Maternal and Fetal Medicine at RBWH. She was in her clinic at Maternal Fetal Medicine (MFM) on 25 July 2014, when asked by Dr Minuzzo to also cover Birth Suite from around 1330. Dr Minuzzo sounded very upset. Dr Sekar initially suggested the evening consultant be called to cover Birth Suite but Dr Minuzzo preferred to speak to Dr Sekar. Dr Minuzzo said that the patients in Birth Suite were not needing any urgent attention and Dr Smith was in the operating theatres and not needing any immediate assistance. Dr Sekar agreed and spoke to Dr Smith and the Birth Suite team leader to tell them she was covering Birth Suite until 1630 and told them to call her on her mobile as she was still busy in her clinic and would not be able to come down to Birth Suite for at least another one to two hours.
114. Dr Sekar went down to Birth Suite around 1600 and met with Dr Smith. Dr Sekar says they discussed Karen's labour and Dr Smith mentioned there had been slow progress but with no other signs of obstruction or abnormal CTG. In her statement provided to the Coroner, Dr Sekar says she told Dr Smith that the baby should be delivered within an hour of the epidural being started.
115. Dr Smith says he had reviewed Karen and was comfortable with progress and the CTG and that the epidural was taking place. He said his plan was to review in two hours. Dr Sekar's statement says she overruled Dr Smith and told him she wanted the baby delivered within the hour. Dr Smith denies this was part of any conversation he had with Dr Sekar. In her oral evidence at the inquest Dr Sekar says that what she meant was that Dr Smith should review Mrs Langley within the hour and if necessary plan delivery. She was not insisting on a delivery by Caesarean section.
116. Dr Sekar says she was not informed of any signs of obstruction such as caput, moulding and blood stained urine. If she had been given this information she would have made an immediate plan to deliver. Similarly, if she had been told about an abnormality in the CTG trace she would have ordered a scalp lactate to assess definitively the baby's well-being.
117. Dr Smith recalls discussing the current plan with Dr Sekar at 1600. Dr Sekar agreed with the plan but noted there should be a low threshold for delivery if

Mrs Langley was not fully dilated at the next review at 1715. Dr Sekar agreed with the suggestion that there should be a low threshold but states she made no mention of a particular hour.

118. Dr Sekar handed over to the night Consultant Dr Bart Schmidt at 1635 at the journey board. Dr Sekar believes Dr Smith was also present but Dr Schmidt says Dr Smith was unable to attend as he was busy elsewhere in the Birth Suite. Dr Sekar says in her statement she told Dr Schmidt that Karen *would need review and delivery in the next half an hour*. Dr Schmidt does not recall this was said at handover. In oral evidence Dr Sekar says what she meant to relay at the handover was that there should be a review and a decision about delivery made in the next half hour depending on dilation. Dr Schmidt agreed this was more consistent with what was the substance of the handover. If the mother was fully dilated then birth may be proceeded with. Otherwise there should be a consideration for a Caesarean section, which would have taken between 40 minutes to one hour to organise and complete.
119. Dr Schmidt recalls Dr Sekar saying that Karen was to be examined at 1730 to see if a Caesarean section was indicated. Dr Schmidt said in evidence he knew the background and labour was slow but considered it was reasonable to wait 30 minutes for a review. Dr Schmidt does not recall being told about any specific signs of obstructed labour (caput, moulding, blood in the urine), but said that is always on your mind when there is slow progress. Dr Schmidt agreed that if those specific signs were expressed it would be of more concern and you would need to review the whole of the circumstances.
120. Dr Schmidt discussed Karen's progress with Dr Smith around 1735 when the decision was made to proceed to Caesarean section. Dr Schmidt was still in the hospital at the time and offered to assist but Dr Smith stated he had enough staff to run two operating theatres. Dr Schmidt said he remained at the hospital until 1800.

Resuscitation after birth

121. Archer was born with a heart rate of 120bpm but was not breathing. Despite resuscitative efforts, the staff were unable to obtain successful ventilation. With a lactate of 6 on cord gases, the RCA team considered that resuscitation should have been effective for Archer but they were unable to clearly identify why he was unable to be ventilated.
122. Dr Bisits considered the resuscitation efforts made following Archer's birth were appropriate.
123. Professor Colditz stated as follows in relation to Archer's blood cord gases at birth: *The umbilical cord gases collected at the time of birth show acidosis but the arterial value for base excess, which is the measure of net hypoxic exposure of the fetus, is well within the normal range for healthy newborns and the umbilical vein value is at the lower limit of normal... These are not values of acidosis that cause injury.*
124. Professor Colditz considered whether these 'relatively normal blood gases' could be accounted for by there being an earlier period of intrapartum hypoxia ischaemia that went undetected and had largely resolved prior to the time of birth. He stated: *I have not been provided with a copy of the CTG but in the RCA report there is an analysis that suggests it is unlikely there was a*

significant earlier intrapartum hypoxic ischaemic event at least from the time the CTG was commenced at 1400. Prior to that time there were a number of intermittent observations of a normal fetal heart rate, which again makes it unlikely that there was a major episode of hypoxia ischaemia at an earlier time in labour.

125. Dr Campbell also made some comment in relation to the blood cord gases, as follows: *Although this baby was not severely acidotic, in terms of organ damage the baby does show signs with the pH and bicarbonate and lactate of intrapartum hypoxia.*
126. Dr Smith gave evidence that he had not heard of amniotic fluid aspiration as an issue and this was unexpected. His later research noted limited cases in the medical literature.

Hypotheses for the cause of amniotic fluid aspiration

127. In his report, Professor Colditz stated the most likely cause of Archer's amniotic fluid aspiration was a failure to suddenly cease, at the time of birth, the normal secretory function of the fetal lung. Professor Colditz noted an alternative hypothesis, being aspiration of amniotic fluid into the lungs due to gasping associated with fetal acidosis. However he then pointed out that *since fetal acidosis is relatively common and amniotic fluid respiration is very rare, it is clear that there cannot be a direct relationship between fetal acidosis, gasping and amniotic fluid aspiration.* Professor Colditz concluded: *I consider that it is unlikely the outcome would have been any different if Archer had been delivered earlier and/or there had not been obstructed labour.*
128. Professor Colditz also stated in evidence he queried the possibility the squames found were not from amniotic fluid but from the lungs as a consequence of aggressive resuscitation. In that respect the evidence of Dr Milne was quite clear in that he identified extensive cells, which he would not expect from resuscitation.
129. In response to the question whether anything more could have been done to prevent the amniotic fluid aspiration suffered by Archer as described in the autopsy report, Dr Bisits stated: *Given the poor understanding of amniotic fluid aspiration as a cause of potential death in a term baby it is very difficult to say that anything could have been done to prevent this happening for (Archer). This is compounded by the reality that CTG monitoring is limited in its ability to detect and predict severe hypoxaemia in a baby during labour. Even the most sophisticated of computer algorithms which minimise inter-observer variability have failed to improve the clinical utility of CTGs. It is also not clear that an earlier caesarean section would have resulted in a better outcome for the baby.*
130. Further in his report, Dr Bisits stated: *In commenting on such cases after I have considered all the facts I ask two questions; first did the care preceding the adverse event meet accepted professional standards? Second if it did not meet accepted professional standards could this have contributed significantly to the adverse outcome which has been the subject of the review? In answer to the first question the care did meet professional standards except for some delay in recognising and acting on an obstructed labour. Further the CTG should have been recognised earlier as abnormal and warranting a scalp lactate assessment. In answer to the second question neither of these factors alone or together are obviously linked to the catastrophic outcome for Archer Langley.*

131. Dr Campbell stated the following in relation to an earlier caesarean delivery (predicated on his opinion that Archer's amniotic fluid aspiration was associated with intrapartum asphyxia causing Archer to gasp): *On the balance of probabilities if the decision to do an emergency caesarean section had occurred at 1530 as suggested by Dr Lyneham and proceeded in a timely fashion, on the balance of probabilities Archer would have avoided the amniotic fluid aspiration of such a severe nature to cause resuscitation to be impossible.*
132. As to whether Archer would have survived if he had been delivered within 75-90 minutes from a decision at 1530 to proceed to Caesarean section, Dr Campbell stated: *I do not believe that I can answer that question honestly. The situation is that in view of the fact that the CTG was in a deteriorating manner, the fact that the labour was not progressing, any early intervention in all probability would have altered the outcome. Would he have had a degree of amniotic fluid aspiration and need a resuscitation? That could have still been possible.*
133. Dr Campbell concluded: *The question in this case is if there had been medical intervention during the labour could it have prevented this baby from suffering intra-partum hypoxia and would the outcome have been different. The histopathology confirmed that this is an amniotic fluid aspiration. Dr Lyneham feels that medical assessment was indicated at 1530 and if that had have been performed it would have been apparent that a caesarean section was indicated. The timing of a category 2 caesarean section would be in the vicinity of 30-90 minutes. In this instance the baby was not born for 3 hours. Professor Colditz notes that the hypothesis is that the amniotic fluid is indeed aspirated in the lungs due to gasping which is probably more likely when fetal acidosis is present. Although this baby was not severely acidotic, in terms of organ damage the baby does show signs with the pH and bicarbonate and lactate of intra-partum hypoxia. It is clearly noted on at 1515 that the baby was having prolonged variable decelerations. At 1520, Dr Dash agreed with variable decelerations and continued the labour. At 17:00hrs the CTG shows prolonged decelerations, Dr Smith was in attendance. The entry of that note by Dr Smith notes that there are variable complicated decelerations of the heart rate. The condition of the mother is consistent with an obstructed labour. The operating theatre is notified of an impending caesarean section. Dr Lyneham's point that if Karen had of been examined at 1530 and the caesarean section or the obstructed labour diagnosed and the caesarean section expedited, on the balance of probabilities the outcome of the baby would have survived.'*
134. Dr Graf states that in her view, it is not possible to identify the point in time at which delivery needed to occur for Archer to have survived, *largely because neither the insult nor the time this occurred (noting that this may have happened over a period of time, not a single point in time) is known.* This is predicated on Dr Graf's opinion that Archer's death may have been due to acute cord compression (in the context of Archer having an unusually thin umbilical cord) or fetal sepsis, either of which could have resulted in an irreversible acute hypoxic brain injury prior to delivery (and also causing the fetus to take deep gasping respirations at the time of the acute hypoxic event, explaining the amniotic fluid aspiration). Dr Graf does say that it is reasonable to suggest delivery closer to the time that the CTG abnormalities were noted would likely have resulted in a better outcome.
135. Dr Graf then states as follows: *If the event was in fact acute cord compression, then delivery prior to this event would have resulted in a likely different*

outcome. Such acute cord events cannot be readily predicted, and it would not be known that this umbilical cord was abnormally thin thus at risk for compression. This may have occurred anytime although likely in the last few hours prior to delivery, possibly corresponding to the time frame in which the CTG was first noted to show abnormality. However, the possible time frame is broad and could extend from shortly prior to delivery (in the last 30-60mins) to as long as around 6 hours before delivery, but unlikely to be much longer given the absence of significant neuronal necrosis seen on neuropathological examination. In the event that infection was the major issue (not confirmed but not clearly excluded), then delivery earlier in the course would have resulted in more time for treatment prior to acute collapse (although the timing of this really cannot be known).

Pathology analysis and cause of death

Autopsy results

136. Dr Nathan Milne was the forensic pathologist who conducted the autopsy. Dr Milne opined the cause of death was due to amniotic fluid aspiration. The aspiration was severe and can cause respiratory distress and death. Dr Milne stated this was consistent with the clinical history of death occurring shortly after delivery, and difficulty ventilating Archer.
137. Neuropathology showed changes in the brain related to poor blood and oxygen supply around the time of death. Dr Milne stated this was the effects of the events leading to death, rather than a cause of death. Otherwise the brain was developmentally normal. There were no congenital abnormalities. Dr Milne stated that the changes in the brain were not consistent with severe hypoxia and the damage was in an area where you see damage first and not an indication of a hypoxic event. Dr Milne agreed with the evidence of Dr Nicole Graf in that you would only see severe hypoxic changes four to six hours after such an event but does not rule out a hypoxic event within that time period.
138. Pathology examination of the placenta by another pathologist showed changes in keeping with a third trimester gestation. The conclusion of that report was that the changes were suggestive of hypoxic changes due to impaired oxygen supply. Dr Milne stated this appears unrelated to amniotic fluid aspiration.
139. Microbiology showed no evidence of infection and no viruses were identified.
140. Dr Milne stated the specific reason there was severe aspiration of amniotic fluid was unknown. There were no congenital abnormalities to predispose the baby to amniotic fluid aspiration. Pregnancy was complicated by failure of labour to progress, necessary to taking an urgent Caesarean section. The pathologist stated it is possible that these events predisposed to amniotic fluid aspiration.
141. Dr Milne was also provided with the reports of Dr Graf and agreed with the opinion expressed by her in those reports, which provide more information. Dr Graf had noted a thin umbilical cord and Dr Milne stated this may be related to the outcome. The squamous cells found by him in the lungs were combined with amniotic fluid and were extensive. The squamous cells are similar to skin cells and come from the fetus and lie in the amniotic fluid. Dr Milne did not agree the accumulation in the lungs may have been due to resuscitation efforts. Dr Milne stated that resuscitation may involve small numbers of such cells being ingested but not to the extent found.

142. Dr Milne agreed with the proposition that the explanation for how the death occurred is best considered by looking backwards as follows:
- i. Squamous cells are found in amniotic fluid in the uterine sac and external to the fetus
 - ii. For those cells to be found deep in the fetal lungs there must have been a gasping or gasping events
 - iii. For there to be a gasping event there must be some form of fetal distress. The distress does not necessarily need to be a hypoxic event. The mild infective process found by Dr Graf remains a possibility as a contribution to an incident of distress.
143. The cause of death stated in the autopsy report was:
- 1a Main condition in neonate: Amniotic fluid aspiration
 - 1b Other conditions in neonate: Dolichosigmoid
 - 1c Main condition in mother: Failure of labour to progress
 - 1d Other conditions in mother: Placental distal villous hypoplasia; systemic lupus erythematosus
- 2 Underlying cause of death: Amniotic fluid aspiration
144. Dr Milne opined that based on the additional information he would now word the cause of death certificate somewhat differently.
145. Dr Milne stated that Dr Nicole Graf has raised some pertinent points in her excellent and detailed report, including her interpretation of the placental histopathology. He said Dr Graf has raised two valid possible underlying causes of the amniotic fluid aspiration – (1) the thin umbilical cord; (2) possible infection based on the identification of inflammation in the umbilical vein (umbilical phlebitis). Dr Milne stated he would replace ‘placental distal villous hypoplasia’ under 1c with these two conditions, and change the underlying cause of death to ‘undetermined’, as it is not possible to determine if one, both or neither of these conditions led to amniotic fluid aspiration. Notwithstanding the undetermined finding, Dr Milne opined that with this additional information, there is a better understanding of the death.
146. Dr Milne stated that based on the additional information he would now write the cause of death certificate as:
- 1a Main Condition in neonate: Amniotic fluid aspiration
 - 1b Other condition in neonate: Dolichosigmoid
 - 1c Main condition in mother: Failure of labour to progress
 - 1d Other conditions in mother: Thin umbilical cord; umbilical phlebitis; systemic lupus erythematosus

2. Underlying cause of death: Undetermined

Report of Dr Nicole Graf

147. Dr Nicole Graf is paediatric and perinatal anatomical pathologist at the Children's Hospital at Westmead. Dr Graf was provided with Histopathology slides and placenta as well as the Autopsy Report.
148. Dr Graf noted two abnormalities. Firstly, the sample of umbilical cord was notably thin (diameter of 8-9mm with normal being 14-16mm) with a relative paucity of Wharton's jelly and this represents a risk factor for cord compression. Dr Graf explained that when a thin cord is compressed in-utero it does not take as much squashing to create an acute stressful or hypoxic event. This could lead to deep fetal breathing gasps in-utero, and this would explain the finding of prominent squames (sloughed skin cells that are normally present in amniotic fluid) within the alveoli of the lungs.
149. The second abnormality was evidence of early infection with umbilical phlebitis (inflammation of the umbilical cord). Dr Graf stated that although subtle, the contribution of this to the outcome was difficult to quantify or confirm but cannot be excluded. Dr Graf stated babies are often born with infections but they recover with antibiotic treatment. Dr Graf noted that at autopsy, microbiology cultures were all negative, but this does not completely exclude the possibility of fetal sepsis.
150. Dr Graf explained that babies do breathe in-utero and this is normal and was needed to develop lung strength. But breathing movements are usually shallow and the level of the amniotic fluid inhaled is not significant. Therefore it may be normal for babies to have residual squames in the upper airway but large amounts in the alveoli of the lungs is not normal.
151. Dr Graf stated that one could not be unequivocal about the contribution of infection and it may be a combination of mild infection and the thin cord.

Report of Dr Diane Payton

152. Dr Diane Payton, anatomical pathologist at Royal Brisbane and Women's Hospital and Lady Cilento Children's Hospital was also asked to consider the histological slides taken from the lungs and placenta and umbilical cord as well as the macroscopic inspection of the placenta.
153. Dr Payton was asked to address whether there was alveoli capillary dysplasia present. She found there was no evidence of this.
154. Dr Payton was also asked whether the squames in the lungs are from amniotic fluid or are they pulmonary in origin. Her report stated there were squames showing keratinization consistent with squames from amniotic fluid. Dr Payton found extensive interstitial and intra-alveolar haemorrhage. Pulmonary haemorrhage in the neonatal lungs is frequently associated with respiratory distress syndrome but may also occur in association with hypoxia, patent ductus arteriosus, congestive heart failure, disseminated intravascular coagulation, congenital malformations, acute pneumonia, systemic lupus erythematosus, Goodpasture's syndrome and rarely as an isolated phenomenon.

155. Dr Payton agreed with Dr Graf's findings on the histology but was unable to be dogmatic about the very focal inflammation definitely indicating sepsis. Dr Payton opined that with very focal sparse inflammatory cells within the wall of a vessel in the umbilical cord, with no evidence of margination in the vessel or evidence of chorioamnionitis, and no positive cultures, she had insufficient evidence to give a specific diagnosis of sepsis. Dr Payton stated there appeared to be other potential considerations as to the cause of the focal minor inflammatory changes and she noted the possibility this was secondary to umbilical cord compression during labour is unable to be excluded.

Summary of pathology opinion

156. The consensus of the pathology evidence is that amniotic fluid was found in the lungs of Archer with squamous cells such that it was most likely there must have been an event of stress, which caused gasping and aspiration of the fluid deeper into the lungs of the fetus. There was no congenital condition which predisposed Archer to this other than an abnormally thin umbilical cord. This feature is in my view a significant one as this can predispose to stress being placed on the fetus when the cord is compressed during labour such as during a uterine contraction or other incident involving the cord during labour, which is not uncommon.
157. Dr Graf stated that no-one can see if the cord is compromised, but this is a risk and fits with some event where there was one or more deeper breaths resulting in squames in the lungs. The clinical position at birth was that the cord blood gases taken were essentially normal indicating there was no chronic hypoxia.
158. The evidence of subtle infection in the placenta is less conclusive but may have contributed in some small degree. The pathology of the brain is such that there is no evidence of a hypoxic event happening in the period prior to four to six hours before the birth.
159. With the presence of amniotic fluid in the lungs the wellbeing of the fetus was not affected, as the fetus was still being oxygenated by the placenta. It was not until birth had progressed that there was evidence of severe respiratory compromise, which aggressive resuscitation was unable to counteract.

Other expert opinion as to Archer's cause of death varies.

160. Professor Colditz attributes Archer's death to the amniotic fluid aspiration, with two possible mechanisms for this aspiration:
- a failure of the baby's lungs to stop secreting fluid (a process that happens in utero) when it is born, thereby preventing the airways filling with air
 - gasping due to fetal acidosis, possibly related to prolonged second stage of labour and obstructed labour
161. Dr Bisits deferred to Professor Colditz's opinion as to possible causes of Archer's amniotic fluid aspiration and did not offer any additional hypotheses.
162. Dr Barrett (obstetric medicine and endocrinology) was asked to comment whether Karen's use of hydroxychloroquine during pregnancy may have contributed to Archers' condition (given Professor Colditz's opinion that this drug may have had some role in preventing Archer's secretion process

switching off at birth). She was unable to confirm a link, but did say that it was appropriate for Karen to continue taking hydroxychloroquine during pregnancy, stating that if the medication had been ceased there would have been an increased risk of a flare of Karen's SLE during pregnancy, which is associated with poor pregnancy outcomes including higher rates of fetal loss and perinatal mortality.

163. Dr Lyneham (obstetrician and gynaecologist) only expresses an opinion in relation to management of Karen's labour and does not offer an opinion in relation to cause of death (although, similar to Professor Colditz, Dr Lyneham states that the CTG readings did not, in his opinion, indicate any degree of significant fetal hypoxaemia and acidaemia). Dr Lyneham said one explanation was cord compression. He said that something could have happened before 17:20 hours but then improves. He had a strongly held view that never at any time were the CTG abnormalities so significant to warrant immediate delivery. Dr Lyneham also said he had never seen a case or read of a case in the literature of amniotic aspiration causing hypoxia during labour. Dr Lyneham did not agree with Dr Campbell's view that if a decision had been made to do an emergency Caesarean section at 1530 and proceeded in a timely fashion then on the balance of probabilities Archer would have avoided the amniotic fluid aspiration of such a severe nature to cause resuscitation to be impossible.
164. Dr Campbell (paediatrician and neonatologist) expressed a view that Archer's amniotic fluid aspiration was associated with intrapartum asphyxia possibly due to fetal acidosis. Dr Campbell explained that a hypoxic event may have caused Archer to gasp resulting in inhalation of debris in the amniotic fluid further down the trachea bronchial tree into the alveoli. Dr Campbell noted although Archer was not severely acidotic, in terms of organ damage *the baby does show signs with the pH and bicarbonate and lactate of intra-partum hypoxia*.
165. Dr Graf (paediatric and perinatal anatomical pathologist) stated an opinion that Archer's death may have been due to acute cord compression (in the context of Archer having an unusually thin umbilical cord) or fetal sepsis, either of which could have resulted in an irreversible acute hypoxic brain injury prior to delivery. Dr Graf advised that either of these conditions could have caused the fetus to take deep gasping respirations at the time of the acute hypoxic event, explaining the amniotic fluid aspiration. However the aspiration would not have been the primary cause of death.

The changes that have already been implemented at the RBWH since Archer's death.

166. The deaths of Archer Langley, Nixon Tonkin and an earlier death of a baby Mia Davies (also the subject of an inquest) as well as significant concerns expressed internally has resulted in many significant changes to systems and processes employed by the RBWH obstetric department.
167. Over the past few years the RBWH has been updating my office of the changes as they have been made. By way of summary, the Executive Director Dr Amanda Dines states the changes were to ensure proper consultant led care, safe effective handovers and prompt escalation of concerns. The most recent update came from a letter of Dr Dines dated 22 March 2017 with a USB file of a large amount of information.

168. It is evident that a Queensland Health commissioned Part 9 Health Service Investigation into the quality and safety of clinical care and the repeated failure of the O & G Department to achieve ongoing accreditation as a training facility by RANZCOG. RANZCOG had in 2014 made a number of recommendations and this was followed up by a further visit and report in August 2015. This resulted in external and internal reviews and a *Roadmap for excellence: supporting change at the RBWH O & G Department 2015* was developed and signed off in September 2015. External consultants have been assisting implementation.
169. RANZCOG has now granted provisional accreditation in 2016 for four years subject to a satisfactory progress report in August 2018.
170. The Roadmap sets out to deliver a redesigned O&G Service to improve patient care and outcomes. This includes:
- introduction of a new single Clinical Director (previously there were two Clinical Directors);
 - structural change to the leadership team and establishment of multidisciplinary clinical teams;
 - a new clinical roster system
171. Staff were regularly informed about the changes including through newsletters and other means as resourcing, staff and rostering issues were developed and implemented.
172. An audit schedule was developed to monitor:
- Registrar & Consultant reviews of high risk patients
 - Midwife antenatal practices including completion of growth charts and obstetric management plans in the pregnancy health record.
173. RBWH have also employed additional staff including:
- four advanced trainees
 - additional Principle House Officers
 - Senior Medical Office (SMO) Conjoint position with the University of Queensland
 - Clinical Director Obstetrics and Gynaecology
174. As well there has been an emphasis on ensuring staff including Registrars and Consultants are provided with training. The O & G Department holds meetings with Registrars and Consultants on a monthly basis, to provide a forum to discuss changes in procedures and offer all medical staff the opportunity to provide improvement suggestions.
175. RBWH also developed two additional procedures. The first related to the *Impacted Fetal Head at Caesarean Delivery*. In summary this provides:
- obstetric consultant should be present if impaction of the fetal head is anticipated, including caesarean sections:
 - at full dilation

- following trial of instrumental delivery or failed instrumental delivery
 - after prolonged periods of obstruction
 - following prolonged periods of pushing in the 2nd stage
 - where presenting part is at or below the ischial spines on vaginal examination
 - where the clinicians are suspicious for impaction of the fetal head
- where proceeding with a second stage caesarean section, the process should involve a senior obstetric clinician (consultant or senior registrar credentialed for complex emergency caesarean sections) and senior midwife
 - procedure for elevating the fetal head: manually by trained staff, using cupped hand with fingers spread over the skull to spread force and decrease risk of trauma, and applying gentle steady pressure – or alternatively by using a fetal pillow placed in the vagina and under the fetal head and then inflated
 - consider use of a tocolytic (e.g. GTN) where indicated (refer to GTN procedure document)
 - other techniques including reverse breech extraction should be used as a last resort or by an experienced clinician
176. The inquest heard consistent evidence from staff that the Women and Newborn Service is now more consultant driven with a greater presence of consultants at the handovers and ward rounds, consultants involved in any emergency cases and more staff to cover leave and absences and improvements to morale and communication. A consultant is now present on every shift. Staff also spoke of increased mandatory training in such topics as identifying obstructed labour, simulated emergencies, CTG, RANZCOG workshops etc. High risk patients, such as Karen with SLE would now be reviewed by a consultant.
177. The apparent difficulties with mobile reception in some areas and pagers has been resolved with the provision of DECT phones (a form of digital cordless phone). In suitable cases Fetal pillows are used.
178. The staff were also aware of the Obstructed Labour policy and how they can escalate concerns and one staff member said a lot of work has been on the escalation process.

Conclusions

179. In reaching my conclusions it should be kept in mind that a coroner must not include in the findings or any comments or recommendations, statements that a person is or maybe guilty of an offence or is or maybe civilly liable for something. The focus is on discovering what happened, not on ascribing guilt, attributing blame or apportioning liability. The purpose is to inform the family and the public of how the death occurred with a view to reducing the likelihood of similar deaths.
180. If, from information obtained at an inquest or during the investigation, a coroner reasonably believes that the information may cause a disciplinary body for a Findings of the inquest into the death of Archer Langley

person's profession or trade to inquire into or take steps in relation to the person's conduct, then the coroner may give that information to that body.

181. In matters involving health care, when determining the significance and interpretation of the evidence the impact of hindsight bias and affected bias must also be considered, where after an event has occurred, particularly where the outcome is serious, there is an inclination to see the event as predictable, despite there being few objective facts to support its prediction.
182. In my experience, where there are negative medical outcomes, there is often evidence of poor communication that contributes, and usually not just one event but a number of such events. As a result, critical information is lost, not communicated, or falls between the cracks and is therefore not considered.
183. The RCA report found there were several issues identified in relation to communication, clinical handover, supervision and escalation and documentation.
184. There were a number of breakdowns in communication. One certainly relates to the review conducted by Dr Dash at around 1520. Dr Dash says she was aware of a concern by the midwives there was obstructed labour, as one of them referred to the possibility of a Bandl's ring. Dr Dash did examine the abdomen and rightly or wrongly came to a different view that it was the OP position of the fetus. Dr Dash says she was not aware of a finding of caput+++ and moulding++. Dr Dash did not look at the partogram, where this information was likely recorded at that time. MW Sheppard conceded it was possible she did not tell Dr Dash about the caput and moulding. Dr Dash also says she was not shown, or did not see, a blood stained urine bag. Dr Dash stated her memory of the events was quite hazy.
185. The two midwives and Team Leader present certainly recall blood in the urine bag and they believe Dr Dash should have seen it. Dr Dash makes no reference to this aspect or to the presence of caput and moulding to Dr Smith when she spoke to him briefly a short time later. Dr Smith says if he was aware of these findings he would have wanted to know more as it would have raised the question as to whether there was another reason, apart from the swollen cervix, for the lack of progress.
186. One of the communication problems related to the reason for the review by Dr Dash. It is accepted MW Smith left a message with Dr Smith at around 1515 to attend but he did not receive this message until sometime later. Dr Dash had not spoken to Dr Smith prior to the review. As far as Dr Dash was aware her purpose in attending was to look at the CTG to ensure it was safe to continue with a plan to wait for two hours whilst the epidural took effect. Dr Dash says she was not reviewing the labour plan or the patient but only the limited aspect of the CTG. I suspect Dr Dash probably was given more information of the status of the patient, consistent with the midwives' evidence, than she now recalls, but she was not concerned about the possibility of obstructed labour as she assumed Dr Smith was aware of these issues and still had his plan for a two hour wait.
187. When Dr Dash spoke to Dr Smith it is evident there was a brief conversation about the CTG improving and no issues or concerns were raised by Dr Dash. It is also apparent Dr Smith did not ask for any further information regarding the

labour and if he did he may then have realised Dr Dash had not conducted a full review of the patient.

188. It is not certain what MW Swift passed on regarding the nature of the concerns she mentioned in her statement to Dr Dash and Dr Smith at the journey board. There is little doubt Dr Dash and Dr Smith did speak briefly at the journey board and MW Swift was present. Dr Dash and Dr Smith do not recall this conversation but I accept there was a conversation. MW Swift's assertion they were 'dismissive' of her concerns there was an obstructed labour was softened in her oral evidence.
189. I am not at all certain a conversation between Dr Smith and MW Sheppard took place in the manner she suggested. Dr Smith does not recall the conversation, but of importance there is no reference to the substance of the conversation in the progress notes, and it was not mentioned in MW Sheppard's statement. MW Sheppard stated she had been diagnosed with post-traumatic stress disorder, and this may have impacted on her recollection.
190. Whatever is the case concerning these conversations, it is evident midwives had concerns and information consistent with the onset of obstructed labour, some of which is documented in the records, that they have not been able to pass on to the senior registrar despite some attempts, in a situation where there was no physical presence of a consultant who could have been asked to assist, during a very busy shift. Then a more junior doctor providing second cover for the Birth Suite attends Karen with a limited focus as to the purpose of her review and assuming the senior registrar was aware of any concerns raised.
191. The timing is critical because the findings of the RCA and the opinions of Dr Bisits and Dr Lyneham are that at 1515 a decision to proceed to a caesarean section or at the very least a medical review should have been undertaken because of the clear signs there was an obstructed labour. Up until that time the opinion of the experts is that the management of labour and decisions made were appropriate.
192. As well there was no cover by a consultant at this critical time. Dr Minuzzo had left the Birth Suite and requested Dr Sekar cover for her. Dr Sekar already had her own list and was unable to be present until 1600. There was some suggestion of criticism of RBWH in the timing of advising Dr Minuzzo that a review of her practice was taking place. One could not blame Dr Minuzzo for wanting further information given to her when she was told there was a meeting for her to attend in a few days. In retrospect, it could have been predicted that Dr Minuzzo could become upset, and the prospect of her seeking to leave the Birth Suite was certainly one scenario but there were other possibilities also. There was probably no perfect time to tell anyone this type of news and in that respect I am not critical of RBWH.
193. Dr Smith then spoke to Dr Sekar. Dr Sekar hands over to Dr Schmidt. If one had accepted some of what was said in Dr Sekar's statement at face value then one would have some real concerns as to the level of communication between these senior doctors. Dr Sekar varied some important aspects of her statement during oral evidence, such that it became more consistent with the versions of Dr Smith and Dr Schmidt. I by no means suggest there has been some collusion in this respect, as I accept the versions of Dr Smith and Dr Schmidt as accurate, but the differences between them and Dr Sekar's statement at least are quite alarming.

194. There was then a delay from 1515 to 1715 before Dr Smith, as he had planned, reviewed Karen and came to a quick diagnosis of obstructed labour and the need to conduct a caesarean section. A caesarean section was indicated from about 1530.
195. There were then further delays after the decision was made at 1715, but this was in the context the CTG was not indicating any fetal distress. There was an 85 minute delay to commence the operation, which delay the RCA found to be outside the acceptable timeframe set by the guidelines of 75 minutes.
196. One of the reasons for the delay was that Dr Smith was required to attend to another procedure, which most opinion suggests was an appropriate response. As well a second theatre and staff had to be set up. Dr Smith had requested Dr Dash review the CTG again, which was also an appropriate response. Dr Smith reasonably felt Dr Dash had sufficient experience and could have performed the caesarean if there was some urgency. No-one seems to have thought the consultant should be called in.
197. Whatever is the case as to the delay at this second time, the caesarean section did not commence until 1832, some three hours after the RCA report and experts say was the time when a decision should have been made to proceed to a caesarean section.
198. The difficulty then is considering whether these delays had any causal impact or effect on Archer's condition at birth. On this point the expert evidence is uncertain. Medical science is not an exact science and amniotic fluid aspiration is a rare event in babies born alive and the experts all stated the condition and what causes it is not well understood.
199. I note the alternative hypothesis queried by Professor Colditz that the squames were not from amniotic fluid but from the lungs as a result of resuscitation efforts. Accepting, as I do, the pathology opinion of Dr Milne that the squames were from an aspiration of amniotic fluid, it remains uncertain, based on the expert opinions, as to what event caused this to occur and at what time.
200. The consensus of opinion is it is not possible to determine clinically that an event of aspiration of amniotic fluid has occurred. That can only be determined at autopsy. When that event occurs, the baby would otherwise be unaffected in utero as the placenta is supplying the oxygenation necessary to maintain the fetus.
201. The cord gasses at birth did not indicate there had been a serious hypoxic event in utero and this is consistent with the CTG monitoring results. There could have been a minor hypoxic stressful event during a contraction, consistent with the variable decelerations noted on CTG. The consensus of the expert opinion is none of these events clinically warranted some immediate action such as urgent delivery. I accept that evidence.
202. There is expert evidence that cord compression could be a fleeting incident causing some distress leading to the baby gasping and inhaling amniotic fluid. This proposition is further supported by the finding by Dr Graf that the cord was abnormally thin.
203. Dr Campbell was of the opinion that on the balance of probabilities if an emergency caesarean section had occurred after 1530 then Archer would have

avoided the amniotic fluid aspiration of such a severe nature to cause resuscitation to be impossible. Dr Campbell was not able to say if delivery had occurred within the timeframe for a category two caesarean section that Archer may still have required a resuscitation but was of the view any early intervention in all probability would have altered the outcome.

204. Dr Lyneham disagreed with Dr Campbell on these points.
205. Dr Graf states it is not possible to identify the point in time at which delivery needed to occur for Archer to have survived, but it is reasonable to suggest delivery closer to the time that the CTG abnormalities were noted would likely have resulted in a better outcome. The time frame for when any hypoxic event occurred was quite broad to be anywhere in the six hours before delivery.
206. I accept the most likely cause of the amniotic fluid aspiration was due to a gasping event, probably associated with the thin umbilical cord predisposing to such an event occurring due to compression of the cord. It cannot be determined when such gasping event occurred. It could have occurred at any time during the admission. It is possible it occurred after the period from 1515 on 24 July 2014 and an earlier delivery could have avoided that event. There were abnormal decelerations according to the experts at 1648, 1710 and 1740 hours and it is entirely possible it was one or more of those moments which caused gasping. Delivery before those moments of abnormal decelerations may have prevented the aspiration. Unfortunately, the timing of the event of aspiration just cannot be determined with any degree of certainty.

Findings required by s. 45

Identity of the deceased – Archer Langley

How he died –

Archer Langley died at Royal Brisbane and Women's Hospital after he was born by caesarean section called due to a diagnosis of obstructed labour. The cause of death was as a result of amniotic fluid aspiration, a very rare event in a term birth. Medical science does not have a good understanding of the causes of the condition. In Archer's case it is possible either a thin umbilical cord may have predisposed Archer to a stressful event in utero or some other stressful event caused a gasping event during which amniotic fluid containing squamous cells were forced deep into the fetal lungs. There were other moments during labour when CTG showed heart beat abnormalities, which may have indicated such an event, but this cannot be determined on the available evidence. When Archer was born the aspiration of amniotic fluid impacted on his respiratory capacity and despite resuscitation attempts he was unable to breath and died. An RCA found although there were delays in identifying obstructed labour (in the context of some CTG abnormalities being identified) and delays in proceeding to a caesarean section, there were no clear links between these delays and the amniotic

fluid aspiration. Accepting these delays were avoidable, the medical consensus could not establish when such a gasping event occurred although some medical opinion stated it was reasonable to suggest delivery closer to the time that the CTG abnormalities were noted would likely have resulted in a better outcome.

Place of death –	Royal Brisbane Hospital HERSTON QLD 4006 AUSTRALIA
Date of death–	25 July 2014
Cause of death –	1a Main Condition in neonate: Amniotic fluid aspiration 1b Other condition in neonate: Dolichosigmoid 1c Main condition in mother: Failure of labour to progress 1d Other conditions in mother: Thin umbilical cord; umbilical phlebitis; systemic lupus erythematosus 2 Underlying cause of death: Undetermined

Comments and recommendations

This inquest was held in close proximity to the inquest into the death of Nixon Tonkin and my findings into that death have also been delivered today.

I have made a number of recommendations in that inquest which do not require to be repeated here. I have summarised the changes that have been made by Royal Brisbane and Women's Hospital over a number of years and having regard to the substance of those changes, the evidence of implementation and the acceptance of these by staff, I do not intend to make any further recommendations other than as below.

The family have expressed some concern that the evidence from the inquest indicates some of the changes have not been effective. Similar evidence was heard in the Nixon Tonkin inquest and I note this evidence and comment that the recommendations made in both RCA reports does need to be reinforced with staff and audits in relation to implementation of the RCA recommendations should continue. In Archer's case for instance there was confusion as to the use of progress notes and the recording of information in the partogram and whether there should be duplication of this information in the progress notes. That does need to be made clearer for both those making the entries and for those who may or should be interested in reading that information.

The parents have also suggested the RBWH provide parents with bereavement facilities, including a suitable room and a bereavement team. That is, in my view, an uncontroversial suggestion and I make that recommendation.

I have determined that no referral of specific medical or nursing staff should be made under section 48(4) of the *Coroners Act 2003*. The death of Nixon Tonkin and Archer Langley were the subject of concurrent investigations by my office and the Office of

the Health Ombudsman, during which our respective offices shared information. A copy of this decision will be forwarded to OHO for its further consideration.

I close the inquest.

John Lock
Deputy State Coroner
Brisbane
28 June 2017