CORONERS ACT, 2003

SOUTH  *AUSTRALIA*

FINDING OF INQUEST

An Inquest taken on behalf of our Sovereign Lady the Queen at Adelaide in the State of South Australia, on the 31st day of March 2014, the 12th day of May 2014, the 23rd, 24th, 25th, 26th, 27th and 30th days of June 2014, the 4th, 17th and 25th days of July 2014, the 25th, 26th, 27th, 28th and 29th days of August 2014, the 17th and 18th days of September 2014 and the 14th day of November 2014, by the Coroner's Court of the said State, constituted of Elizabeth Ann Sheppard, Deputy State Coroner, into the death of George Darcy Key.

The said Court finds that George Darcy Key aged 8 days, died at the Flinders Medical Centre, Flinders Drive, Bedford Park, South Australia on the 29th day of October 2011 as a result of perinatal hypoxic ischaemic encephalopathy . The said Court finds that the circumstances of his death were as follows:

1. Introduction and reason for Inquest

1.1. This Inquest concerns an exploration of issues arising out of the death of newborn George Darcy Key, delivered on 21 October 2011 at the North Eastern Community Hospital (NEC) in Adelaide. The evidence supports a finding that during labour the baby suffered hypoxia and, when delivered, was in such poor condition that he required intensive management. MRI testing on 27 October 2011 revealed bilateral extensive damage to the brain. After discussion with the baby's parents about the grim outlook for the future, a decision was taken to withdraw ongoing medical care. Baby Key died two days later.

2. Outline of findings which are not in dispute

2.1. Sylvia Kassaras was admitted to NEC on the evening of 20 October 2011 for induction of labour for her first baby under the direction of obstetrician, Dr Basil Antonas. Ms Kassaras was 32 years old. At her first antenatal visit she weighed 90 kilograms. Her weight at term was not documented. When admitted, Ms Kassaras was 5 days post term. Prostaglandin gels were inserted by a midwife at 9:45pm with normal cardiotocography (CTG). By 7am the following day Ms Kassaras was in labour and 3cm dilated. Dr Antonas attended to rupture the membranes, which resulted in rapid onset contractions and some reduction in the foetal heart rate (FHR) and variability but which improved subsequently, possibly as a result of altering the mother's position.

2.2. An epidural was inserted by anaesthetist, Dr Waleed Alkhazrajy, who was on site at the time around 8am and in response to a plea for urgent pain relief from Ms Kassaras.

2.3. Dr Antonas telephoned for an update from the midwife and requested a review of the CTG which was faxed to his rooms around 10am. When Dr Antonas called back to discuss the trace he indicated that he was happy with it and he would review Ms Kassaras at midday.

2.4. Meanwhile, Dr Antonas had patients booked in his consulting rooms in North Adelaide. At about 12:45pm he phoned the NEC to explain that he was delayed at the Women's and Children's Hospital (WCH) with a patient who had gone into labour prematurely, and that there was a possibility that she might require a caesarean section if a forceps delivery was unsuccessful. He requested that Ms Pacifico perform a vaginal examination of Ms Kassaras and report back to him.

2.5. Ms Pacifico did as requested and reported back by phone to Dr Antonas around 1pm that Ms Kassaras was 5-6cm dilated, 'OT and -2 position'. Dr Antonas ordered that labour be supplemented by his 'high dose' syntocinon regime. The midwife did not feel comfortable to use the high regime and so commenced at a lower rate of 24ml per hour.

2.6. When Ms Van Der Kroft took over care of Ms Kassaras at 2:30pm, the syntocinon was running at 48ml per hour. She noted that the contractions had been 4 in 10,

moderate to strong, but were becoming less regular and dropping back in intensity. Ms Van Der Kroft increased the syntocinon from 48ml to 96ml per hour.

2.7. When Dr Antonas was free to leave the WCH at about 2:20pm he decided to return to his rooms to attend to patients booked in to see him, rather than to return to the NEC to review Ms Kassaras.

2.8. At about 3:45pm, Ms Van Der Kroft reported to Dr Antonas after conducting a vaginal examination that Ms Kassaras was 9cm dilated, 'at spines, ?OT'. Given that the baby's head had not descended sufficiently and was in the occipito-transverse position, Dr Antonas ordered an increase in the syntocinon to 120ml per hour and indicated that he would be in 'within the hour'.

2.9. Meanwhile, the midwife followed these instructions. While running at 120ml per hour the contractions were at least 5 in 10 and moderate to strong. Whilst the midwife recorded the baseline FHR at between 130-140 beats per minute, it is during this period that problems started to emerge.

2.10. At 4pm Ms Kassaras complained of feeling cold and started vomiting. The FHR dropped to 90 beats per minute during an episode of vomiting. Her temperature increased to 38ºC by 4:25pm and it was difficult for the midwife to determine the baseline FHR from viewing the CTG. Contractions were recorded as 5 in 10 and strong. Ms Van Der Kroft reduced the syntocinon rate slightly to 100ml per hour. By about 4:30pm Ms Kassaras was fully dilated.

2.11. The elevated temperature prompted the midwife to contact Dr Antonas at 4:30pm. During this call, lasting over 4 minutes, Ms Van Der Kroft indicated some of her concerns which prompted Dr Antonas to request a copy of the CTG to be forwarded to his rooms by facsimile. Dr Antonas ordered an intravenous antibiotic and an antiemetic. Because Ms Van Der Kroft was concerned and did not want to leave her patient to arrange for the CTG to be faxed, she enlisted help from another midwife. Meanwhile, the medication needed to be drawn up and administered. After Ms Anderson called Dr Antonas at 4:43pm to double check the intravenous order, the drugs were administered at approximately 5pm.

2.12. The portion of CTG trace to be faxed to Dr Antonas was torn off the machine at 4:42pm. When this happened the machine was inadvertently left off, which meant that there was no CTG recording for a period of 7 minutes until it was re-activated.

2.13. The syntocinon infusion was stopped by a midwife at about 4:50pm as a precautionary measure for between 15 and 30 minutes. It was recommenced at 40ml for a further 15 minutes or less.

2.14. Meanwhile, the portion of trace to be faxed came to the attention of team leader, Ms Bruggeman who formed the view that it was concerning and that the baby might be in distress.

2.15. At 4:45pm, Ms Bruggeman called Dr Antonas and directed him to come to the hospital, asserting to him in a firm voice that the baby needed to be delivered. She wrongly assumed that Dr Antonas had seen the trace before speaking to him.

2.16. The faxed CTG was received some 13 minutes after this phone call and 23 minutes after it had been requested by Dr Antonas.

2.17. After about 5 to 15 minutes, Dr Antonas left his rooms and drove through peak hour traffic for approximately 20 to 30 minutes to the NEC without having seen the CTG, but under the impression that he was required to be in attendance without delay.

2.18. Meanwhile, Ms Kassaras' temperature rose to 39.9ºC. A top up dose of epidural anaesthetic was administered at approximately 5:05pm after which Ms Kassaras' blood pressure dropped to $^{92}/_{30}$ and the FHR dropped to 90 beats per minute. Oxygen was administered by the midwives, the syntocinon infusion stopped, intravenous fluids increased and attempts made to improve the FHR by having Ms Kassaras move onto her hands and knees.

2.19. By about 5:30pm Dr Antonas had arrived at the NEC and performed an examination which revealed full dilation, but with the baby's head in the 'OP' position. The CTG indicated foetal distress. Dr Antonas judged that vaginal delivery was the most expedient way of proceeding and so attempted gentle forceps rotation for about 5 minutes in between contractions, but without success.

2.20. Dr Antonas then decided that a caesarean was required and from 5:40pm he and Ms Bruggeman made several phones calls to secure an anaesthetist, an assistant and a paediatrician to attend immediately. Meanwhile preparations were made at the hospital for the caesarean section.

2.21. After initially struggling to locate an anaesthetist, Dr Barry Egan was contacted at 6pm and attended 10 minutes later. The baby was delivered by caesarean section at 6:35pm. Dr Pollnitz was the paediatrician in attendance. At delivery Baby Key had a pulse rate of 10 and was not breathing. He responded to resuscitation, but needed to be transferred into the care of MedSTAR staff for care at the Flinders Medical Centre (FMC) where he was managed for severe birth hypoxia until his death on 29 October 2011. Meanwhile it was determined after delivery that the placenta was small, weighing 363gm, which was less than the 10^{th} percentile at term.

3. Issues at Inquest

3.1. As a result of an 'expert' review of management of the delivery of Baby Key by Professor Roger Pepperell in June 2012, questions arose concerning whether the use of syntocinon to augment labour resulted in excessive uterine contractions and foetal distress which were not detected or managed appropriately. The Inquest was delayed partly to enable a report in response at the request of lawyers for Dr Antonas.

3.2. There was also a suggestion during the investigation of this matter from some midwives that Dr Antonas may have been difficult to contact on the day Baby Key was delivered. It was suggested that Dr Antonas was reluctant to attend his patient in labour until birth was imminent because he had a number of patients to review in his rooms.

3.3. Baby Key's father noted in an affidavit that shortly after delivery he saw very noticeable indentations on the baby's head, which presumably raised the possibility of injury to the baby's skull during the attempted forceps delivery. Mr Key also stated that at a post natal visit with Dr Antonas, the doctor made a remark to the effect that the baby was delivered a bit late.

3.4. As the evidence unfolded some of these concerns faded away and many of the criticisms of management of the labour, expressed by Professor Pepperell, were disputed by Dr Antonas as well as another experienced obstetrician, Dr Michael McEvoy.

3.5. Ultimately, I consider that the major issues arising in this Inquest are as follows:

1) Whether the administration of syntocinon had a role to play in the outcome;
2) Whether the CTG revealed signs of foetal distress at a time when intervention was called for, but earlier than when it occurred at 5:30pm;

3) Whether the 'decision to delivery' interval was acceptable in the circumstances;

4) Whether the small placenta contributed to the outcome.

3.6. I am particularly mindful of the potential danger of 'hindsight' analysis, given the sad outcome. I also have regard to the practical realities for obstetricians who are reliant upon midwives to manage their patients during labour in a range of hospitals, some of which have limited or no back up facilities to deal with emergencies. The NEC hospital is a small private hospital serviced by private practitioners, who supervise management of women in labour from elsewhere unless they are advised of a problem, or the woman is ready to deliver.

3.7. I accept that the practice of obstetrics requires judgment and balancing of competing risks during labour. It appears that some practitioners are more resistant than others to deliver by caesarean section when concerns arise regarding foetal distress during labour. It is acknowledged that foetal distress occurs commonly during labour and that in the majority of cases, the baby recovers without complication.

4. Post Mortem – Dr Nicholas Manton

4.1. Forensic Pathologist, Dr Nicholas Manton, performed a post mortem on 3 November 2011. In his report dated 17 February 2012 Dr Manton concluded that the cause of death was 'hypoxic ischaemic encephalopathy with severe diffuse cortical necrosis and diffuse white-matter injury'[1]. According to Dr Manton his findings were consistent with 'a severe intrapartum hypoxic event'. I accept the conclusions expressed as to the cause of death.

4.2. Whilst the pathologist indicated that the cause of hypoxia was undetermined, he noted that one contributing factor may have been the size of the placenta, which weighed 363 grams.

4.3. Dr Manton made the following observations concerning the placenta:

> 'The placenta is noted to be small in size (less than the 10th percentile for the gestational age and with a mean placental weight more in keeping with 32 weeks gestation) with villi showing irregular maturation and reduced vascularity such that it is possible a degree of placental insufficiency may have contributed.' [2]

[1] Exhibits C1a and C1b
[2] Exhibit C1a, page 2

4.4. It is acknowledged that, currently, there is no way of determining placental weight during pregnancy.

4.5. Whilst a small placenta is thought to have diminished functional reserve, there was no suggestion in this case of growth restriction. Baby Key was said to be of normal weight at 3200 grams and there were no pathological abnormalities noted during Dr Manton's examination. Dr Manton indicated that whilst the significance of the small placenta in this case was uncertain, the reduced placental functional reserve might have been a contributing factor in the episode of acute hypoxia which led to the baby's demise[3]. Evidence from the medical witnesses during this Inquest leaves this topic unresolved. In time, one might expect some research to be conducted which could shed light on the role of the small placenta during labour, however, in this Inquest it is a topic which is unable to be clarified.

4.6. Dr Manton found no evidence of birth trauma, including injuries to the face or skull.

5. Mr David Key

5.1. Mr Key adopted his affidavit[4] as an accurate outline of events, however, in evidence, he struggled to recollect more than a few details about how his wife was managed throughout her labour at NEC, which is not surprising, given the passage of time and the distressing outcome.

5.2. Mr Key maintained that about 4:30pm he became aware of a concern about the baby's condition and the actions taken by the midwives to change his wife's posture.

5.3. One matter which was covered in the affidavit, but not elaborated upon in his evidence in chief was concerning. He described seeing a deep 'crevice' on the baby's skull once the baby had been delivered by caesarean section. Having heard evidence from several other witnesses on this topic, I find that there was some temporary superficial marking visible on the baby's face or head at birth, however it was not causally relevant to the baby's demise.

5.4. At a follow up appointment following the baby's death, Dr Antonas is said to have made a statement to the couple that 'we got George out a little bit too late'[5]. In cross-examination, Mr Key seemed fairly confident that this remark was made by

[3] Exhibit C1b
[4] Exhibit C9
[5] Transcript, page 57

Dr Antonas. Dr Antonas did not deny making such a remark, but indicated that he did not believe that there was any undue delay in the delivery of the baby, but he may have mentioned his difficulty getting hold of an anaesthetist. Dr Antonas acknowledged that something happened during labour which resulted in hypoxia, but was at a loss to explain why the hypoxia was so severe[6].

6. Dr Barry Egan

6.1. According to the affidavit prepared by Dr Egan[7] he was contacted about 6pm by Dr Antonas about needing to perform an emergency caesarean section at the NEC. He understood that the anaesthetist who inserted the epidural earlier in the day was unavailable.

6.2. Because Dr Egan lived close to the hospital, and was home at the time, he was able to get there within about 10 minutes. He performed a rapid assessment and administered top up epidural, Xylocain 2% with adrenalin, which dropped Ms Kassaras' blood pressure a little. This was addressed by administration of a small dose of Metaraminol. In his view, none of the drugs administered in the circumstances would have impacted upon the foetus given the short time frame.

6.3. According to Dr Egan, there was no sense of urgency as far as he could recall about there being a need for the baby to be delivered immediately. It was conceded that events moved quickly in any event.

7. Dr Robert Pollnitz

7.1. This witness[8] is the paediatrician who was called in at short notice by Dr Antonas once a decision was made to perform the caesarean section.

7.2. Dr Pollnitz has many years experience and now works half-time. He attends births at various private hospitals around Adelaide and consults in North Adelaide.

7.3. When he arrived at the NEC Dr Antonas was preparing the abdomen for caesarean. According to Dr Pollnitz, the baby was delivered within about 15 to 20 minutes of the procedure at 6:35pm and he indicated that whilst he understood that the caesarean was

[6] Transcript, page 1322
[7] Exhibit C2a
[8] Exhibit C21a

required as soon as possible because of the indications of foetal distress, he was not aware of any particular urgency in this case[9].

7.4. According to Dr Pollnitz, the baby was in very poor condition at birth. Baby Key's colour and tone was poor. He was limp and unresponsive with no respiratory effort and a pulse of 10 beats per minute. With intubation, ventilation and adrenaline given there was a response and improvement. The pulse was 140 beats per minute, with 100% oximetry reading within 2 minutes. An apgar score of 1 was recorded at 1 minute, 4 at 5 minutes and 7 at 10 minutes.

7.5. The emergency team, MedSTAR, was contacted about 3 minutes after delivery. Baby Key started to breathe 8 to 9 minutes after birth, but he had low tone until the MedSTAR team arrived about 40 minutes later, at which time they took over management and conveyed Baby Key to the FMC Paediatric Intensive Care Unit.

7.6. Dr Pollnitz said that it was clear at the outset that Baby Key had suffered severe birth asphyxia. According to Dr Pollnitz, he was surprised by the degree of birth asphyxia which Baby Key suffered because he had been advised that the foetal heart rate had dipped to 70 beats per minute 'only at full dilatation' and that the attempted forceps delivery was not prolonged.

7.7. Notwithstanding his long years of experience, Dr Pollnitz said that he has never been able to estimate the length of time that hypoxia might have been an issue before delivery. According to Dr Pollnitz, there are many factors involved and I had the impression from this witness and other experts that the topic is poorly understood, notwithstanding the enormity of its impact. Dr Pollnitz elaborated on his experience as follows:

> 'I attend many Caesarean sections for foetal distress with FH dips to 70bpm (three this week alone) and my usual experience is that the babies need only minimal resuscitation and make a rapid full recovery with no sequelae. I am not able to explain why in Baby Key the hypoxia was so severe as to cause his death.' [10]

7.8. Dr Pollnitz noted a change in recent years which he outlined as follows:

> 'It's a frequent occurrence, even back in 2011 we would have lots of older mums having their first child and perhaps an IVF baby and all the staff are understandably concerned to monitor the labour closely and if there are signs of foetal distress as in a foetal heart

[9] Transcript, page 1188
[10] Exhibit C21a, page 3

> rate dropping with contractions then there is frequent recourse to caesarean section. I would probably be called three times a week to a caesarean for such reasons.' [11]

7.9. Dr Pollnitz added that generally the babies are delivered in good condition. He indicated that after Baby Key was delivered he was initially optimistic, hoping for a better outcome, but recognised that oxygen deprivation can cause major brain damage. He realised that by the time the baby was transferred to the FMC, he was in serious trouble[12].

7.10. Baby Key was said to be normally formed and of normal size, weighing 3.2 kilograms. He stated that there were minor pressure marks on both sides of the face 'consistent with a gentle trial of forceps'. Shortly after the MedSTAR team arrived, Baby Key developed seizures which could not be alleviated by medications and which was suggestive of a major hypoxic brain injury[13].

7.11. Dr Pollnitz stated that he did not realise that the placenta in this case was smaller than normal. According to Dr Pollnitz, problems leading to hypoxia at birth may also commence during the pregnancy.

7.12. Part of the management of Baby Key shortly after delivery was the administration of intravenous sodium bicarbonate via an umbilical cannula which was given to correct acidosis following birth[14].

7.13. When questioned about whether he considered it prudent to request a sample of cord blood be taken at delivery, for blood gas analysis, he indicated that it was not something he regarded as necessary in the circumstances[15]. The evidence indicates that it is only in larger tertiary hospitals that cord blood gases are measured.

7.14. I find that if a sample had been available for analysis it would have assisted in determining the degree of hypoxia at birth with precision by estimating the level of foetal metabolic acidosis. The additional information would not have altered the outcome, but may have contributed to an understanding of what occurred.

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[11] Transcript, page 1193
[12] Transcript, page 1209
[13] Exhibit C21a, page 2
[14] Exhibit C21a, page 2 and Exhibit C1a, page 3
[15] Transcript, page 1200

7.15. I find that Dr Pollnitz carried out his role competently following the birth of Baby Key and that he was adequately supported by the midwives until the MedSTAR team arrived at the hospital.

8. Dr Sanjay Sinhal

8.1. Dr Sinhal was the 'on call' neonatologist who was responsible for Baby Key's management from the time the MedSTAR retrieval team was called to the NEC[16]. He also gave directions to MedSTAR staff by phone while they were assessing the baby en route to the FMC.

8.2. Dr Sinhal explained that the baby was said to be suffering from the effects of birth asphyxia, an expression which he said was used interchangeably with that of hypoxic ischaemic encephalopathy (HIE).

8.3. According to Dr Sinhal the extent and duration of compromise in the blood supply to a baby's brain will impact on how well a baby will recover, if at all[17]. Some compromise to the blood supply is not uncommon during labour, however in some cases, for example where there is umbilical cord compression during labour, it is said to be difficult to gauge the extent of the problem. It is accepted that during normal labour the foetus is exposed to repeated periods with reduced uterine and placental blood flow during contractions. In most cases, it is believed that the foetus is able to tolerate these episodes, but generally the FHR reduces in response as a coping mechanism. It is the more prolonged periods of reduced FHR which causes concern.

8.4. I understand that HIE is a huge issue for doctors and their patients because of the risk of death or cerebral palsy in newborns. It is therefore important that every labour is managed in a way which reduces the risk of development of birth asphyxia. Unfortunately, it appears that notwithstanding its significance, the factors underlying the problem are poorly understood because of the limitations with research options and the means of adequately monitoring the foetal condition.

8.5. Dr Sinhal explained that a classification system referred to as 'HIE stage 1, 2 or 3' is used to determine the severity of the condition of the newborn and the likely prognosis. Stage 1 babies are said to have a small compromise to the blood supply to

[16] Exhibit C15
[17] Exhibit C15, page 3

the brain, with a good chance of recovery during the first few days of birth. Stage 3 describes babies who will almost certainly suffer severe disability or death.

8.6. Baby Key's presentation at birth was said to be consistent with Stage 2, which reflects a compromise to the brain for a longer period than for Stage 1. Around 80% of babies in this category are said to be likely to suffer some mild compromise to their function, but go on to be capable of functioning as independent adults. The remaining 20% either fail to survive or suffer permanent moderate or severe disabilities including cerebral palsy, low IQ, deafness and blindness. Some outcomes for these babies have improved by using cooling treatments for protection of the brain. This treatment was attempted for Baby Key.

8.7. One of the indicators informing the prognosis is said to be the heart rate both before and after birth. Dr Sinhal described the situation as follows:

> 'A normal or near normal heart rate is a positive sign. If there is no heart rate or a very low heart rate for a prolonged period of time, low enough to compromise the perfusion of the brain for that duration, then the outcome can be poor. In George's case, a positive sign was that his heart rate was good shortly after birth. Based on the information I had been provided and my own observations of George, I believed he was suffering from HIE stage 2B (2A is HIE stage 2 without seizures and 2B is HIE stage 2 with seizures).' [18]

8.8. A 'point of care' ultrasound of Baby Key's brain was undertaken on the evening of his admission to FMC to exclude any congenital factors or intraventricular haemorrhage[19]. When viewing the ultrasound Dr Sinhal said that he observed mild brain oedema which was common in babies presenting with HIE. He also suggested that the presence of cerebral oedema might be consistent with past seizures having occurred[20]. Because the ultrasound was not conducted by the Radiology Department, a report was not generated.

8.9. Dr Sinhal said that he conducted the ultrasound himself to assist him in his clinical management[21]. According to Dr Sinhal this type of test does not allow one to identify the time when the brain is injured[22]. However, in his review of management in this case, Professor Pepperell indicated that if an ultrasound examination done within a few hours of delivery shows signs of cerebral oedema, this would indicate to him that

[18] Exhibit C15, page 4
[19] Transcript, page 889
[20] Transcript, page 905
[21] Transcript, page 888
[22] Exhibit C15, page 5

hypoxia occurred before labour or very early in labour[23]. The images are said to have been deleted from the relevant machine in the Imaging Department at FMC because of the limits of storage capacity[24]. The absence of a report, together with the deletion of the images, has prevented any further clarification of the nature of the cerebral oedema at that crucial early stage.

8.10. According to Dr Sinhal, following the birth of babies thought to be compromised by hypoxia, a sample of cord blood is taken to assist with the baby's management thereafter and to assist with an assessment of the prognosis. The blood gas results are an indicator of the severity of the metabolic problem facing the newborn[25]. In Baby Key's case this was not done, despite Dr Sinhal mentioning it twice on the telephone to a midwife at the NEC hospital between 12 and 16 minutes after the baby's delivery, and while Dr Pollnitz was resuscitating the baby[26]. Dr Sinhal conceded that he was not aware that small hospitals such as the NEC have no facilities for doing what he requested.

8.11. I was assisted by Professor Pepperell's oversight of the post delivery cord blood results taken at 7:45pm and subsequently, which was summarised as follows:

> '1945 hours (70 minutes after birth) Capillary blood sample pH 7.23, pCO2 32.5, Base excess -14. Lactate level very high at 16.99. This sample was collected 70 minutes after birth and showed evidence of a metabolic acidosis but the pH was only minimally reduced. It does not allow an accurate assessment to be made of the likely pH and base excess levels at birth, because these could have been made much better because of the resuscitation given.
>
> 2045 hours. Arterial blood sample. This showed the pH was higher at 7.29, the pCO2 was 27, and the base excess was -13.
>
> At 2250 hours the arterial blood results were pH 7.32, pCO2 29 and base excess -10. There was therefore continuing improvement with time.' [27]

8.12. Whilst I accept that cord blood gas analysis had an important role to play in determining the severity and the duration of hypoxia in this case, there is no evidence to suggest that the absence of cord gas results compromised the management of Baby Key thereafter. However, given the importance of this issue for doctors and the labouring woman, one might have expected this to be done routinely in cases such as this to contribute to an understanding of hypoxic events during labour.

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[23] Exhibit C18a, page 10
[24] Refer to email from Susan Lonie, Clinical Risk Manager, FMC
[25] Transcript, page 895
[26] Transcript, pages 895-896
[27] Exhibit C18a, page 9

8.13. An MRI of Baby Key's brain was conducted on 27 October 2011 and showed extensive damage in both hemispheres, and which confirmed that the outlook was bleak. I accept the explanation given by Dr Sinhal about the MRI playing a limited role in the early phase of the baby's management, without repeating the detail[28].

8.14. I accept that Dr Sinhal is an experienced and capable neonatologist who managed the situation competently. For this reason I do not propose to detail the complex medical management while the baby was in Intensive Care at FMC. It is clear that the prognosis was not encouraging from an early stage when the baby experienced seizures which needed to be managed with anticonvulsant medication at the NEC hospital. I am also satisfied about the nature of the communication between staff and Baby Key's parents at FMC during this difficult time.

8.15. Dr Sinhal was asked to comment upon the factors which neonatologists consider may contribute to a presentation of hypoxia at birth. He candidly acknowledged that most clinicians are unable to say whether it results from injury during birth alone, or whether there might have been some compromise to the blood supply in the days or weeks before birth. In that regard, he considered that placental insufficiency may also be a potential contributing factor but was unable to elaborate. Having said that however, Dr Sinhal considered that in the case of Baby Key, it appeared to be more a case of 'birth asphyxia'[29].

9. South Australian Perinatal Practice Guidelines

9.1. A number of guidelines[30] were referred to during the Inquest which govern the management of induction of labour. Having heard from various witnesses about their role in practice, I accept that these documents have been prepared with a deliberately conservative approach in contemplation that they will be followed by midwives and practitioners with varying levels of experience, including those with no experience. I accept that these guidelines may be departed from by experienced practitioners, however it is appropriate in my view, that a conservative approach should be followed where possible to minimise the known risks of hyper stimulation of the uterus and consequential hypoxia to the foetus. It is noted that the documents indicate that the aim of syntocinon is to achieve a maximum rate of contractions of between 3 and 4

[28] Transcript, page 903
[29] Transcript, pages 906, 908
[30] Exhibits C7, C17, C22 and C23

per 10 minutes, yet it is widely acknowledged that during unassisted labour there will often be contractions of 5 in 10, especially towards the final stage of labour. The evidence in this Inquest makes plain that most practitioners and midwives aim for strong contractions of 5 in 10 for effective labour.

9.2. The guidelines stipulate that the minimum dose of syntocinon is to be administered to achieve the desired contraction rate. In cases where there is said to be 'uterine hypercontractility' but without signs of foetal compromise, the correct response, in accordance with the guidelines, is to reduce the level of infusion and seek a review. I do not intend to detail the contents of the guidelines any further in my findings, but bear them in mind.

9.3. <u>Events during labour</u>

9.4. <u>Jennifer Pacifico</u>

This witness was the midwife responsible for Ms Kassaras during the morning shift of 21 October 2011[31]. Much of her evidence was concerned with how she interpreted the CTG throughout the labour and her consequential actions.

9.5. I note that the midwives at NEC were required to undergo regular updated training which was performed on line. It is recognised that the CTG is an imperfect tool for monitoring the wellbeing of the foetus and that interpretation of the trace requires special training. The research also suggests that since its introduction and use in monitoring labour, it has not resulted in improved outcomes. It appears that monitoring may occasionally give rise to a false sense of security.

9.6. The FHR is said to be altered during contractions as well as in response to the labouring mother's position and when a vaginal examination is performed. It is also well-known that the type of contact between the sensor and the mother's abdomen, as well as altered maternal position, may affect the quality of the trace[32]. Whilst a foetal scalp clip device is used in some hospitals to improve the quality of the trace, it was not used for Ms Kassaras.

9.7. Ms Pacifico said that she understood that Ms Kassaras was admitted the previous evening and that prostaglandin gel was introduced in accordance with direction from

[31] Exhibit C10
[32] Transcript, page 98

Dr Antonas. She witnessed Dr Antonas perform the procedure to rupture the membranes at about 7am. According to this witness, after Dr Antonas left the hospital Ms Kassaras rapidly developed painful contractions and became very distressed. She is said to have demanded an epidural for pain relief. Ms Pacifico explained that because Dr Alkhazrajy was in the hospital at the time seeing another patient, she requested that he insert the epidural because it might have taken too long to arrange Dr Antonas' preferred anaesthetist to attend. When Dr Antonas learned of this decision in a phone call at about 8am, he expressed his disapproval. He later explained that it was because he had an arrangement with particular anaesthetists who agreed to do this work for his patients on the understanding that they would be available if they were needed later during the labour. As it turned out, Dr Alkhazrajy was not available that evening and that fact presented a challenge when trying to locate another anaesthetist urgently at about 5:40pm. In the circumstances, I find that it would have been prudent for staff at NEC or Dr Antonas to arrange for another anaesthetist to be on standby, if called upon later that evening.

9.8. Dr Antonas phoned for an update around 10am to discuss progress and requested a copy of the CTG tracing be faxed to him[33]. Dr Antonas discussed the trace and his patient's progress in a call at 10:24am[34]. The following is Ms Pacifico's summary of the situation at that time:

> 'After reviewing the CTG I faxed, Dr Antonas rang me back and said he was happy with the last 30 minutes I had sent through. We had a discussion about the current CTG, including the wandering baseline, we spoke about the beat to beat variability and the variable decelerations and the fact Sylvia was creeping in to having four to five contractions every ten minutes. Dr Antonas did not request any new orders, so he didn't want me to change my management or do anything differently to what I was doing, he said he would review her again at 12.00pm.' [35]

9.9. When questioned about this faxed CTG, Ms Pacifico indicated that whilst not having a memory of it now, she would have sought the assistance of another midwife to fax the trace so that she could remain with her patient[36]. The faxing process was complicated by the necessity for the trace to be placed onto A4 sheets for photocopying before being faxed.

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[33] Exhibit C4a, page 28 and Exhibit C10, page 6
[34] Exhibit C6d and Exhibit C4, page 28
[35] Exhibit C10, page 7
[36] Transcript, page 105

9.10. At about 12:45pm Dr Antonas phoned from the WCH to indicate that he was attending another patient who might require an emergency caesarean section. He requested that Ms Pacifico perform a vaginal examination and report back to him[37]. At about 1:12pm Ms Pacifico phoned Dr Antonas to report her assessment which included an estimate that cervical dilatation was between 5cm and 6cm. Dr Antonas ordered intravenous syntocinon infusion to commence in accordance with his regime, which Ms Pacifico understood was a high dose regime, commencing at 36ml per hour[38]. In fact, Dr Antonas' high regime commenced at 40ml[39].

9.11. The witness explained that, in her view, the high dose regime was inappropriate for a woman in Ms Kassaras' situation and she therefore chose to commence at a lower dose. She added that she understood that the high dose regime was indicated for women with 'unfavourable cervical resistance to low and moderate regimes'. There is support for that view in relevant guidelines for augmented labour in this State and particularly in the NEC's own regime[40]. Ms Pacifico conceded that she did not convey her disquiet about the order with Dr Antonas and, when pressed, implied that she found Dr Antonas to be intimidating.

9.12. The evidence from midwives during the Inquest indicated that the syntocinon regime utilised by Dr Antonas was higher than for the majority of other obstetricians they had worked with, however it appears that the nurses were given discretion to determine the level used according to the progress of the labour including any sign of foetal distress. I accept that it is appropriate for midwives to exercise their discretion when administering syntocinon, however, in my view, if there is disagreement with the doctor, the midwife should discuss the concern at the time with the doctor.

9.13. Ms Pacifico commenced the syntocinon at a rate of 24ml per hour at 1:30pm with a view to gradual increase. Ms Pacifico explained that when she handed over to Ms Van Der Kroft at 2:30pm, whilst she had noted some decelerations occurring during her shift, the foetal heart baseline rate had been maintained[41]. She observed that at about 2:15pm the maternal contractions were occurring at a rate of 5 in 10 minutes and hence there was no need to increase the syntocinon level beyond 48ml per hour[42].

[37] Exhibit C4, page 29 and Exhibit C10, page 8
[38] Exhibits C7 and C6b
[39] Exhibit C12
[40] Exhibits C7, C17 and C28
[41] Transcript, page 149
[42] Exhibit C4, page 29 and Exhibit C10, page 10

The pardograph indicates that the contractions were of moderate intensity and 4 in 10 minutes[43].

9.14. Whilst Ms Pacifico only had about 4 years experience at the time, I formed the view from her evidence that she was well informed and appropriately cautious in her management of Ms Kassaras.

9.15. Maria Van Der Kroft

This witness was the midwife who took over care of Ms Kassaras from Ms Pacifico just before 2:30pm. Her witness statement was prepared one year after the events in question, but with assistance of notes made the following day. Ms Van Der Kroft appeared to have very little independent memory of what transpired and was unable to elaborate beyond what was documented with any degree of certainty.

9.16. Ms Van Der Kroft had qualified in 1985 and after working at Modbury Hospital for 15 years, moved to NEC in 2008. In 2011 she worked irregular shifts as a casual employee.

9.17. According to her witness statement, Ms Van Der Kroft had the impression that the CTG trace during the morning shift had been 'non-reassuring' in the sense that there was some concern. It is not clear what led to this impression, but I bear it in mind as a reason which might have justified a cautious approach during her shift[44].

9.18. Ms Van Der Kroft increased the syntocinon infusion rate from 48ml to 96ml at about 2:45pm. Her entry in the notes suggests that the contractions had dropped back to an irregular pattern of frequency and strength. I accept that a midwife is required to exercise judgment in this regard to ensure that the momentum of efficient contractions is maintained. The witness believed that the FHR for this period displayed good variability with accelerations and a normal baseline[45]. Ms Van Der Kroft appeared unsure whether she was following a particular syntocinon regime when deciding to increase the rate at 2:45pm[46], but explained that her aim was to achieve 4 to 5 strong contractions in 10 minutes. She acknowledged in evidence that if the contractions increased to 6 in 10, then she would need to drop back the infusion rate and monitor

[43] Exhibit C4, page 24
[44] Transcript, pages 361, 392
[45] Transcript, page 264
[46] Transcript, page 490

the situation. From answers given during her evidence, I formed the view that this midwife had a fairly limited understanding of the reason for caution here[47].

9.19. Dr Antonas was said to have phoned to check on progress and requested that a vaginal examination be conducted. Independent records indicate that Ms Van Der Kroft reported back to him by phone at 3:46pm[48]. The following is a note of what was conveyed:

> 'Cx 9cm dilated, thin, pp. at spines, ?OT, some caput felt.' [49]

9.20. The witness explained that she found it difficult to be certain whether the head was in the occipito transverse position or not and she was unsure if she discussed the nature of the contractions with Dr Antonas during that call[50].

9.21. Dr Antonas, directed Ms Van Der Kroft to increase the syntocinon infusion from a rate of 96ml to 120ml per hour and he indicated that he would be in within the hour. The record indicates that Ms Van Der Kroft followed this instruction and for the following 30 to 45 minutes the syntocinon was administered at the higher rate[51].

9.22. According to the CTG trace between 3:30pm and 4pm, there is a suggestion that the rate of contractions had increased to 6 in 10 minutes, although Ms Van Der Kroft charted them as 5 in 10 and moderate to strong. If they were 6 in 10, Professor Pepperell indicated in his evidence that this was excessive and called for a reduction in syntocinon rather than an increase. There was no provision on the pardograph to record such a high contraction rate in any event, although one might expect it noted elsewhere if it was recognised by the midwife. On this topic Dr Antonas indicated in evidence that had he known there were 6 in 10 contractions, it would not have concerned him unless the increased contractions were sustained over a prolonged period and the CTG became abnormal. At about 3:50pm Ms Van Der Kroft noted that the FHR was 130 to 140 beats per minute.

9.23. The evidence suggests that the rate and strength of contractions was not discussed when Ms Van Der Kroft spoke with Dr Antonas again. Ms Van Der Kroft did not

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[47] Transcript, pages 432, 4388
[48] Exhibit C6b
[49] Exhibit C4, page 58
[50] Transcript, pages 277, 279 and 286
[51] Exhibit C4, page 24

appear to recognise the frequency of contractions as of concern[52]. Given the potential dangers associated with hyper stimulation, it would have been prudent to give more attention to this feature of the labour and to discuss it with the doctor.

9.24. The next period of significance was at 4pm. This is when Ms Van Der Kroft claimed to have become concerned about the condition of the foetus. At this time, the witness said that she administered Panadol for headache. She noted that Ms Kassaras' temperature and pulse were elevated (38ºC), she was vomiting and felt 'cold and shivery'. The FHR had dropped to 90 beats per minute during an episode of vomiting[53]. I bear in mind the drop in quality of the CTG and temporary foetal distress during episodes of vomiting which Ms Van Der Kroft said went on for some time. The deterioration in quality of the trace is said to be partly due to loss of contact during maternal movement.

9.25. Ms Van Der Kroft explained that it was the elevated temperature which caused her to phone Dr Antonas, but she also wanted to advise him that a vaginal examination revealed that Ms Kassaras was fully dilated. At 4:30pm, she phoned Dr Antonas at his consulting rooms[54]. The call lasted about 4 ½ mins.

9.26. During her evidence Ms Van Der Kroft conceded that during this call, apart from mentioning the elevated temperature, she may have discussed the blood pressure reading of $^{118}/_{72}$ and the FHR, but she was unsure about that[55]. It seems logical that there was some discussion about the interpretation of the CTG during the call because Dr Antonas requested that a copy of it be faxed to his rooms[56]. Having considered the evidence from Dr Antonas on this topic, I find that Ms Van Der Kroft probably told him that she was unable to confidently estimate the baseline FHR from the trace.

9.27. The pardograph which charts multiple observations is incomplete from 4pm with respect to the FHR as well as the maternal pulse and blood pressure readings[57]. There is a sense from the record keeping that the situation may have been deteriorating, or that the midwife was extremely busy dealing with multiple demands upon her[58].

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[52] Transcript, page 303
[53] Transcript, page 290
[54] Exhibit C6b
[55] Transcript, pages 291, 319 and 321
[56] Transcript, page 290
[57] Exhibit C4, page 24
[58] Transcript, page 446

9.28. Ms Van Der Kroft conceded that she did not turn her mind to whether there was hyper stimulation of the uterus from the syntocinon[59]. I find that there was probably no discussion during the call at 4:30pm about the appropriateness of continuing the syntocinon infusion. According to the pardograph, the syntocinon infusion was dropped back from 120ml to 100ml at about the time of the phone call in any event[60]. Ms Van Der Kroft could not recall why the infusion was reduced, but suggested that it may have been in response to a deterioration of the FHR[61]. If one adopted a conservative approach to the use of syntocinon as advocated by Professor Pepperell, it would have been prudent to stop it at 4pm and to monitor the FHR thereafter.

9.29. When asked about her level of concern for her patient, Ms Van Der Kroft indicated that she would have preferred that Dr Antonas was at the hospital when she called him at 4:30pm. When reviewing the trace, Ms Van Der Kroft said that her major concern was the welfare of the baby when the FHR became concerning at approximately 4:30pm[62]. In the circumstances, I find that if she was genuinely concerned, she should have asked Dr Antonas to come in to assess Ms Kassaras as a priority. I suspect that if Dr Antonas had offered to come when she phoned him at 4:30pm, she would have readily agreed to it.

9.30. Ms Van Der Kroft explained that because she did not want to leave her patient unattended, she gave the relevant portion of the trace to another midwife, possibly Ms Bruggeman, to be faxed to Dr Antonas' rooms. The trace was torn off at approximately 4:42pm.

9.31. During the 4:30pm phone call, Ms Van Der Kroft was instructed by Dr Antonas to administer intravenous Ampicillin and Maxalon. There was some delay with the administration of the drugs caused by the need for a second midwife to verify the intravenous order with Dr Antonas[63]. I find that verification occurred at 4:43pm when Ms Anderson rang Dr Antonas at his rooms.

9.32. Telephone and fax records indicate that the CTG facsimile transmission was not received at Dr Antonas' rooms until 4:58pm, which was some 23 minutes from the time Ms Van Der Kroft concluded her conversation with Dr Antonas. There is no

[59] Transcript, page 439
[60] Exhibit C4, page 24
[61] Transcript, page 474
[62] Transcript, page 332
[63] Transcript, page 295

explanation in the evidence for the delay other than by reference to the possibility that the faxing procedure was not undertaken as quickly as it ought to have been, or that the fax machine at Dr Antonas' end was busy, as is suggested by some of the records. In this era of internet technology, it seems likely that transmission of this important information could be done more efficiently, if not contemporaneously.

9.33. At 5pm Ms Kassaras' temperature is said to have increased to 39.9ºC and at 5:12pm her blood pressure reading dropped to $^{92}/_{34}$. Her pulse was 127 and the FHR had dropped to 90 beats per minute, despite attempts to improve the situation by altering the maternal position. Another factor to consider at this time was that Ms Kassaras requested and received a top up of her epidural anaesthetic at about 5:05pm. At this time the CTG trace is said to indicate foetal distress. According to Ms Van Der Kroft she was unable to leave Ms Kassaras because of the demands upon her, and for that reason it may have been at her suggestion that Ms Bruggeman called Dr Antonas into the hospital. In evidence Ms Van Der Kroft said that by 4:50pm she was concerned that Dr Antonas had not yet attended because the CTG was in her words 'very non-reassuring' and he needed to make 'decisions about what was to happen'[64].

9.34. Whilst the pardograph records that syntocinon was stopped at around 5:30pm, the records are potentially unreliable. It appears that the catalyst for stopping it was the fact that the CTG machine was inadvertently left off at 4:42pm causing a gap in the trace of 7 minutes. The midwives followed normal practice in this regard once it was discovered and the syntocinon was stopped to permit some monitoring as a precautionary measure between 4:45 and 5pm, at which time it was recommenced at a dose of 40ml, but was stopped again after about 10 minutes[65]. Ms Van Der Kroft seemed to think that she took the decision to stop the infusion, but was unsure about that[66]. When she was taken to the relevant trace after 5:10pm she agreed that the drop in FHR would have justified a decision to turn it off[67]. Once the syntocinon infusion was stopped, Oxygen was administered and intravenous fluids were increased. It was noted that shortly after these things happened, Dr Antonas arrived at the hospital[68]. The evidence suggests that Dr Antonas arrived at the hospital at about 5:30pm.

[64] Transcript, pages 311-312
[65] Exhibit C4, page 24
[66] Transcript, page 301, 476
[67] Transcript, page 310
[68] Exhibit C4, page 59

9.35. There was no back-up medical staff at NEC unless the obstetrician had organised someone to cover for him. Dr Antonas explained that he would not normally organise a back-up unless he was away.

9.36. Loris Bruggeman

This witness was not asked to provide a statement until February 2014[69]. In 2011, she had worked at the NEC hospital for 25 years. On the night in question she was employed on a part time basis as a midwife and was rostered as team leader. Ms Bruggeman maintained that her attention was drawn to an issue with Ms Kassaras when Ms Anderson was photocopying the CTG in preparation to fax it to Dr Antonas.

9.37. According to Ms Bruggeman there was a fax machine in the delivery ward, however, before faxing the trace, the midwife had to go to the post natal ward to photocopy it. When looking at the trace, Ms Bruggeman observed that it was 'non-reassuring'. In evidence, this witness elaborated upon her observations by reference to the features of the trace noting variable decelerations, accelerations and contractions of such frequency that led her to believe that the uterus had been 'hyper-stimulated' and that the baby was under stress. Ms Bruggeman maintained that she told Ms Anderson to inform her if Dr Antonas was unable to come to deliver the baby[70].

9.38. I find that the next conversation with Dr Antonas concerning his patient was a brief one in which Ms Anderson had Dr Antonas confirm the intravenous drug order at 4:43pm. There is no evidence to suggest that Ms Anderson had a discussion about when Dr Antonas was coming to the hospital.

9.39. Ms Bruggeman said that when she later asked one of the midwives, possibly Ms Anderson, if Dr Antonas was coming in to deliver the baby, she was informed that he was not coming. She then stated that she phoned Dr Antonas at his rooms and informed him in a fairly curt manner that he needed to come to the hospital to deliver the baby. According to the witness, Dr Antonas replied that he was leaving 'now'[71]. The phone records indicate that this call took place at 4:45pm, lasting only 25 seconds.

[69] Exhibit C13
[70] Transcript, pages 726, 730
[71] Transcript, page 734

9.40. After Dr Antonas arrived at the hospital and was unable to rotate the baby using forceps, Ms Bruggeman maintained that he told her that the reason it was unsuccessful was because Ms Kassaras was too fat[72]. I note that Dr Antonas disputes saying this to the witness. Ms Bruggeman explained that when Dr Antonas determined that a caesarean section was necessary, she tried to contact a number of anaesthetists without success and suggested that they call a 'code green' which would result in an alert to available anaesthetists, however she said that Dr Antonas was against the idea and was able to contact Dr Egan in any event.

9.41. Whilst there would have been anxiety initially when trying to find an anaesthetist promptly, I find that the attendance of Dr Egan was ultimately secured without undue delay, more as a result of luck than careful management. Ms Bruggeman said that the theatre staff were still at the hospital and were notified to prepare for the caesarean.

9.42. During cross-examination Ms Bruggeman indicated that when she phoned Dr Antonas to ask him to come in to the hospital, she assumed that he had seen the fax which was of concern to her[73]. She also elaborated, possibly with the influence of hindsight, that the situation was urgent and that a 'crisis' was unfolding. I accept that Ms Bruggeman was of the view when she called Dr Antonas that there was a problem which needed attention[74]. This witness maintained that she thought the trace indicated that the baby was at 'great risk' and that it was important for delivery to be effected as soon as possible to prevent damage to the baby. Dr Antonas disagreed with these assessments when giving his evidence[75]. In my view Ms Bruggeman was completely justified in calling Dr Antonas into the hospital urgently.

9.43. According to Ms Bruggeman, in her experience, whilst Dr Antonas generally did not attend his patients until time of delivery, the midwives were encouraged to call him and ask him to come in if there was a problem.

9.44. <u>Kirsten Anderson</u>

This witness was a midwife working the afternoon shift on 21 October 2011 at NEC, however she was not responsible for the care of Ms Kassaras. Her assistance was called for by Ms Van Der Kroft, firstly concerning a top up of the epidural medication around 3pm and then to check the intravenous medication order made by Dr Antonas

[72] Transcript, page 738
[73] Transcript, page 755
[74] Transcript, page 824
[75] Transcript, page 1394

at 4:43pm. According to this witness, she did not discuss any other aspect of care for Ms Kassaras during that telephone conversation[76].

9.45. Ms Anderson's account of events was fortified to some extent by reference to a record of events which she completed at home with the help of a friend on 22 October 2011. I understood that the document was produced in part because Ms Anderson was quite distressed about the events the previous evening at the hospital and she needed to debrief and set out an account of what occurred. I bear in mind that the document was generated without reference to the hospital records[77].

9.46. According to this witness, after checking the telephone drug order, she assisted with administration of both the antibiotic and Maxalon, which she estimated would have taken several minutes, slowly administering them directly into the vein[78].

9.47. Meanwhile, Ms Anderson stated that Ms Van Der Kroft asked her to check the CTG tracing for Ms Kassaras, at which time she noticed that it had stopped recording. After checking that there was still paper in the machine, Ms Anderson said that she could hear a satisfactory foetal heart, re-commenced the machine, but in consultation with Ms Van Der Kroft, turned the syntocinon off as a precaution, given the absence of continuous trace for some 7 to 8 minutes[79].

9.48. Ms Anderson stated that she left to attend her own patient, but when she returned later, the syntocinon had been restarted, albeit at a lower dose. The epidural had been topped up. Ms Kassaras' blood pressure had dropped. She saw two 'severe variable decelerations to approximately 80 with slow recovery and decreased/minimal variability' on the CTG which concerned her and so she advised Ms Van Der Kroft to turn the syntocinon infusion off. This witness described her concern also about the accuracy of the automatic blood pressure machine reading, suggesting that a manual machine be used, but the offer was declined by Ms Van Der Kroft. Ms Anderson commenced oxygen therapy. There was then an attempt to reposition Ms Kassaras to improve the FHR[80]. I understood this witness to say that she recognised that the situation called for a prompt response by the midwives. I had the impression from

[76] Transcript, page 924
[77] Exhibits C16, C16a and C16b
[78] Transcript, page 927
[79] Transcript, page 934, 947
[80] Transcript, page 956

this evidence that Ms Van Der Kroft was struggling to recognise and deal with the situation.

9.49. Ms Anderson indicated that she may have written a retrospective entry on the trace noting the time of arrival of Dr Antonas, but because Ms Van Der Kroft disagreed with the accuracy of the note, it was scribbled out[81].

9.50. This witness was fairly confident that she was not involved at all in photocopying the CTG trace and faxing it to Dr Antonas, but she was aware that it was being faxed by someone. According to Ms Anderson, from around the time the CTG was faxed to Dr Antonas, there was a sense of 'importance' about the situation, but not 'panic'[82].

9.51. Ms Anderson stated that Dr Antonas occasionally attended his patients in labour during the day, but not always. She added that he was very available by phone and would come if needed[83]. As to her experience with dosage of syntocinon, she explained why she did not follow a high dose regime and had a very cautious approach to increasing the level of administration[84]. The witness impressed me with her answers on this topic.

10. Professor Roger Pepperell

10.1. Professor Pepperell[85] is an eminently qualified obstetrician who has practised in public and private hospitals, mainly in Melbourne. His extensive CV details his clinical work, teaching engagements and publications on topics within the field of obstetrics, with a particular focus on infertility[86]. Professor Pepperell held the position of Professor and Chairman of the Department of Obstetrics and Gynaecology at the University of Melbourne Royal Womens' Hospital in January 1978. From January 2004, he was appointed Professor Emeritus at the University of Melbourne. He holds a teaching position in the Department of Obstetrics and Gynaecology at the Royal Womens' Hospital and is an examiner at the University of Melbourne. Whilst he maintains a private practice, he spends a good deal of his professional time preparing expert reports. He has given evidence as an expert in this Court previously.

[81] Exhibit C4c
[82] Transcript, page 944
[83] Transcript, page 994
[84] Transcript, page 1000
[85] Exhibit C18a
[86] Exhibit C18c

10.2. Professor Pepperell was asked by then counsel assisting to review the available documentation in this case and to prepare a report for the Coroner. The report which was generated in June 2012 was the forerunner to this Inquest[87]. A short addendum report was generated in August 2014 in response to some evidence given during the Inquest by Dr Antonas, as well as in response to a report generated by Dr McEvoy who was asked to comment upon Professor Pepperell's report[88].

10.3. In his original report, Professor Pepperell made several observations, some of which are no longer sufficiently relevant to mention. The more pertinent observations may be summarised as follows:

1) The instruction to commence a syntocinon infusion at 1305 hours was one which many obstetricians would not have given, bearing in mind the progress of cervical dilation up to that time;

2) There was an additional potential risk of excessive response to the syntocinon leading to possible foetal hypoxia because of the earlier use of prostaglandin;

3) After 1330, the contraction frequency was sufficiently excessive to warrant a reduction in the infusion rate;

4) Dr Antonas should have been notified by a midwife of the change in deceleration pattern between 1430 and 1530 hours with a request for a review which may have brought forward the caesarean delivery by 90 minutes;

5) The decision to increase the infusion rate thereafter until 1540 was completely inappropriate because late decelerations featuring on the CTG were almost certainly resulting from hyper stimulation;

6) The small sized placenta, whilst not discoverable prior to birth, almost certainly had a role to play in the excessive uterine contraction frequency, adversely effecting the foetal heart rate pattern.

10.4. According to Professor Pepperell, on the basis of his observation of late decelerations on the CTG, the total duration of possible hypoxia was about 4 ½ hours. If calculated from the emergence of features which were even more concerning on the CTG at 1600 hours, then the period of hypoxia was estimated to be 2 ½ hours[89].

[87] Exhibit C18a
[88] Exhibits C18b and C20
[89] Exhibit C18a, page 7

10.5. A table included in the Professor Pepperell's report sets out his assessment throughout the labour of the CTG tracing under headings which include 'Baseline rate (bpm), Baseline variability, Reactive accelerations, Decelerations, Uterine contraction frequency and Comments'. He documented a contraction rate of 6 in 10 between 3pm and 4pm and worrying decelerations from time to time after about 1:30pm.

10.6. Professor Pepperell's evidence in chief

According to Professor Pepperell, the approach to induction using prostaglandin, followed by syntocinon in Melbourne where he has practised for many years, is one accompanied by great caution, taking into account the risks associated with the unpredictability of a woman's response during labour. He maintained that 'extreme care' was required concerning when syntocinon is commenced and how quickly it is increased[90].

10.7. He detailed the things one looks for in a CTG trace which point to possible hypoxia:

> '… one is a reduction in the beat-to-beat variability, so that there's less than five beats per minute; and No.2, are decelerations which are occurring, particularly if they are late decelerations and if they're recurrent late decelerations, or if they are very deep and prolonged variable decelerations. Early decelerations don't usually mean much but if they become very deep and prolonged and last for longer than the contraction, they're a concern, but the most concerning are the loss of beat-to-beat variability, particularly if it's absent completely, and also the occurrence of the late decelerations, and if those are both present then that's usually considered a major likelihood of hypoxia and action needs to be taken. Most hospitals would call - would call a code green, meaning immediate caesar, if they're not fully dilated under those circumstances. Or consideration for urgent vaginal delivery if they are fully dilated.' [91]

10.8. The witness explained how he observed these features on the CTG and included them in the table of observations in his initial report. Professor Pepperell reiterated that in light of differences of opinion expressed about his observations from Dr Antonas as well as Dr McEvoy, he returned to the documents to reconsider his findings. Professor Pepperell stated on several occasions during his evidence, that he showed the relevant CTG sections to midwives at the Royal Women's Hospital, and that those persons agreed with his assessment[92].

10.9. Naturally, I can have no regard to opinions expressed by others in such circumstances, and I was rather surprised that this witness believed that it was appropriate to

[90] Transcript, page 1070
[91] Transcript, page 1071
[92] Transcript, pages 1072, 1076

undertake this exercise and to refer to it as confirmation of the status of his own opinion.

10.10. Notwithstanding this criticism, I was assisted by the explanation given about the potential impact upon a foetus of contractions which are considered to be 'excessively frequent'.

10.11. According to Professor Pepperell the frequency of contractions is said to be important:

> '… because the baby only receives sufficient blood supply to the placental bed to - to get its own oxygen levels up during the phase of uterine relaxation. And ideally that should be about a minute and a half and then another minute of the duration of the contraction. If the contraction's occurring at five in 10 minutes and the contractions are lasting for a minute, you're down to only a minute between contractions when the oxygen transfer can occur, and certainly if the contractions are longer or the pressure between them tends to be higher, as it often is when you're using Syntocinon, then the potential time is even further reduced. So the likelihood of hypoxia is increased.' [93]

10.12. The witness emphasised that in his experience labour ward staff and medical staff were aware of the risks of hypoxia when syntocinon is being used and that if the contractions increase beyond 5 in 10 minutes, the syntocinon is adjusted down or off, depending upon the presence of anomalies in the CTG. He conceded that if one knew in advance that there was a small placenta, you would take 'extra care'[94].

10.13. Professor Pepperell elaborated upon what he described as 'late decelerations' on the trace between 1330 and 1430 hours which, in his view, should have called for a reduction or cessation of syntocinon[95].

10.14. Professor Pepperell pointed to periods on the trace where he observed 6 contractions in 10 minutes[96] which was at variance with the assessments of Drs Antonas and McEvoy. He explained that in his assessment, the CTG pattern between 1500 and 1530 hours was such that the correct response was to turn the syntocinon off, call the doctor to review the patient, certainly by 1530 hours and make a decision whether urgent delivery was necessary[97]. Professor Pepperell conceded that whilst there may have been some improvement to the trace after the mother was repositioned, the decelerations were still evident and between 1550 and 1640 hours the CTG was

[93] Transcript, page 1072
[94] Transcript, page 1073
[95] Transcript, pages 1075-1078
[96] Transcript, pages 1075, 1080
[97] Transcript, pages 1084-1085

increasingly abnormal[98]. Professor Pepperell noted the assessment of the trace by Dr McEvoy, which was at odds with his own assessment in part and which may be explained by the application of different rules of interpretation[99].

10.15. According to Professor Pepperell the accepted rule around the world for the identification of a deceleration is where one sees more than a 15 beat reduction which lasts for at least 15 seconds. When pressed, he added that the opinions expressed on this topic by Dr McEvoy were different to those of professionals elsewhere in Australia and in his view were inappropriate[100]. It was conceded however, that he was unfamiliar with how the rules were applied outside of Victoria.

10.16. According to Professor Pepperell the presenting features on the CTG in this case were such that severe foetal hypoxia ought to have been contemplated. He estimated that in two thirds of patients where these features were evident, the baby would not be hypoxic, however because one does not know for certain until after birth, it is important to perform an examination and determine whether delivery can be expedited[101].

10.17. If an obstetrician is unsure of the calibre of midwives responsible for his patient, particularly in a private hospital without backup, then in his view, a higher level of supervision and attendance is called for. When Dr Antonas was advised of Ms Kassaras' elevated temperature, it ought to have raised a concern, but would not of itself have warranted urgent attendance at the hospital, according to Professor Pepperell[102].

10.18. Professor Pepperell was not critical of the 'decision delivery interval' of an hour in this case at the NEC hospital, but indicated that he would have hoped it could have been as little as 30 minutes.

10.19. According to Professor Pepperell, in a public hospital setting, there would have been a code green called at around 1330 hours which in this case would have resulted in a caesarean section often within 30 minutes[103].

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[98] Transcript, pages 1083-1084
[99] Transcript, pages 1090-1091
[100] Transcript, page 1092
[101] Transcript, page 1086
[102] Transcript, page 1164
[103] Transcript, page 1087

10.20. After being taken through transcript of evidence from Dr Antonas concerning his interpretation of sections of the trace, Professor Pepperell conceded some points made by Dr Antonas, about the significance of decelerations noted, however, he maintained that the contractions were excessive, notably between 1508, 1528. He added that around the time of the elevated temperature, it was concerning enough to warrant a review of the trace by Dr Antonas, which he would expect to be transmitted within a few minutes[104].

10.21. Professor Pepperell noted that between 1634 and 1637 hours there was a prolonged deceleration in the trace, however he conceded that between 1654 and 1710 hours, the trace was normal, but became abnormal thereafter[105].

10.22. Ultimately during cross-examination concerning his interpretation of the CTG trace between 1300 and 1430 hours, Professor Pepperell conceded that he may have overstated the number of decelerations which he previously interpreted from the CTG for that portion of the trace.

10.23. During cross-examination by counsel for the NEC hospital, Professor Pepperell was taken to guidelines and definitions applicable to the identification and characterisation of decelerations on a CTG. Whilst he accepted that one of the decelerations previously nominated as a late deceleration at 1410 and another at 1419 hours were not clear examples of a late deceleration, Professor Pepperell maintained that his general assessment of the trace between 1400 and 1430 hours, was that it featured late decelerations.

10.24. It was only during cross-examination that this witness revealed that, in his experience, audit assessments of CTGs indicate significant variance amongst those undertaking the exercise without the benefit of knowing what treatment was given and what the outcome was.

10.25. During cross-examination by counsel for Dr Antonas, reference was made to Bulletin 70 issued by the American College of Obstetricians and Gynaecologists which featured this topic. The relevant section reads as follows:

> 'There is wide variation in the way obstetricians interpret and respond to electronic foetal monitoring. When four obstetricians, for example, examined 50 cardiotocograms, they

[104] Transcript, pages 1103, 1106 and 1162
[105] Transcript, page 1107

> agreed in only 22% of the cases. Two months later, during a second review of the same 50 tracings, the collegians interpreted 21% of them differently than they did the first time. In another study, five obstetricians independently interpreted 150 cardiotocograms and the obstetricians interpreted the tracings similarly in only 29% of the cases, suggesting poor intra-observer variability.' [106]

10.26. Professor Pepperell accepted that it was challenging to avoid being influenced by the outcome, when reporting on cases such as this, however he insisted that he is well aware of the potential for bias when reviewing cases and preparing his reports.

10.27. Ultimately Professor Pepperell accepted that if the CTG in this case featured a late deceleration at 3:30pm which might have been explained by the performance of a vaginal examination, then the fact that there were said to be 6 in 10 contractions between 1500 and 1530 hours would not of itself have been a cause for altered management[107].

10.28. Professor Pepperell had initially maintained that whilst the CTG before 1600 hours looked 'pretty okay' until a vaginal examination occurred, the contraction rate was excessive. By 1600 hours, in his view, the CTG was such as to warrant the doctor being notified. He said that in his experience in Melbourne at a Tertiary hospital, he would expect a doctor to be notified by the midwife as early as 1:30pm, however he was not surprised that a midwife in a private hospital would leave notification until later[108].

10.29. Professor Pepperell explained that because of his experience sitting on perinatal mortality and morbidity committees, he saw many problems associated with syntocinon infusions given in excess. He stated that he would never use a high dose regime. In that regard he said that he has a conservative approach to the use of it, particularly in late labour where the problems tend to occur[109].

10.30. When pressed on the criticism in his addendum report of the methodology followed by Dr McEvoy in assessing the frequency of contractions in this case, Professor Pepperell's attention was drawn to practice guidelines, issued in Practice Bulletin 106 in 2009. He acknowledged that to use an assessment by averaging over a 30 minute

[106] Transcript, pages 1138, 1146
[107] Transcript, page 1153
[108] Transcript, pages 1140, 1141
[109] Transcript, page 1143

window, as Dr McEvoy had done, was consistent with those guidelines, however he added that he was not aware of that method being used anywhere[110].

10.31. Professor Pepperell acknowledged that if Dr Antonas had attended the hospital as planned at 12:30pm, the CTG would have looked normal and a decision would have been made about use of syntocinon on an informed basis. He added that there would then be an expectation of readiness for delivery later in the day at about the time Dr Antonas ultimately attended[111].

10.32. At the conclusion of his evidence it appeared that some of the initial criticisms of the management of Ms Kassaras' labour had been overstated. There is little doubt that Professor Pepperell follows a conservative approach to augmented labour, and with sound reason, given the risks to the foetus. Whilst I accept that he is a very experienced clinician, I proceed with some hesitation when evaluating his interpretation of the CTG in this case, given the concessions which he has made during his evidence. Whilst I accept that the CTG is a useful tool for surveillance of foetal wellbeing, it clearly has significant limitations.

11. Dr Basil Antonas

11.1. Dr Antonas outlined his long experience as an obstetrician in Adelaide, stating that he has been head of the Obstetrics Unit at the Women's and Children's Hospital since 2000[112]. This position carries part time attendance on Tuesdays for a morning antenatal clinic, as well as in-patient responsibilities and twice monthly weekend responsibilities. He has for many years consulted in private practice and has visiting rights at private hospitals including Burnside and Calvary. Because of dwindling numbers of patients at the NEC hospital, he ceased attending there in early 2014.

11.2. Dr Antonas described his management of Ms Kassaras' pregnancy by reference in part to the routine which he has followed for many years. It is not necessary in this Inquest to detail the antenatal management, however it is worth noting that obesity was a potential issue because of the increased risk of hypertension and diabetes. Ms Kassaras did not develop either of these complications and apart from having

[110] Transcript, page 1150
[111] Transcript, pages 1168-1169
[112] Exhibits C12a and C12b

anxiety and some bleeding which was monitored, the pregnancy was uneventful and the foetus grew appropriately[113].

11.3. According to Dr Antonas, this was his patient's first pregnancy and he did not expect any problems. There was no indication that the placenta was small and no way of determining that until delivery. Furthermore, Dr Antonas indicated that there is no research to his knowledge about how a small placenta might be relevant to management of pregnancy and labour[114].

11.4. When Ms Kassaras passed the estimated due date of 15 October 2011, he decided to admit her to NEC on the evening 20 October 2011 for induction of labour in accordance with his practice. Prostaglandin was ordered to be inserted by a midwife, following CTG assessment of the foetal heart at 9:50pm. Post insertion CTG was said to be normal. Dr Antonas explained that a CTG is an adjunct to clinical management, but is not a good predictor of outcome, unless there are certain abnormal features present[115].

11.5. He attended his patient the following morning at about 7am, at which time his examination indicated that there was good progress, with dilatation at 3cm occurring during the night. Dr Antonas explained that he ruptured the membranes which prompted commencement of labour.

11.6. According to Dr Antonas, after he left the hospital he learned that his patient had requested epidural pain relief and that Dr Alkhazrajy had agreed to insert it because he was available at the time. I accept the explanation given by Dr Antonas that he would have preferred to be consulted about this and to arrange for one of his preferred anaesthetists to insert the epidural on the understanding that they would make themselves available for follow up later in the day if necessary[116].

11.7. A copy of the CTG was faxed by the midwife within about 10 minutes of speaking to Dr Antonas about 10am. I accept explanations given in evidence for features of the trace which were faxed at that time and which were said to be explained by a number of temporary factors, including a top up of epidural medication, vomiting and positional change[117].

[113] Transcript, page 537
[114] Transcript, page 1370
[115] Transcript, page 573
[116] Transcript, page 578
[117] Transcript, page 601

11.8. According to Dr Antonas he phoned the midwife back advising that he was happy with the trace and that he would review Ms Kassaras at midday. Meanwhile however, he said that he was required to attend upon another patient in premature labour at the WCH and was likely to be occupied there for about an hour[118].

11.9. Dr Antonas explained that it was his usual practice for women in their first labour to attend to them 4 or 5 hourly for a review of their progress and to reassure his patient that he was around for her. In this case, he said he was very sorry that he was unable to do that, although believed that if he had attended as planned, it would not have altered his management of Ms Kassaras[119]. He rejected the suggestion that his usual practice was to only attend upon his patient when delivery was imminent, as stated by Ms Bruggeman[120].

11.10. Dr Antonas said that he phoned the NEC at about 12:45pm to explain that he was held up at the WCH and requested that a vaginal examination be conducted by Ms Pacifico who was to report her findings to him thereafter.

11.11. According to Dr Antonas, when Ms Pacifico informed him by phone that there had been limited progression of the cervical dilatation and minimal descent of the baby's head, he decided that there was a need to augment the labour with syntocinon. Dr Antonas rejected the criticism by Professor Pepperell to commence syntocinon at that time[121]. He explained that between 7am and 1pm dilatation had progressed only 2cm and so syntocinon was indicated to encourage more efficient contractions, to dilate the cervix and move the baby's head into position.

11.12. Notwithstanding the observations of Professor Pepperell concerning the potential risks of syntocinon following the insertion of prostaglandin, I find that the decision to commence syntocinon some 15 hours later, was reasonable in all of the circumstances. I accept that it was prudent to ensure that the labour was not unnecessarily prolonged, provided that it was managed with an appropriate level of caution.

11.13. According to Dr Antonas, he has been using a high dose syntocinon regime for 40 years which commenced at 40ml, increasing each quarter hour to a maximum rate of

[118] Exhibit C4 and Transcript, pages 585, 612
[119] Transcript, page 610, 713
[120] Transcript, page 1371
[121] Transcript, pages 556, 563

240ml, compared with the 196ml maximum used at the WCH[122]. His explanation for using this regime was simply that he had been doing it this way because that was the regime back in the days when he was a registrar[123]. Dr Antonas conceded that he was unfamiliar with the applicable Royal College of Obstetrics and Gynaecology guidelines concerning this topic[124].

11.14. He explained that because syntocinon is given in a titratable form, a midwife is able to adjust it down if necessary[125]. He was not critical of the decision taken by the midwife to depart from the high dose regime and did not expect to be informed about that[126].

11.15. During evidence Dr Antonas reviewed the relevant features of the CTG for the period between 12:30pm and 2:30pm. He rejected the assessment of Professor Pepperell and considered that there was no indication at that stage on the CTG of anything unusual happening to the foetus[127].

11.16. He explained that he had a full consultation list in his rooms in North Adelaide that day and so after finishing at the WCH, he decided to return to his rooms rather than to travel to NEC to review Ms Kassaras. He justified his decision on the basis that when he phoned the NEC at about 2:20pm, he was given the impression from the midwife that there was no concern.

11.17. The medical notes and telephone records suggest that he was informed at about 3:45pm that cervical dilatation had increased to 9cm, with some doubt about whether the head was in an occipito transverse position, which was recognised as undesirable for delivery.

11.18. Dr Antonas explained that his decision at 3:45pm to increase the syntocinon to 120ml per hour was to ensure that the momentum was maintained and to try to turn the baby's head from the occipito transverse position and to bring it further down[128]. He agreed that he told the midwife that he would be there within an hour.

[122] Exhibit C12 and Transcript, page 1265
[123] Transcript, pages 1265, 1355
[124] Transcript, page 1357
[125] Transcript, page 560
[126] Transcript, page 618, 1349
[127] Transcript, page 626-628
[128] Transcript, page 632, 1238

11.19. He acknowledged that if he had been advised that the contraction rate was 6 in 10, he may not have increased syntocinon, however he noted when reviewing the trace, that the contraction rate dropped to 5 in 10 after 4:10pm, but were 6 in 10 between 4:20pm and 4:30pm[129]. Contrary to the method used by Professor Pepperell to calculate the contraction rate, Dr Antonas considered that it ought to be made by averaging over a 30 minute period, which on his estimate revealed less than 6 in 10[130].

11.20. He explained that if the contractions increased to 6 in 10, the midwives are expected to use their discretion to reduce the rate of syntocinon[131]. He acknowledged that he would have discussed the FHR with Ms Van Der Kroft before directing her to increase the rate, but was unable to recall if he discussed the contraction rate. He stated that he expected the midwife to tell him if the contraction rate was 6 in 10[132]. When reviewing this portion of the trace in evidence, Dr Antonas conceded that it revealed some 10 minute periods of 6 contractions, but added that the FHR improved thereafter, which suggested that there was no case for concern[133].

11.21. Dr Antonas explained that when he was called to come and deliver the baby, the CTG which he requested be faxed had not been received. He explained that ideally he would have reviewed the trace first and if it showed sufficient abnormality, he would initiate the arrangements for surgery before coming in, however, in this case, it was more efficient to attend upon the patient and attempt a forceps delivery first. Questions arise however, about whether in such a situation, a stand by alert ought to be made to relevant medical personnel in the event that they are required urgently[134].

11.22. When reviewing the faxed portion of the trace between 4pm and 4:30pm[135] Dr Antonas indicated that if he had received it at his rooms in a timely manner, he would have noticed that the baseline heart rate was abnormal and would have considered altering the rate of syntocinon as well as treating the elevated temperature[136]. He also stated that he would have noted that between 1420 and 1430 hours, contractions were 6 in 10 minutes and he would have ordered the syntocinon to be stopped[137]. He said that the trace indicated a concern, but did not warrant an

[129] Transcript, page 1255, 1258
[130] Transcript, page 560
[131] Transcript, page 1262
[132] Transcript, page 1269
[133] Transcript, pages 1304-1305
[134] Transcript, page 586
[135] Exhibit C4a
[136] Transcript, page 1253
[137] Transcript, page 1243

immediate delivery. He later qualified this answer by stating that if he had seen the fax, he would have wanted to attend the hospital immediately[138].

11.23. Dr Antonas indicated that to manage the situation conservatively, one would stop the syntocinon to determine what was happening and try to work out whether the syntocinon had a role to play in the concerning trace[139].

11.24. He rejected the suggestion from Professor Pepperell's report that he inappropriately prioritised his consulting list over the labouring mother[140]. Dr Antonas was unable to recall whether he needed to attend to patients in his clinic after Ms Bruggeman called him into the hospital[141]. It is disappointing that the information given and the concerns expressed by Ms Van Der Kroft did not move Dr Antonas to offer to review Ms Kassaras immediately. He conceded that after her call he did not chase up the requested CTG because he was distracted by the consults in his rooms.

11.25. According to Dr Antonas, had he come to the hospital within an hour of 3:45pm as he indicated that he would do, he would have stopped the syntocinon, examined Ms Kassaras and if fully dilated tried to have her push and if that did not work he would have tried forceps and, meanwhile, if the CTG did not improve and forceps were unsuccessful, he would have organised a caesarean[142].

11.26. The reason given by Dr Antonas for not attending when he indicated he would was that it was simply an estimate of when he would come, in anticipation that Ms Kassaras would be fully dilated and then there would be another hour or two for her to 'push the baby out'[143]. If Dr Antonas had arrived at 4:45pm it seems likely that the baby could have been delivered, if necessary by caesarean section, at least by about 6pm if the decision to delivery interval was 60 minutes. If that interval was able to be shortened, delivery might have been possible as early as 5:30pm. Whilst this speculative process is unhelpful in some respects, it is worth contemplating, especially when one considers that there is general agreement that the CTG revealed significant foetal distress from shortly after 5pm.

11.27. When Dr Antonas did conduct his examination of Ms Kassaras at approximately 5:30pm the foetus was in the 'OP' position and by using forceps he was able to rotate

[138] Transcript, pages 1258, 1283
[139] Transcript, page 1260
[140] Transcript, page 1378
[141] Transcript, page 1240
[142] Transcript, page 1264
[143] Transcript, page 1276

only to the OT position, therefore he returned the foetus to the OP position and abandoned the attempt. He estimated that the whole process took perhaps 10 minutes, performed in the period between contractions[144]. According to Dr Antonas, it was not necessary to put a contingency plan in place in the event that a caesarean section might be required. He emphasised that arrangements are generally only made once a decision is taken to perform the caesarean and not before[145].

11.28. When delivering the baby, Dr Antonas recalled that it probably took a few minutes longer than the usual 5 minutes, because he had to 'disimpact' the baby out of the pelvis[146].

11.29. He explained that the decision to delivery interval involved arranging for an assistant, an anaesthetist, a paediatrician and theatre staff notification. Additionally, blood needed to be taken for grouping and matching and oxygen is administered to the mother[147]. Dr Antonas did not concede that there was undue delay between the decision to perform a caesarean section and the time of delivery, but acknowledged that if Ms Kassaras had been a patient in the WCH, a caesarean section probably could have been undertaken within 30 minutes[148].

11.30. Dr Antonas indicated that considering how Ms Kassaras' pregnancy and labour progressed, he was surprised by the outcome for Baby Key, which he believed was a pretty rare occurrence[149]. I understood him to indicate that given the absence of any apparent explanation for the outcome, he has not made any adjustments to his practice as a result of this experience, although he found it distressing. He conceded that within the profession he has observed that some younger practitioners utilise caesarean sections for delivery in circumstances where older, more experienced practitioners would use normal delivery, depending on clinical contra indications[150].

11.31. Having considered the evidence from Dr Antonas and others, I find that he is probably one of a number of older and very experienced practitioners who are not as risk averse as others in their management of augmented labour. It might be prudent for practitioners who fall within this end of the spectrum to consider whether the hospitals admitting their patients have the expertise and back up to support those

[144] Transcript, pages 1288, 1390
[145] Transcript, page 1382
[146] Transcript, page 1392
[147] Transcript, page 586
[148] Transcript, page 1398
[149] Transcript, page 1292
[150] Transcript, page 1293

potential risks. With the benefit of hindsight, it seems fairly clear that the outcome for Baby Key may have been quite different if he had been delivered by timely intervention with caesarean section.

12. Dr Michael McEvoy

12.1. Dr McEvoy[151] is an Adelaide obstetrician and gynaecologist with 29 years experience in solo private practice. He is the Director of Clinical Services at Flinders Reproductive Medicine Unit and has previously worked at the WCH in private and public practice.

12.2. After outlining the role of syntocinon in labour, Dr McEvoy maintained that in his view, it was quite reasonable for Dr Antonas to commence syntocinon when he did[152]. He considered when reviewing the available material in this case that there was no indication of hyperuterine stimulation throughout the labour. He estimated that the contractions did not increase beyond a rate of 5 in 10 every 10 minute interval. During cross-examination he conceded that the contraction rate between 3pm and 3:30pm may be calculated at a mean of 5.33 in 10 minutes, but he maintained that there was no reason for concern, because the foetal heart rate remained 'stable throughout'[153].

12.3. When calculating the rate of contractions, Dr McEvoy used the method endorsed by the American College of Obstetricians and Gynaecologists, as the number in a 10 minute period, but averaged over 30 minutes[154]. This approach was disapproved of by Professor Pepperell, notwithstanding that he is a member of the American College[155].

12.4. Dr McEvoy considered that some of Professor Pepperell's criticisms of the management in this case were influenced by the benefit of hindsight.

12.5. According to Dr McEvoy, the CTG trace for Ms Kassaras was not concerning until 4:19pm when there were 3 late decelerations, which he defined as a reduction in foetal heart rate by at least 15 beats per minute below base line for at least 15

[151] Exhibits C20 and C20a
[152] Transcript, page 1432
[153] Transcript, pages 1462, 1463
[154] Transcript, page 1442
[155] Exhibit C19 and Transcript, page 1449

seconds[156]. He explained that in his experience, decelerations in the FHR are common during normal labour without any adverse outcome, but the longer the decelerations last, for example 30 seconds or several minutes, the worse the outcome[157]. He considered that the CTG disclosed an emerging pattern of concern between 4:10pm and 4:30pm.

12.6. However, bearing in mind the poor quality trace, explicable in part due to positional change, vaginal examination and vomiting, Dr McEvoy indicated that it was not until the period between 5:10pm and 5:30pm that the trace was sufficiently concerning that it required some action to be taken.

12.7. According to Dr McEvoy, there was a deceleration just before 3:30pm, but became normal thereafter and so he believed that if he was managing the patient, he would not have acted on it and would not have advised a reduction of syntocinon in these circumstances[158].

12.8. When asked about the instruction by Dr Antonas to increase the syntocinon rate from 96ml to 120ml at 3:45pm, this witness acknowledged that he would have expected the midwife to advise him of the frequency and strength of contractions, before increasing the rate of infusion[159]. According to Dr McEvoy, if he was informed that there was 9cm dilatation, contractions were moderate to strong and 5 in 10, with a normal heart trace, it would be acceptable to increase the syntocinon at 3:45pm. His opinion also took into account that the 'presenting part' of the foetus during vaginal examination indicated the possibility of an 'obstructed labour'[160].

12.9. Dr McEvoy indicated that if the foetus was presenting in the occipito transverse position, or 'borderline location' it would have raised a concern that the patient would be a 'borderline caesarean section versus vaginal delivery situation'. In these circumstances he said that he understood the rationale to increase the syntocinon. He added that it was not necessary for the obstetrician to be in attendance at that time, partly because Ms Kassaras may not have been ready to deliver for several hours[161].

[156] Transcript, page 1435
[157] Transcript, page 1436
[158] Exhibit C20, page 6 and Transcript, page 1465
[159] Transcript, page 1468
[160] Transcript, pages 1469, 1471
[161] Transcript, pages 1471-1472

In this case, given that Dr Antonas indicated that he would be attending within the hour, Dr McEvoy agreed that it would be advisable for the doctor to notify the midwife if he was unable to attend within that timeframe.

12.10. Dr McEvoy said that if he was the treating obstetrician and had been notified by the midwife that the CTG was 'non reassuring' at 4:30pm, he would have reacted as Dr Antonas had done. He would have requested a copy of the trace and undertaken to phone back to 'establish foetal well-being' as soon as he had time to review the fax transmission, or an SMS transmission of the trace[162]. He conceded that if he had been the treating obstetrician and was advised that his patient developed a fever, he would be more concerned[163]. He endorsed a reduction of syntocinon to 100ml at about 4:30pm[164].

12.11. He considered that between 5:10pm and 5:30pm, the trace revealed a 'saw tooth' pattern of foetal heart activity, which was very concerning. He suggested that it might have been explicable by the administration of top up epidural at 5:05pm, although one would expect the effect to be temporary, lasting no more than 5 minutes.

12.12. According to Dr McEvoy, he would not have organised an urgent caesarean section until he had fully assessed the CTG. He considered that there was no evidence of ongoing foetal distress until 5:10pm when things 'started to look grim'[165]. From 5:12pm, Dr McEvoy stated that the trace showed clear evidence of foetal distress, requiring expedited delivery of the baby, by vaginal delivery if the mechanical features were favourable to adopt that course, or by caesarean section which on average would take 45 minutes to set up[166].

12.13. Dr McEvoy indicated that he would expect many babies born within an hour of these features of distress on the trace, to have a good outcome, although he acknowledged that in this case, the trace became much worse as it progressed before delivery[167].

12.14. A possible explanation for a deterioration in the situation, suggested by Dr McEvoy, was the attempted forceps rotation, which might have raised the intracranial pressure in the foetus[168]. There was also the possibility of cord compression which, according

[162] Exhibit C20, page 6 and Transcript, page 1486
[163] Transcript, page 1474
[164] Transcript, page 1484
[165] Transcript, pages 1498-1499
[166] Transcript, page 1480
[167] Transcript, page 1437, 1480
[168] Transcript, page 1505

to Dr McEvoy, may occur during attempted rotation when a gush of fluid presses against the cord. Another potential explanation was the effect on the blood flow to the foetus when the mother was positioned in the lithotomy position for the purpose of vaginal examination and also for the attempted forceps rotation[169].

12.15. When asked about the references to syntocinon in the perinatal practice guidelines[170], Dr McEvoy explained that he understood that they were developed with infrequent users in mind and that therefore it was a very conservative document which was not binding upon practitioners. Whilst the guidelines indicate that during augmented labour one aims for a maximum contraction rate of 3-4 in 10 minutes, this witness emphasised that in normal, unassisted labour, it is not uncommon, especially during late labour, for contractions to be 5 in 10 minutes[171].

12.16. His view about the significance of excessive contractions was consistent with that expressed by Dr Antonas, which was that when there are contractions which might be regarded as excessive, say more than 5 in 10, but there was no indication on the CTG of foetal distress, then one infers that there is no evidence of a significant reduction in blood flow to the foetus[172].

12.17. Because one never knows how a person will respond to syntocinon, Dr McEvoy emphasised the desirability of starting at a low dose and increasing it until efficacy is achieved[173]. In his own practice he explained that he commences at a dose of 12ml per hour, doubling every 15 minutes to a maximum of 192ml, which he acknowledged was higher than the manufacturer's recommended upper limit of 120ml[174]. This witness also explained the challenges for obstetricians when trying to avoid too much syntocinon because of the risk of foetal distress and too little which may result in insufficient progress of labour[175]. Dr McEvoy conceded that as a 'tool' to assess foetal wellbeing, CTG is not as good as one would like it to be[176].

[169] Transcript, pages 1508-1510
[170] Exhibit C17
[171] Transcript, pages 1429, 1433
[172] Transcript, page 1435
[173] Transcript, page 1430
[174] Transcript, page 1527
[175] Transcript, page 1504
[176] Transcript, page 1434, 1438

12.18. I accept the evidence from this witness and others that the intended purpose of syntocinon is to promote efficient progress of labour and to avoid unnecessary caesarean sections which pose a risk to mothers of post operative complications[177].

12.19. Dr McEvoy mentioned his knowledge of research which suggested that some pre-existing antenatal events may play a part in adverse outcomes which look like birth hypoxia[178]. He expressed a qualified opinion that the small placenta in this case may have made the foetus more vulnerable, in the sense that foetal distress might commence during early labour if the placenta is not functioning well, even in cases where syntocinon is not used[179].

12.20. On the topic of blood cord gases, this witness stated that they were not routinely obtained in private hospitals because one needed to have facilities to analyse the samples quickly, the results of which are of academic interest, rather than being necessary for management of the baby thereafter[180].

12.21. I found Dr McEvoy to be a credible and thoughtful witness. In evaluating the opinions expressed by Dr McEvoy, I bear in mind his acknowledged working relationship with Dr Antonas over the years. He denied being influenced by previous dealings with Dr Antonas when expressing his views about the way in which Dr Antonas managed the delivery of Baby Key[181].

13. Findings

13.1. When Ms Kassaras was admitted for induction of labour on 20 October 2011 to the NEC, apart from the fact that she was overweight, there was no indication that a more cautious approach to her management was warranted than would be followed in the normal primagravida woman.

13.2. Whilst some obstetricians may not have decided to commence syntocinon at 1:05pm the following day, it was a reasonable decision, given the progress of labour up to that time.

13.3. Commencement at a lower dose than that specified by Dr Antonas was appropriate, given that the reaction to the drug is uncertain, however if Ms Pacifico was

[177] Transcript, page 1432
[178] Transcript, page 1439
[179] Transcript, page 1439, 1478
[180] Transcript, page 1451
[181] Transcript, page 1517

uncomfortable to follow the high dose regime ordered by the doctor, she should have discussed her concern with Dr Antonas.

13.4. The fact that Dr Antonas did not attend upon Ms Kassaras around midday in accordance with his stated plan was regrettable, but not causally relevant.

13.5. By about 3:30pm the rate and strength of contractions were approximately 5 in 10 minutes in response to syntocinon infusion of 96ml per hour and there was no convincing indication of foetal distress on the CTG to warrant a request by the midwife for Dr Antonas to review the patient.

13.6. The decision to increase the syntocinon at about 3:45pm following a telephone update by Ms Van Der Kroft with Dr Antonas was one which more conservative obstetricians may not have made, but could not be described as a decision which was inappropriate in the circumstances. Given the length of time since Dr Antonas had seen his patient, it would have been prudent to review her personally before increasing the syntocinon.

13.7. Between about 4pm and when Ms Van Der Kroft phoned Dr Antonas at 4:30pm to report an elevation in temperature, she was unable to interpret the CTG with any confidence. I find that her level of concern was justified and should have resulted in a request for review of her patient by Dr Antonas as soon as possible.

13.8. The decision taken by the midwife at about 4:15pm to reduce the syntocinon rate to 100ml per hour was appropriate, but given that the contraction rate was at least 5 in 10, moderate to strong and there was difficulty interpreting the FHR, the infusion ought to have been stopped until the FHR was assessed by Dr Antonas.

13.9. Based on the information provided to Dr Antonas by Ms Van Der Kroft at 4:30pm, it was reasonable for Dr Antonas to request that the CTG be faxed to his rooms before considering how to proceed.

13.10. Notwithstanding this however, Dr Antonas must have realised on the available information that there was the possibility of obstructed labour and that a caesarean section would be necessary. It was nearing the end of the day when the traffic would be heavy and securing the attendance of emergency staff was likely to be more time consuming after hours. Dr Antonas had not reviewed Mrs Kassaras since 7am and the midwife was struggling to cope.

13.11. The 23 minutes taken for the trace to be faxed to Dr Antonas was unacceptably long in the circumstances.

13.12. I find that if Dr Antonas was able to review the trace in a timely manner, he would have recognised that the contractions were excessive between 4:20pm and 4:30pm and that the FHR was concerning, which may have caused him to instruct the midwife to cease syntocinon. A prudent response by a conservative obstetrician would have been to attend the hospital to review the situation, which would mean that he could have been in attendance at approximately 5pm, if he left immediately and took 20 minutes to drive there.

13.13. If Dr Antonas was able to attend at 5pm, it is likely that the caesarean section would have taken place at least 30 minutes earlier, in which case the outcome may have been different. If Dr Antonas attended within an hour of 3:45pm, as he indicated he was planning to do, I find that the caesarean section could have been performed even earlier.

13.14. I find that a higher level of supervision was called for than was provided by Dr Antonas at this small private hospital.

13.15. The combined effect of delay in fax transmission, patients requiring attention in his rooms and peak hour traffic, probably resulted in a delay of at least 30 minutes.

13.16. I find however, that if the trace was transmitted efficiently and was reviewed by Dr Antonas, say within 10 minutes of 4:30pm, it is unlikely that he would have left for the NEC much earlier than he did, particularly if he was part way through an examination of one or more patients in his rooms.

13.17. At about the time Dr Antonas was called in to the hospital urgently by Ms Bruggeman, the syntocinon infusion was stopped, not in response to foetal distress, but because the trace machine stopped recording. It was restarted by the midwife at 40ml per hour for 15 minutes or so at about 5pm, which I find in the circumstances, was inappropriate.

13.18. By about 5pm there was clear evidence on the CTG of foetal distress as a result of hypoxia and immediate intervention was called for.

13.19. I find it likely that syntocinon played a role in the outcome by producing borderline excessive contractions which in combination with other factors resulted in hypoxia.

13.20. I find that while in most cases a foetus can tolerate some degree of hypoxia, Baby Key for reasons not well understood and not foreseen, was more vulnerable than others.

13.21. I find that it is likely that placental insufficiency played a role here in the severity of hypoxia suffered by Baby Key.

13.22. The multiple factors which are likely to have contributed to hypoxia include the disruption to the exchange of blood to the foetus during contractions, positional disadvantage during vaginal examinations, drop in blood pressure during epidural top ups and the attempted forceps rotation of the head at approximately 5:30pm.

13.23. Because there was no accurate way of determining the true severity of hypoxia, I find that from about 5pm, the labour was managed on the basis that Baby Key was suffering a concerning level of hypoxia, but would probably be as resilient as most other babies and would recover following expedited delivery by caesarean section.

13.24. Whilst the 'decision to delivery' time of approximately 60 minutes was arguably acceptable on the assumption that Baby Key was suffering a level of hypoxia which was 'concerning', in hindsight it was unacceptably long in this case because the level of hypoxia was life threatening.

13.25. By about 5:40pm when the decision to deliver by caesarean section was made, the signs of foetal distress were more than just 'concerning' and warranted urgent caesarean section.

13.26. It seems that there is no appetite in this State for improving the current 'decision to delivery' interval expectations, notwithstanding the occasional catastrophic outcome for a baby who suffers severe hypoxia during labour.

13.27. In my view, given what is at stake here, I consider that there is room for improvement in that regard.

13.28. If Ms Kassaras had presented to a better resourced hospital such as the WCH instead of the NEC, I find that Baby Key's chances of survival would have been enhanced.

14. Recommendations

14.1. Pursuant to Section 25(2) of the Coroners Act 2003 I am empowered to make recommendations that in the opinion of the Court might prevent, or reduce the likelihood of, a recurrence of an event similar to the event that was the subject of the Inquest.

14.2. The Court makes the following recommendations directed to the Chief Executive Officer of the Royal Australian and New Zealand College of Obstetricians and Gynaecologists, the President of the SA Branch of the Australian Medical Association, the Chair of the Royal Australian College of General Practitioners (SA Faculty) and the Chief Executive of the Department of Health:

1) Given the potential catastrophic outcomes in cases of severe birth hypoxia, medical practitioners should candidly discuss these risks with their patients at an early stage of pregnancy to enable them to make an informed decision about which Tier level hospital they will be admitted to for delivery;

2) Where a caesarean section is thought to be a real likelihood, practitioners ought not wait until the last moment to put arrangements in place where simple standby arrangements could be organised by hospital staff or obstetricians;

3) Considerations should be given to improving the way CTG recordings are transmitted to obstetricians who are supervising labour from outside the hospital.

Key Words: Pregnancy and Birthing; Hypoxia

In witness whereof the said Coroner has hereunto set and subscribed her hand and

Seal the 14th day of November, 2014.

Deputy State Coroner