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 21st, 22nd, 23rd and 25th days of January 2008 and the 23rd day of May 2008, by the Coroner's Court of the said State, constituted of Anthony E Schapel, Deputy State Coroner, into the death of Riley Krol.

The said Court finds that Riley Krol aged 11 days, late of 22 Raymond Road, St Agnes, South Australia died at the Women's and Children's Hospital, 72 King William Road, North Adelaide, South Australia on the 11th day of March 2005 as a result of 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 is a matter of considerable complexity. Riley Krol, a male infant, was born on 1 March 2005 at the Modbury Public Hospital ('the Modbury'). Riley died several days later on 11 March 2005 at the Women's and Children's Hospital ('the WCH'). His parents were Ms Melinda Krol and Mr Haydn Williams.

1.2. Following Riley's death, a post-mortem examination was performed by Dr Anthony Bourne at the WCH. I received in evidence Dr Bourne's report which was verified by his affidavit[1]. Dr Bourne's report refers to his own examination as well as that of Dr Lynette Moore who conducted an examination of the placenta and umbilical cord. The cause of death as expressed by Dr Bourne in his report is hypoxic ischaemic encephalopathy. This cause of death essentially arises out of deprivation of oxygen

[1] Exhibits C3 and C3a

from a person's brain. I accept the cause of death as expressed by Dr Bourne. I find that Riley Krol died on 11 March 2005 and that his cause of death was hypoxic ischaemic encephalopathy.

1.3. The pathology that led to Riley's death resulted from a sustained period of hypoxia (oxygen deprivation) that he experienced before his delivery by emergency caesarean section. Riley's delivery took place in the early hours of the morning of 1 March 2005. To my mind the evidence did not establish what it was, in an otherwise healthy unborn child, that had led to this period of hypoxia. A true knot in Riley's umbilical cord had been detected immediately after his delivery. A true knot, if sufficiently tight, can result in necessary oxygenation being deprived from the foetus prior to delivery. However, I also heard evidence that routine measures that had been delivered to Riley's mother during the course of his induced birth could also lead to hypoxia. There are competing explanations as to why Riley experienced a period of hypoxia prior to his delivery. In the event, it has not been necessary for me to determine what it was that led to Riley experiencing this sustained period of oxygen deprivation. The cause of the oxygen deprivation was not identified prior to delivery, and even if it had been determined, it would not have made any difference to the management of Riley's delivery.

1.4. Melinda Krol, who was then aged 32, was admitted to the Modbury on the evening of 27 February 2005. At that time she was several days overdue. For that reason, failing an elective caesarean section, the risks were such that a natural delivery of Riley had to be induced. Sadly, circumstances conspired such that delivery ultimately had to be effected by an emergency caesarean section in the early hours of the morning of 1 March 2005. This emergency delivery occurred in less than optimal circumstances. I expand on this later. At the time of her confinement Ms Krol had a body mass index (BMI) of approximately 36. This figure reflects a level of obesity. This, together with the fact that Ms Krol was several days overdue, would raise the prospect of complications with Riley's delivery. The quite appropriate induction of Riley's delivery, decided upon as it was in circumstances where the pregnancy had run several days past its usual course, raised the possibility that a caesarean section birth might ultimately have to be effected. I heard evidence that on a statistical basis the delivery by caesarean section is, if not on the cards, more common where an overdue delivery has to be induced. Ms Krol's level of obesity meant that in the event of a

caesarean section delivery the administration of a spinal anaesthetic could be problematic. As it transpired, Riley ultimately did have to be delivered by way of emergency caesarean section and attempts at administering a spinal anaesthetic for this purpose proved to be unsuccessful. In the event, anaesthesia was effected by way of an epidural, a procedure that is more time consuming than other anaesthetic procedures.

1.5. The entire circumstances of Riley's birth have since been examined by medical experts. These experts were respectively a very experienced consultant obstetrician and gynaecologist, Professor Roger Pepperell, and an equally experienced consultant anaesthetist, Dr Andrew Buettner, both of the Royal Women's Hospital in Melbourne. While there could be no room for criticism of Ms Krol's management at the Modbury until a certain point in time, a question mark over the manner in which Ms Krol's caesarean section delivery was effected was raised. The contention is that once the decision was made to deliver Riley by way of an emergency caesarean section, the delay in effecting that delivery was unacceptable. This was the issue that I examined during the course of this Inquest. The secondary issue was whether or not if there was an unacceptable delay in effecting the caesarean section delivery, that delay or part of that delay played any role in Riley's ultimate demise.

1.6. Other than the alleged unacceptable delay in carrying out the emergency caesarean section, there is no suggestion made by either of the medical experts to whom I have referred that anything else in Ms Krol's management was not standard practice. In particular, there was insufficient documentary support to warrant a broader inquiry into suggestions raised by Riley Krol's parents that Ms Krol had on two occasions during her confinement insisted on, or expressed a preference for, an earlier caesarean section delivery. The first such occasion was said to have occurred at approximately 9am or 9:30am on 28 February, and the other at approximately 9:30pm that evening. I will later refer to contemporaneous notations to the effect that at 9am that day Ms Krol was '*happy with*' the proposed course of her induction. Secondly, there is no documentary evidence to support the contention that at 9:30pm any further insistence on a caesarean was voiced to hospital staff, in particular to a Registered Midwife, Stephanie Wilckens. What communication there was between Ms Krol and Ms Wilckens as to the issue of a caesarean section being performed is documented as having occurred much later at about 12:15am. There is no reason to conclude that if

insistence upon a caesarean section had been voiced at that time the caesarean section would necessarily have taken place then and there and not have awaited the arrival of appropriate medical and nursing staff the following morning[2].

2. The course of Melinda Krol's confinement

2.1. Melinda Krol was admitted to the Modbury Public Hospital on the evening of 27 February 2005. The estimated due date for Riley's birth had been 20 February 2005. Ms Krol was thus overdue by several days at the time of her admission. The plan upon Ms Krol's admission was to induce labour with a view to a natural childbirth. The induction was to be effected by way of the insertion of Cervedil, a prostaglandin preparation. A cardiotocograph (CTG) was connected to Ms Krol. This device monitors the heart rate of the unborn child on a continuous basis. The connection is made by way of straps fastened to the mother's abdomen. A CTG may also be effected by way of the connection of a scalp clip to the scalp of the unborn child. However, in order to achieve such a connection, the scalp of the unborn child has to be exposed and for this purpose an artificial rupture of the membranes (ARM) generally has to occur. In Riley's case, the membranes would not be artificially ruptured until the early hours of the morning of 1 March 2005. A foetal heart rate of between 120-160 beats per minute is considered normal. This range of normality was described in evidence by one of the experts, Professor Roger Pepperell, the experienced obstetrician and gynaecologist[3]. During the course of the Inquest a differing view as to what might be considered normal at the lower end of that range was expressed by Dr Lekamge who had been the Obstetric Registrar essentially overseeing Ms Krol's care on the night of 28 February and the morning of 1 March 2005. I return to what Dr Lekamge said about heart rate. To begin with the CTG revealed nothing out of the ordinary as far as Riley's heart rate was concerned. At about 5:40am on 28 February the Cervedil fell out. There is another reference to it possibly having fallen out at 4am but the time at which this event occurred is not material.

2.2. At 9am on 28 February 2005 Ms Krol was examined by a Registrar. There is a comprehensive and apparently contemporaneous handwritten note of this

[2] The issue is further discussed in the transcript of proceedings at pages 368-375
[3] Transcript, page 315

examination. The note forms part of the progress notes that relate to Melinda Krol[4]. The note records discussion between the Registrar and Ms Krol as to the proposed course of her induction. The proposed course as recorded in the notes was that following discussion with a Consultant, Prostin would be inserted at about 3pm that day and that a further dose would be given at about 9pm. Prostin is a hormone designed to induce labour and to ripen the cervix so as to facilitate an artificial rupture of the membrane. The note records that Ms Krol's circumstances would be assessed early the following morning and if the situation was not favourable, they would proceed by way of a caesarean section. The note records that all of this was discussed with Ms Krol. It also records that she was '*happy ĉ this*'.

2.3. The first dose of Prostin was inserted that afternoon. CTG monitoring was continued and there is no suggestion that there were any worrying signs throughout the course of that day. As it happened, the second dose of Prostin was not administered. At 11:00pm Riley was observed to have been very active within the uterus. The CTG which had been absent for some time was then recommenced for a pre-Prostin trace. It appears that Ms Krol's labour commenced at some point in time thereafter. A Registered Midwife by the name of Stephanie Wilckens was on duty that night, as was an Obstetric Registrar, Dr Lekamge.

2.4. At about 12:15am Ms Wilckens spoke to and examined Ms Krol. Ms Wilckens gave evidence in the Inquest, and I will refer to that evidence in due course, but it is as well also to refer to her apparently contemporaneous note that was made of their conversation and of Ms Wilckens' examination. At this time Ms Wilckens recorded that Ms Krol was not keen on the administration of further Prostin. It is recorded that Ms Krol stated that she felt that she was going to have a caesarean section in any event and queried why she should bother with the discomfort she was then experiencing. Ms Wilckens recorded that Ms Krol was experiencing some pain but that it was difficult to assess whether she was contracting due to Ms Krol's weight and position. The observation was made and recorded by Ms Wilckens that the patient was at that stage amenable to an ARM, but it was decided that the membranes would remain intact for the time being. Ms Wilckens also recorded that Ms Krol was

[4] Exhibit C4, pages 63 and 64

requesting analgesia. Notations in the clinical record demonstrate that Pethidine and Maxalon were given to Ms Krol at 12:30am.

2.5. In Ms Wilckens' note timed at 12:15am she has made reference to some early decelerations as revealed by the CTG monitor but that they had picked up quickly. A decelerations is a transient slowing of the foetal heart rate. Other than that, there appears to be no reference to, nor suggestion of, any other non-reassuring aspects of the CTG trace at that time. The trace had a baseline of approximately 140 beats per minute which is within the normal range. At about 12:40am the CTG was disconnected to enable Ms Krol to walk to the toilet. At approximately 12:42am the CTG monitor was reconnected. Between that time and 1:00am Ms Wilckens detected further decelerations in Riley's heart rate on the CTG trace. As a result of Ms Wilckens' observations, Dr Lekamge was notified.

2.6. Both Ms Wilckens and Dr Lekamge gave evidence during the course of the Inquest. At the time at which these events occurred, Ms Wilckens had been a midwife for nearly 22 years. She had commenced her employment at the Modbury in 1986. Much of the reconstruction of these events owes itself to Ms Wilckens observations and recollections. Ms Wilckens was an intelligent, straight-forward witness who to my mind had a very good recollection of these events notwithstanding that they had occurred nearly three years ago. Ms Wilckens demonstrated to me that during the course of that night she had been alert and had a good insight as to what had been taking place, particularly in relation to her perceptions as to the actions of participating individuals and of interactions between those individuals. She struck me as a very good observer of the behaviour of people. I bore in mind the possibility that Ms Wilckens may have been examining the matter with the benefit of hindsight, or even have had a motive to lessen her role in this affair. I saw no evidence of that and in any case nothing of the kind was ever put to her in cross-examination. Although Ms Wilckens was not entirely free of indignation in respect of what had transpired here, she seemed nevertheless to be reasonably dispassionate. In the event I had no hesitation in accepting Ms Wilckens' evidence. Ms Wilckens commenced her duty that evening at about 10:15pm. Ms Wilckens explained to me in evidence that at the handover that had occurred between the outgoing and oncoming shift, the previous midwife on duty had indicated that Ms Krol was due for the administration of Prostin.

The outgoing midwife had indicated to Ms Wilckens that there had been much foetal movement and that it had been difficult to ascertain a baseline for the foetal heart rate.

2.7. In evidence Ms Wilckens elaborated upon the encounter with Ms Krol which she noted in the clinical record as having occurred at 12:15am. At that time Ms Wilckens detected a baseline in the CTG trace that was '*good*'. Ms Wilckens told me that she performed an examination of Ms Krol to determine whether or not the pain that she was experiencing was as a result of labour contractions and concluded that Ms Krol was in the early stages of labour. Ms Wilckens told me that Ms Krol had expressed some doubt as to whether she really wanted to go through with the rest of the induction and said that she was sick of the pain. There was discussion about the benefits of a natural delivery, but there was also discussion about the possibility of Ms Krol being allowed to sleep for the night and having a caesarean section delivery the following morning. Ms Wilckens told me that she left Ms Krol to '*mull that over*'[5] as she wanted Ms Krol to make an informed decision about those issues, but that when she returned, events had been overtaken by the fact that Ms Krol was now dilating and in early labour. The plan was at that time to see what would happen overnight and then give consideration to artificially rupturing the membranes in the morning. Ms Wilckens told me that at some point in time during her discussion with Ms Krol a further deceleration or decelerations in the CTG was observed.

2.8. Ms Wilckens later observed further decelerations in Riley's heart rate after Ms Krol returned from the toilet at 12:42am. This caused her enough concern to raise the matter with Dr Lekamge, the Obstetric Registrar. Their discussion resulted in the decision to artificially rupture Ms Krol's membranes at that time. The reason for rupturing the membranes at this time was two fold. Firstly, it would facilitate the application of a foetal scalp electrode onto the baby's head to better monitor the foetal heart rate. The strap that up to that point in time had been utilised for this purpose can be an imperfect method of monitoring. Secondly, the rupturing of the membranes would enable the colour of the amniotic fluid to be observed. This can give some indication as to whether or not an unborn child is suffering from foetal distress. In short, the thinking behind the rupture of the membranes was to better enable those

[5] Transcript, page 22

looking after Ms Krol to make a decision as to whether or not delivery needed to be expedited.

2.9. A situation of emergency arose after the membrane was ruptured. Although nothing of particular significance was detected upon examination of the amniotic fluid following the rupture of the membranes, the foetal heart rate of Riley within the next few minutes descended to a level that was, in obstetrics parlance, non-reassuring and indeed life threatening.

3. Events following the artificial rupture of the membranes

3.1. At the time the membranes were ruptured a scalp clip was placed on the baby's head in order to provide a more accurate CTG trace. The ARM occurred at approximately 1:23am. There then followed, as evidenced by the CTG trace, a severe and prolonged period of bradycardia. Bradycardia is the slowing of the heart rate below its normal range. In this case it fell quite rapidly to levels between about 60-80 beats per minute. I heard evidence that a sustained period of bradycardia will likely result in significant hypoxia to the foetus. In due course, sustained deprivation of oxygen will lead to an hypoxic brain injury that could well be permanent. It can also result in death, as occurred in this instance. It is understood that periods of foetal bradycardia at these levels that last in excess of 20 minutes are highly likely to result in long-standing compromise to the child's brain function. As it was to transpire, the bradycardia in this particular case persisted for a period significantly in excess of 20 minutes. I will return to the length of the period of bradycardia in due course. It was readily evident after Riley was ultimately delivered that he was acidotic which is very much in keeping with the existence of profound hypoxia, and it will be remembered of course that at post-mortem it was clear that the child had died of an hypoxic brain injury. It is plain, therefore, that the hypoxic brain injury was sustained during the period of bradycardia that had existed before Riley was delivered and that it was this period of bradycardia that led to the child's ultimate demise.

3.2. Dr Lekamge was asked to examine Ms Krol and he did so very shortly after it was determined that the bradycardia was not going to resolve quickly. Having consulted his superior, Dr Lekamge made a decision to deliver the baby by way of an emergency caesarean section. This decision was naturally the correct one in the circumstances. The evidence given by Professor Pepperell suggests that up to this

point Ms Krol's management was routine and that everything done so far had been done in accordance with the usual standards. However, the decision that was made to deliver the child by way of an emergency caesarean section was not carried out until about 3:15am, approximately 90 minutes after the decision had been made. This meant two things. Firstly, it meant that there was a prolonged period during which the child suffered from oxygen deprivation. Secondly, while the child remained in utero, resuscitative efforts were not administered for that 90 minute period. In the event, resuscitative efforts, whilst ultimately establishing the child's respiration, were ineffective in ultimately preventing the child's death from irreversible hypoxic brain damage.

4. Obstetric Emergency Protocol

4.1. There was in existence a document entitled the 'Obstetric Emergency Protocol'. A copy of this document was tendered during the course of the Inquest[6]. The document purports to have been amended most recently on 17 September 2002. It applied to emergency obstetric procedures carried out at the Modbury at the time with which this Inquest is concerned.

4.2. The document commences as follows:

> 'This protocol is intended for '**crash caesareans**' for complications such as umbilical cord prolapse and fetal bradycardia. In such cases the decision to delivery time should be **30 minutes or less**. It may also be used for other obstetric emergencies such as eclampsia.
>
> This Protocol is not intended for less urgent out of hours caesareans for conditions such as failure to progress in labour. The 30 minute decision to delivery time does not apply to these cases, and these caesareans should be arranged by the Obstetric Registrar in the same way as other out of hours cases.' (Emphasis is part of the original text).

4.3. The protocol clearly applied to the situation that had developed in Ms Krol's case. It will be noted that the protocol stipulated that the time lapse between the decision to perform the emergency caesarean section to delivery time should be 30 minutes or less, and on the face of it, applied equally to out of hours deliveries such as Ms Krol's.

4.4. The protocol identifies a number of responsibilities imposed upon hospital staff. Among them was a responsibility upon the Nursing Manager to call in the appropriate

[6] Exhibit C12

operating room team. A responsibility was imposed upon the Anaesthetic Registrar to call in an Anaesthetic Consultant if required. The document also explained that while it was the responsibility of the attending midwife or Obstetric Registrar to make the decision to trigger the Obstetric Emergency Protocol, it specifically relieved the Obstetric Registrar of the responsibility '*to further 'hurry' anaesthetic and operating room personnel in their operations*'.

5. The surgical and anaesthetic scenario at the time of the activation of the Obstetric Emergency Protocol

5.1. Dr Lekamge who was the on duty Obstetric Registrar for this shift, had graduated as a Bachelor of Medicine and a Bachelor of Surgery in 1986 from a Sri Lankan university. In 1994 he had graduated as a Specialist in Obstetrics and Gynaecology from the University of Columbo in Sri Lanka. Following this graduation, he had worked in a university as a Senior Lecturer, at the same time practising as a Gynaecologist. He came to Adelaide in 2001 and worked in the WCH as a Registrar in Obstetrics and Gynaecology. He had been employed at the Modbury since 2002 as a Registrar in Obstetrics and Gynaecology. Dr Lekamge was qualified and experienced in the performance of caesarean section procedures. On the night in question he ultimately delivered Riley utilising that method.

5.2. I have already referred to the presence at the hospital of the midwife, Ms Wilckens. There was another midwife also in attendance. Her name was Robyn Lavrencic. She had been a midwife since 2003. Ms Lavrencic also gave evidence to the Inquest.

5.3. Dr Debbie Knight was the on duty Anaesthetic Registrar. In fact, Dr Knight was the only Anaesthetic Registrar on duty at the hospital. There were no on duty Anaesthetic Consultants (specialists) in attendance. Dr Knight had been an Anaesthetic Registrar at the hospital for two months. Her experience with anaesthetics prior to the beginning of that two month period had consisted of a brief three month stint as a General Medical Officer in the Anaesthetic Department at the Modbury. Dr Knight, who gave evidence to the Inquest, also told me that she had also learned some anaesthetic skills, such as intubation, when she had undertaken a tour of duty in East Timor with the Royal Australian Air Force.

5.4. The evidence before me demonstrated that the anaesthetic procedure required for the performance of a caesarean section could be one of three. A general anaesthetic (or GA), in which the patient is essentially put to sleep for the duration of the caesarean

section, is one such procedure. Integral to a general anaesthetic is the pre-oxygenation of the patient. As well, the patient is intubated. It was said in evidence that a general anaesthetic for a caesarean section is a relatively uncommon method of anaesthesia, except in the emergency setting. Regional anaesthesia is more routinely performed for a caesarean section. This form of anaesthesia does not involve a loss of consciousness on the part of the patient and may be delivered directly into the spinal column. An alternative method of regional anaesthesia may be effected by way of an epidural anaesthetic. This also is delivered into the spine, but it takes longer to take effect. The advantage that a general or spinal anaesthetic has over epidural anaesthetic is that the former two methods can be administered quickly and will take effect faster. In an emergency setting, delivery of anaesthesia by way of an epidural is therefore not ideal. However, a patient who has elected to endure labour with an epidural anaesthetic already in place might, if a caesarean section is ultimately indicated, simply need topping up to enable the caesarean to be performed. This can be achieved in a relatively straightforward manner. In this particular case Ms Krol did not have an epidural anaesthetic in place. Thus in the context of this emergency, the necessary anaesthetic, in whatever form, had to be administered from scratch.

5.5. Being a relatively junior Registrar, Dr Knight required supervision. The levels of supervision that might apply to trainee anaesthetists are stipulated in the Australian and New Zealand College of Anaesthetists supervision policy[7]. Some of the evidence that was given in relation to Dr Knight's expertise and required level of supervision was not entirely consistent. However, there was no real dispute that Dr Knight, even in the circumstances of an emergency caesarean section, would not have been considered appropriate to perform a general anaesthetic in the absence of a supervising Consultant. Whatever mode of anaesthesia was administered, the presence of an Anaesthetic Consultant would have been required in Dr Knight's case. Although Dr Knight was capable of administering a spinal and epidural anaesthetic, and was permitted to commence the administration of such an anaesthetic, and perhaps even to commence a general anaesthetic, the presence of the Consultant would nevertheless be mandatory given Dr Knight's lack of seniority.

5.6. I have already referred to the fact that there was no anaesthetic consultant present in the hospital. I was a little surprised to learn that such a scenario is not unusual after

[7] Exhibit C2b

hours. However, the Modbury had access to an on-call anaesthetic consultant after hours. On this particular night Dr Robyn Campbell was the on-call anaesthetic consultant. Dr Campbell was conferred with her Fellowship of the Australian and New Zealand College of Anaesthetists in 1998. She has been practising anaesthesia since 1988. She has been a Fellow of the Royal College of Anaesthetists since 1993. Dr Campbell was employed by the Modbury. For the night in question she described her role in these terms:

> 'My job was to be on call from home after hours to be called in to assist the Registrar when needed.' [8]

5.7. Dr Campbell lived at Chain of Ponds. At that time of the night her home was about a 30 minute drive to the Modbury. Dr Campbell performed the required anaesthesia after she had been called by Dr Knight and had then driven to the hospital.

5.8. At the time the decision was made to perform the emergency caesarean section, the situation can be summarised as follows: although the obstetric registrar who would perform the surgery was available, operating theatre staff had to be obtained; there was no immediate means by which a general anaesthetic could be administered if that was what was required for the carrying out of the surgery; an anaesthetic consultant was approximately 30 minutes away; and the foetus remained in bradycardia which showed no sign of resolving. This set of circumstances meant that Riley Krol's chances of survival were limited.

6. Timeline of events following the decision to perform an emergency caesarean section

6.1. The following timeline is derived for the most part upon retrospective notes made in relation to the preparation for, and carrying out of, the caesarean section. The retrospective notes form part of the Modbury progress notes relating to Ms Krol's confinement. There are very few contemporaneous notations made by the participants in this emergency caesarean procedure. Some of the times recorded in the retrospective notes are reconstructions. The last contemporaneous note made before the emergency caesarean is timed at 2:20am. This is a note of Ms Wilckens which records the decelerations to 70 beats per minute. As a result of that observation, she had raised with Dr Lekamge the performance of an ARM. Ms Wilckens' note records

[8] Transcript, page 213

the performance of that procedure at 1:23am, and then a deceleration to 80 beats per minute. The note records that a 'crash LSCS' (caesarean section) was decided upon and that Ms Krol was 'prepped' for the operating theatre. The note also records a deceleration to 60 beats per minute for approximately 30 minutes, following which there was a foetal heart rate of 100 beats per minute 'for the last 5/60', meaning for the last 5 minutes, one assumes prior to 2:20am.

6.2. The above note suggests that the bradycardia at around the rate of 60 beats per minute had existed for approximately 30 minutes. As will be seen, the foetal heart rate returned to a level of approximately 100 beats per minute following Ms Krol's transfer to the operating theatre prior to the arrival of the anaesthetic consultant, Dr Campbell. It was said in respect of this supposed return to a level resembling normality that this was a reassuring aspect. This was claimed by Dr Lekamge in evidence. This level is in fact sub normal, and, as will be seen, any confidence generated by a return to this level was misplaced.

6.3. Retrospective notes of events surrounding the carrying out of the caesarean section were made on 3 March 2005 by Ms Wilckens and by Dr Lekamge respectively. Dr Knight made retrospective notes on 15 March 2005. Dr Campbell made her retrospective note on 17 March 2005.

6.4. <u>Ms Wilckens' notes</u>

Ms Wilckens has recorded in her retrospective notes that Dr Lekamge had arrived at the ward at 1:35am and had stated that there was a need for an immediate caesarean section. At approximately 1:40am, the Nurse Manager was notified to obtain theatre staff for a 'crash section'. Dr Knight who was then on the ward indicated that she would need to call her Consultant as she was unable to perform a general anaesthetic herself. Dr Lekamge checked the foetal heart rate and a 70 beats per minute heart rate, which is dangerously bradycardic, was confirmed. Ms Wilckens has recorded that the foetal heart rate was continuously between 60-80 beats per minute until Ms Krol was transferred to the operating theatre at 2:05am. This would mean that up to that point in time there had been bradycardia in existence for at least 30 minutes. Ms Wilckens has recorded that Dr Knight attempted a spinal anaesthetic while awaiting the arrival of Dr Campbell. Dr Campbell is recorded as being present at 2:20am and that both Ms Wilckens and Registered Midwife Lavrencic questioned Dr Campbell's decision to persist with the so far unsuccessful attempts by Dr Knight to perform a

spinal anaesthetic. Dr Campbell is recorded as having stated that the spinal '*would be better*'. When further spinal attempts failed, a decision to perform an epidural was then made. Ms Wilckens has recorded that she asked Dr Campbell '*wouldn't a GA be quicker?*'[9] to which Dr Campbell then stated that a general anaesthetic would further compromise the foetus. Ms Wilckens recorded that she asked Dr Lekamge about utilising general anaesthetic, but that he had stated that the foetal heart rate had improved and that it was okay to proceed, presumably meaning with the epidural. Ms Wilckens has also recorded that a trace at 3:03am revealed a foetal heart rate of 120-130 beats per minute. The CTG was removed at 3:05am when the caesarean section procedure actually began. Riley Krol was delivered at 3:14am according to Ms Wilckens' note.

6.5. Dr Lekamge's notes

Dr Lekamge's retrospective note about these events records that at 1:30am he was called to see Ms Krol after the ARM procedure had been carried out. The child had foetal bradycardia and Ms Krol was experiencing some discomfort. The CTG revealed a foetal heart rate of 60-70 beats per minute. Dr Lekamge performed an examination including a vaginal examination. Dr Lekamge recorded that he discussed the patient's condition with Dr Hughes, the on-call Obstetrician. Dr Hughes agreed with Dr Lekamge that a caesarean section should be carried out. Dr Lekamge has recorded that his decision was 'to deliver the baby as soon as possible (≃0145h)'[10]. Dr Lekamge has then recorded that he gave instructions to Ms Wilckens and other nurses to arrange for 'immediate delivery crash LSCS'. Dr Lekamge informed the Nurse Manager to obtain the necessary staff to carry out an urgent caesarean section. It is recorded that at 1:45am (possibly 1:50am) Dr Knight was informed about the decision to perform a caesarean section which would 'need to be done as soon as possible'. Dr Knight informed Dr Lekamge that she would not be able to administer general anaesthesia until the anaesthetic consultant arrived at the operating theatre. Dr Knight agreed to carry out all the necessary preparation and said that she could try to obtain spinal anaesthesia to enable Dr Lekamge to carry out the caesarean section. At that stage Dr Lekamge has recorded that the CTG was showing a heart rate of 80 with accelerations up to 90 beats per minute. At 2:00am Ms Krol was transferred to

[9] Transcript, page 46
[10] Exhibit C4, page 71 (the symbol ≃ indicates approximate time)

the operating theatre. By 2:10am Ms Krol was lying on her left lateral side on the operating table and CTG monitoring, which had been discontinued for a short time, was recommenced. It was noted at that time that the foetal heart rate had 'improved up to base line of 100-110 bpm with improved variability'. Dr Lekamge has recorded that Dr Knight was attempting to perform a spinal anaesthetic and that Dr Campbell, the anaesthetic consultant, arrived in the operating theatre between 2:20am and 2:30am. Dr Campbell then took over the attempted administration of the lumbar puncture that was needed for the spinal anaesthesia. A foetal heart rate of 110 beats per minute was noted. Also noted is foetal monitoring being changed again to scalp electrode method, with a foetal heart rate still of around 110 beats per minute. The epidural catheter was inserted at approximately 2:55am. Dr Lekamge has recorded 'I was informed that level of anaesthesia is satisfactory to proceed with preparation around 3:05am'. The caesarean section was commenced at 3:09am and the child was actually delivered at about 3:14am. Dr Lekamge has noted a foetal heart rate of 100 beats per minute and he then describes certain resuscitation measures that were then carried out. He has also noted the true knot in the umbilical cord. Dr Lekamge has noted this 'as the cause of foetal bradycardia'[11].

6.6. Dr Knight's notes

Dr Knight made her notes of these events on 15 March 2005. She has recorded that at about 1:50am the alarm sounded in the O&G Ward, where she evidently was at that time. Dr Knight made her way to the delivery suite where she was informed by a midwife that Ms Krol would require an 'emergency c-section'[12] due to the fact that a foetal bradycardia of 60-70 beats per minute had been recorded post ARM. Dr Knight then notes that she carried out certain preparatory procedures with anaesthesia in mind. Dr Knight noted that the patient had no contraindications to spinal anaesthesia but that MPII[13] and Ms Krol's anatomy would make a general anaesthetic more difficult. Dr Knight obtained patient consent for both a general anaesthetic and a spinal anaesthetic. She notes that Dr Lekamge 'confirmed the need for urgent c-section'. At that stage Dr Knight called the anaesthetic consultant, Dr Campbell, who informed Dr Knight that she would come to the hospital straight away. Dr Knight notes that she then went to the theatre where she asked theatre staff to prepare for a

[11] Exhibit C4, page 72
[12] Exhibit, page 72a
[13] A Mallampati score of 2 (a method of classification used to predict the ease of intubation)

spinal as well as a general anaesthetic. She outlined her plan to theatre staff that she would attempt a spinal anaesthetic and proceed with that until Dr Campbell arrived 'for back up to perform a GA'. Dr Knight notes that she was again made aware that the caesarean section needed to be carried out 'as soon as possible'. The patient arrived in the theatre and CTG monitoring and preparation for spinal anaesthesia there occurred. Dr Knight has recorded that at this time the foetal heart rate was 100-110 beats per minute with improved variability. Dr Knight noted that Dr Campbell arrived at the operating theatre at approximately 2:20am at which stage Dr Knight was in the process of, and having difficulty with, inserting the spinal anaesthesia. Dr Campbell then attempted spinal anaesthesia with no success. An epidural was then inserted. 20ml of Xylocaine was administered and a further 10ml was later required. Dr Knight noted that the baby was delivered at 3:15am. Dr Lekamge informed those present that there was a true knot in the umbilical cord.

6.7. Dr Campbell's notes

Dr Campbell's retrospective notes were prepared on 17 March 2005. She has noted that she was called at her home at approximately 1:50am and was 'told of fetal bradycardia'[14]. Dr Campbell has made no notation of having been told of the actual foetal heart rate, nor the period of time over which bradycardia had existed. Dr Campbell noted that she came in immediately (20 minutes in car plus a 10 minute walk) arriving at approximately 2:20am to 2:25am. At that time Dr Campbell has noted that the patient was already prepared for a spinal anaesthetic. The foetal heart rate was about 100 beats per minute at that time. Between two and three attempts were made at a spinal anaesthetic by Dr Campbell. These occurred between 2:25am and 2:30am. At 2:35am Dr Campbell has noted that an epidural was put in place with 20ml of the anaesthetic medication. At 2:50am a further 10ml was administered. At 2:55am the surgeon was 'given ok to block level @ ≈0255'. Dr Campbell has noted that the foetal heart rate was monitored throughout this time at a level of approximately 100-110 beats per minute. Dr Campbell has specifically noted that the surgeon, who obviously was Dr Lekamge, was present throughout and that a general anaesthetic was 'not requested nor was there a request for immediate anaesthesia (?as HR was OK)'[15].

[14] Exhibit C4, page 73
[15] The underlining of the word 'not' is part of the original text

6.8. The key occurrences from the above accounts of what transpired on the morning of 1 March 2005 are as follows:

Time (hrs)	Event
0123	ARM takes place
0130	Foetal bradycardia observed by Dr Lekamge
0135-0145	Dr Lekamge makes the decision to perform an emergency caesarean section
0145-0150	Dr Knight informed of need for caesarean section in delivery suite
0150	Dr Knight contacts Dr Campbell who indicates that she will attend immediately
0205-0210	Ms Krol is transferred to the operating theatre
0210 ⏩	Dr Knight unsuccessfully attempts to administer a spinal anaesthetic
0220-0225	Dr Campbell arrives at the Modbury operating theatre
0225-0230	Dr Campbell unsuccessfully attempts to administer a spinal anaesthetic
0235	Epidural anaesthetic is put in place with 20mls of Xylocaine
0250	A further 10ml of Xylocaine is administered by way of the epidural block
0255 approx	Dr Lekamge was given the clearance to perform the surgery
0300	Prepared and draped for surgery
0309	Surgery commenced
0314	Riley Krol is delivered

7. Conclusions available from the timeline

7.1. The above timeline demonstrates quite dramatically that the 30 minute window of opportunity as contemplated by the emergency caesarean protocol was exceeded by a significant margin. The decision to perform the emergency caesarean section was made at the latest at 1:45am. The first attempts at anaesthesia did not occur until 2:10am. Delivery occurred at 3:14am when resuscitation measures were, for the first time, administered. The bradycardia had been in existence since before 1:45am. In fact, the CTG trace reveals a situation of bradycardia shortly after the ARM procedure which had occurred at 1:23am. The notation suggests that Dr Lekamge was notified about this non-reassuring situation at about 1:35am. The CTG trace is consistent with bradycardia at that time. The bradycardic period is quite evident until approximately 2am, just before Ms Krol was taken to the operating theatre. There is a period of time in which the CTG trace was not connected. It appears that a period of bradycardia was in existence for approximately 30 minutes, even before Ms Krol was taken to the operating theatre. That period of time in itself, especially given the levels of

bradycardia that were in existence, could have adversely affected the health of the unborn child. There was a further period of 1¼ hours before the child was delivered. That period of time seems to have been consumed by preparations for anaesthesia, by the unsuccessful efforts at achieving spinal anaesthesia as performed firstly by Dr Knight and then by Dr Campbell, by the administration of the epidural and by the time taken for the epidural to take effect. It will be observed that much of this could have been avoided had Ms Krol been given a general anaesthetic at the outset. Of course, there was no person qualified, willing and able, to administer a general anaesthetic at the outset.

7.2. Having heard all of the evidence, and in particular having seen the participants in these events give evidence, it is very difficult to detect any meaningful sense of urgency in what transpired after the decision was made to proceed by way of an emergency caesarean section. I exclude from that observation certain attempts that were made by nursing staff to accelerate the process that I will refer to in a moment. I have already referred to the period of bradycardia that had not resolved by the time Ms Krol was transferred to the operating theatre. There was a short period of time during which the CTG was disconnected. After it had been reconnected, the heart rate appears to have picked up to levels approaching normality. Dr Lekamge told me that he derived some reassurance from this fact. On the other hand, I was informed that what this really represented was a 'terminal trace', from which no reassurance could be sensibly derived. This is especially so given the prolonged period of bradycardia which had preceded Ms Krol's transfer to the operating theatre.

8. The interaction between the obstetric and anaesthetic clinical staff

8.1. Registered Midwife Stephanie Wilckens gave evidence that after the decision had been made to perform the emergency caesarean section and Dr Knight, the Anaesthetic Registrar, had been called, she had said to Dr Knight that they would need to do a general anaesthetic as it was a 'crash section'. This expression had been intended to convey the fact that this was a caesarean section of the highest degree of emergency. Ms Wilckens told me that Dr Knight's response was that she was unable to perform a general anaesthetic and would have to call her consultant in[16]. Ms Wilcken's statement to Dr Knight was a reflection of Ms Wilckens' belief that an

[16] Transcript, page 33

emergency caesarean section dictated a general anaesthetic in any event. Other evidence would suggest, however, that that is not the case and that depending upon the circumstances and assessment of risk to the patient, a spinal anaesthetic may be as effective and may be administered almost as speedily. Events proved this to be incorrect in Ms Krol's case.

8.2. Although the CTG trace and the foetal heart rate appeared to improve once Ms Krol was in theatre, Ms Wilckens was still not happy with it. Ms Wilckens, an experienced midwife, did not regard the improved trace as in any sense reassuring. She said:

> 'Because it still wasn't right. It was still bradycardic for a period of time. We weren't getting an accurate trace because there was a lot of loss of contact and I just thought it was a terminal trace. If you have a low heart rate for that length of time and it picks up I was under the impression that if it does pick up like that then it's probably terminal.' [17]

However, according to Ms Wilckens, Dr Lekamge had said at the time that the trace had demonstrated an improved variability and that it was appropriate to proceed by way of epidural anaesthesia. Ms Wilckens' attitude to this optimistic claim was:

> 'We needed to get this baby out.' [18]

Ms Wilckens believed that she had said they should be doing a general anaesthetic at that stage. But her impression was that Dr Lekamge had seemed reassured by the improved trace. Ms Wilckens admitted that notwithstanding her own professional view of what the trace really meant, she herself had taken some comfort from Dr Lekamge's apparent reassurance. Ms Wilckens' thought processes in this regard are quite understandable given the fact that Dr Lekamge was the Obstetric Registrar. As will be seen, the improved trace was a matter from which very little comfort ought to have been derived.

8.3. Ms Wilckens and Ms Lavrencic, the two midwives, both gave evidence that when Dr Campbell arrived in the operating theatre, and had persisted in the attempts to perform the spinal anaesthetic, Ms Wilckens had said to Dr Campbell words to the effect '*aren't you going to do a GA*'[19], meaning a general anaesthetic. To this Dr Campbell had said words to the effect of '*no, this would be better*'[20]. Ms Wilckens took this to

[17] Transcript, page 66
[18] Transcript, page 67
[19] Transcript, page 44
[20] Transcript, page 44

mean that it would be better for the baby. When the spinal failed, and Dr Campbell indicated that she would proceed with an epidural, again Ms Wilckens suggested that a general anaesthetic would be more appropriate, saying to Dr Campbell words to the effect '*wouldn't a GA be quicker?*'[21].

8.4. Ms Lavrencic gave evidence along similar lines. Her expectation had been that once the anaesthetic consultant arrived a general anaesthetic would be administered. Ms Lavrencic confirmed that Ms Wilckens queried Dr Campbell as to why a general anaesthetic was not going to be utilised. Ms Lavrencic recalled that Dr Campbell's response was that they were going to persevere with the spinal anaesthetic or an epidural as it would be the safest option. When asked whether anyone had expressed any sense of reassurance as a result of the improved trace, Ms Lavrencic said:

> 'Not so much reassured but for someone who came into it at a later stage they may not have realised the significance of the trace leading up to that unless it was clearly communicated to them.' [22]

This observation proved to be correct. The significance of the improved trace had to be measured against the earlier poor trace, a fact that could not be put to one side, and a fact that needed to be communicated to Dr Campbell. Ms Lavrencic said that in her view there did not appear to be good communication among those present[23]. In particular, Dr Lekamge maintained an attitude of silence as far as she could detect. Ms Lavrencic regarded Dr Lekamge as the person upon whom there had been the responsibility to convey the necessary sense of urgency to the anaesthetists. She was plainly right on that score.

8.5. Neither Ms Wilckens, nor anyone else for that matter, explained to Dr Campbell the nature of the underlying problem that led to a general anaesthetic being preferable. In particular, Ms Wilckens did not believe any person present had pointed out to Dr Campbell that there was a need for a general anaesthetic due to the earlier distress evidenced by foetal bradycardia. She said:

> 'Yes I don't think anyone did that. I think it was a forgone conclusion that she knew.' [24]

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[21] Transcript, page 46
[22] Transcript, page 80
[23] Transcript, page 81
[24] Transcript, page 65

In other words, Ms Wilckens made the not unreasonable assumption that Dr Campbell would have had an appreciation of those matters. I can readily understand why Ms Wilckens would make such an assumption given that within the room there were experienced clinicians who would be expected to have had a full understanding of the urgency of the situation.

8.6. Dr Lekamge said in evidence that he decided to perform the caesarean section because the baby '*needed immediate delivery and the delivery is by caesarean section*'[25]. He had announced at the time that he would speak to his Obstetric Consultant, Dr Hughes, to obtain his advice and consent, but that as far as he was concerned they were '*going for urgent or crash caesarean section with this lady*'[26]. There does not seem to be any dispute, or to have been any misunderstanding at that time between Dr Lekamge and the nursing staff, as to the urgency of and the need for immediate caesarean delivery, and as seen, Ms Wilckens was well aware of the urgency quite independently of anything that Dr Lekamge might have said.

8.7. When Dr Lekamge spoke to Dr Knight he told her that the baby needed to be delivered '*soon as possible*'[27]. It was in this context that he asked her whether she could perform a general anaesthetic to which she had responded negatively. Dr Knight said that she would attempt a spinal anaesthetic and speak to the Consultant Anaesthetist who was on-call. Dr Lekamge told me that he would have preferred to have had a general anaesthetic administered at that time but that this resource was simply not available, bearing in mind the limited skills that Dr Knight possessed at that time[28]. Although Dr Lekamge acknowledged that even with a crash caesarean section the obstetric protocol time of 30 minutes is difficult to achieve especially at night, Dr Lekamge gave every impression in his evidence that he had wanted to perform the procedure virtually immediately after he had made his decision to do so and once the necessary theatre staff were in place. Dr Knight for her part said in evidence that from what Dr Lekamge had told her she had understood that there was a need to deliver the baby '*as soon as possible*'[29]. The urgency of the situation she says was conveyed to Dr Campbell on the telephone. She said that she told Dr Campbell

[25] Transcript, page 97
[26] Transcript, page 99
[27] Transcript, page 136
[28] Transcript, page 137
[29] Transcript, page 171

that there was '*an urgent caesarean section*'[30]. She also testified that she had told Dr Campbell about the existence of the foetal bradycardia and also believed that she had conveyed the length of time over which the bradycardia had existed. On this, I am not certain that Dr Knight did in fact convey to Dr Campbell the length of time over which bradycardia had existed. In other parts of her evidence Dr Knight seemed to suggest that she had not been aware of that length of time, and if she had been so aware, her approach as to what Dr Campbell should have done upon her arrival may have been different. Dr Campbell told me that nobody ever mentioned the time over which the bradycardia had persisted. I prefer and accept Dr Campbell's evidence on this issue. Of course, Dr Knight was unable to perform a general anaesthetic, but she told me in her evidence that she anticipated being able to administer a spinal anaesthetic and '*that I could have a perfectly adequate anaesthetic ready to go, even by the time Dr Campbell came in*'[31].

8.8. Although Dr Knight may not have been aware of the precise details as to the period of and significance of the bradycardia, she does not claim to have been under any illusion about the fact that the baby needed to be delivered urgently. In the event, she was unable to achieve a spinal anaesthetic. Dr Knight acknowledged that she persisted with her attempts at administering the spinal anaesthetic longer than she otherwise would have if Dr Campbell had been present. She acknowledged that she would have abandoned the attempts at spinal anaesthesia if there had been another choice open to her. She knew that she needed assistance at consultant level. Dr Knight did not consider administering an epidural because during her attempts at the spinal, she had thought that she had been close to success and that if she had managed to achieve a spinal, anaesthesia would therefore have been more rapidly achieved. She also said that she may have encountered just as much difficulty administering an epidural as the spinal. In the event, this difficulty did not come to pass because when Dr Campbell eventually attempted the epidural, she had immediate success. Dr Buettner, the anaesthesia expert from Victoria, opined that Dr Knight had been placed in an untenable situation. It is hard to disagree with that observation. As well, Dr Buettner believed that, given her level of seniority, Dr Knight's choice to perform a spinal anaesthetic had been the correct one. I agree. Dr Knight took the initiative in

[30] Transcript, page 172
[31] Transcript, pages 171-172

very unfavourable circumstances not of her making. She did everything she could to effect the necessary anaesthesia. Her failed attempts at administering a spinal anaesthetic have to be considered in the light of the fact that Dr Campbell, the specialist anaesthetist, was also unsuccessful in this regard.

8.9. Dr Lekamge acknowledged that sustained bradycardia lasting for 20 to 30 minutes causing persistent hypoxia or low oxygen levels could create a very dangerous situation such that the child could suffer permanent brain damage[32]. Sustained bradycardia for such a period had in fact existed in this case. His hope and expectation had been that Dr Knight would have been able to effect a spinal anaesthetic expeditiously such that he could have commenced operating well before Dr Campbell arrived in the theatre[33]. Of course, those hopes were dashed when Dr Knight was unable to perform the spinal anaesthetic. One would have expected therefore that by the time Dr Campbell arrived in the theatre, at which time the futile attempts at a spinal anaesthetic were still being made, Dr Lekamge would have had an acute level of concern about the situation. Other clinicians at that stage might have been utterly frantic. There does not appear to be any evidence of such an attitude here. On the contrary, Dr Lekamge said that because the heart rate had improved to around 110 beats per minute, his '*anxiety level*' had diminished[34]. This improvement, in Dr Lekamge's assessment, was such that he was content to go along with Dr Campbell's decision to perform the time consuming epidural anaesthetic.

8.10. Dr Lekamge made a number of statements about his assessment of the improved heart rate that do not accord with the assessment of others, including the experienced midwife Ms Wilckens and the very experienced expert Professor Pepperell. Dr Lekamge said that he had been comfortable with the decision to move from a spinal anaesthetic to an epidural procedure[35]. He said '*at that time the baby's heart rate had improved to around 110*'[36]. He also said that he was happy to continue with an

[32] Transcript, page 106
[33] Transcript, page 107
[34] Transcript, page 112
[35] Transcript, page 109
[36] Transcript, page 109

epidural[37]. He did not acknowledge whether Ms Wilckens had spoken to him about that situation. Dr Lekamge gave the following passage of evidence:

> 'Q. When the rate in the theatre returned to 110 or so what did you put the improvement down to. What was the explanation for the improvement as far as you were concerned at the time.
>
> A. Yes, at that time I didn't know a definitive reason why baby had bradycardia but the only signal I'm getting is from the baby's heart rate and I have seen it's improved.
>
> Q. Yes.
>
> A. And it can happen. In my experience I have seen in - not persistent bradycardia like that - I have seen when it is bradycardic for one or two minutes, it improved when the baby had the cord round neck. So it get loosen up and then it returns to normal.
>
> Q. Yes.
>
> A. So in this situation I was happy, I was thinking 'Okay, for whatever the reason going on inside, the baby's getting enough oxygen'.
>
> Q. But did you have any explanation available to you at the time as to why there had been at one point in time bradycardia and then at another point in time, what appeared to you, at any rate, to be a more assuring - a more reassuring heart rate. Did you have an explanation for that scenario as a whole before you delivered the baby, I mean.
>
> A. No, no. I was satisfied with the improvement of the heart rate at that time.'[38]

8.11. Dr Lekamge seemed to suggest that although the significant bradycardia had been worrying, the improvement in the heart rate had justified a '*sense of comfort*' on his part[39]. This in spite of the fact that on any assessment, life threatening bradycardia had existed for an extended period of time, not just for one or two minutes. In addition, a foetal heart rate of 110 is in any case at the very bottom end of what might be considered normal.

8.12. By the time Dr Campbell arrived, Dr Lekamge, surprisingly in my view, said that even then he did not have a reason to press for general anaesthesia. This comment seems somewhat incongruous with any hope on his part that the child may not have been significantly adversely affected after all[40]. On the other hand, Dr Lekamge acknowledged in evidence that he had had an expectation that they were going to have an affected baby once it was delivered. He said '*I think we are going to have a*

[37] Transcript, page 113
[38] Transcript, pages 117-118
[39] Transcript, page 133
[40] Transcript, page 140

affected baby, hypoxic baby, asphyxiated baby'[41]. In his own mind he described the child's prognosis as '*not very good*'[42].

8.13. I found some of Dr Lekamge's evidence difficult to reconcile internally, particularly in relation to what he said believed as far as this child's prognosis was concerned. One would have thought that if there had been any hope of the child being born alive or of being born without any severe deficit, urgency would have been an essential ingredient of all facets of this caesarean procedure. The nursing staff certainly had that sense of urgency and had done everything they could to make their attitude plain. The following question and answer seems to sum up what Dr Lekamge's definitive evidence is on the subject:

> 'Q. So is there any particular reason why when you were aware that Dr Campbell was going to perform an epidural, because the spinal anaesthetic wasn't working, that you didn't speak up at that point and just ask or speak to her about a general anaesthetic.
>
> A. At that time the heart rate has been improved, as much as I could comfortable be at that time, and at the same time my appreciation was Dr Campbell was aware of the urgency and the necessity and at the same time I was thinking she must be thinking of the risk associated with giving general anaesthesia and that is that she decided about the mode of anaesthesia. I was thinking, okay, she must be deciding that this is best for this patient and I didn't have a reason to interrupt at that time because as the obstetrician I was happy with the improvement that the patient showed at that time.' [43]

If Dr Campbell had been aware of the urgency of the situation, it ought to have seemed odd to Dr Lekamge that Dr Campbell would nevertheless be content to perform an epidural anaesthetic and not a general anaesthetic. Dr Lekamge would suggest that Dr Campbell's failure to perform a general anaesthetic was perhaps as a result of a risk assessment conducted by her. There is some support for this as Ms Wilckens and Ms Lavrencic said that Dr Campbell had said something to the effect that an epidural would be better or safer. However, underpinning Dr Lekamge's acquiescence in Dr Campbell's approach to his patient's anaesthesia was the somewhat misguided assessment on his part that the child had showed an improvement. On the face of it, Dr Lekamge's acquiescence would be more congruent with a resignation on his part that the child's fate was already sealed and

[41] Transcript, pages 131-132
[42] Transcript, page 132
[43] Transcript, page 151

that urgency was therefore no longer an issue. Either way, if it was truly the case that Dr Lekamge had derived significant comfort from the improved CTG trace, or had thought that it augured favourably for the unborn child's well being, he existed in a state of profound self delusion.

8.14. That said, it was not Dr Lekamge's fault that there had not been the necessary anaesthetic expertise available when he had originally made the decision to perform the caesarean.

8.15. As to whether anything was said to Dr Campbell when she arrived about the urgency of the situation, he said that he did not hear any communication between anyone and Dr Campbell as to whether she should be performing a general anaesthetic. Specifically, when asked whether Ms Wilckens had said to Dr Campbell words to the effect 'aren't you going to do a general anaesthetic?', Dr Lekamge said:

> 'It could have been. I think the expectation was when Dr Campbell walk into the theatre for the general anaesthetic and I think the decision - if there has been any communication, I think that was the time, not late down in the track about 20 minutes later.' [44]

But Dr Lekamge himself does not claim to have conveyed any sense of urgency to Dr Campbell, and he was the surgeon. Rather, he said that he had an expectation that Dr Campbell would have had an understanding of the bradycardia, or would have gained an understanding of the bradycardia through Dr Knight, the Anaesthetic Registrar. Dr Lekamge specifically suggested in evidence that he did not have any reason to suspect that Dr Campbell had not been completely informed about the urgency of the delivery notwithstanding the fact that she had elected to perform a more time consuming anaesthetic procedure.

8.16. Dr Campbell told me in her evidence that during their telephone conversation, Dr Knight had described the foetal bradycardia. Dr Campbell thought that it may have been said that the bradycardia was 'prolonged', but no-one actually mentioned a time[45]. Dr Campbell told me that when she arrived at the operating theatre, she was asked by the anaesthetic nurse whether she was going to perform a general anaesthetic. Dr Campbell had responded by enquiring what the foetal heart rate was

[44] Transcript, page 158
[45] Transcript, page 220

at that time. One of the persons present advised her that it was 100-100 beats per minute[46].

8.17. Dr Campbell gained a general impression that Ms Krol may have had a difficult airway, meaning for the purposes of a general anaesthetic. In the event Dr Campbell decided to administer an epidural anaesthetic after her own attempts at a spinal anaesthetic proved to be unsuccessful. She said she would not have performed a general anaesthetic unless she had been told to do so, but in any event she was content to perform an epidural because it appeared to her at the time to have been feasible[47].

8.18. Dr Campbell acknowledged that a nurse may have spoken to her about an actual need to perform a general anaesthetic, remembering that Ms Wilckens claimed she had challenged Dr Campbell about that in fairly confronting terms. Dr Campbell suggested that this may have happened, but unless it had been the surgeon who was directing her, she may have simply treated it as a general query rather than as a suggested course of action. She said:

> 'It would honestly not have occurred to me that anybody other than the surgeon would be attempting to direct me in any way.' [48]

8.19. Dr Campbell told me that the expression 'crash section' was never used in her presence, or on the telephone, at any stage that night. Nor was she told anything about the period of bradycardia having been 20 to 30 minutes in duration. Dr Campbell was asked whether that information would have changed her approach to the patient. She said:

> 'A. I probably would have asked when I got into theatre if it was a super-urgent sort of case they needed a general anaesthetic for. I would have asked that, I wouldn't - still wouldn't have proceeded.
>
> Q. So you cannot say now whether that information alone would have made a difference to the way you approached the anaesthetic process.
>
> A. No, not unless it would have made a difference to how I was directed by the surgeon to approach the anaesthetic process.' [49]

[46] Transcript, page 223
[47] Transcript, page 224
[48] Transcript, page 226
[49] Transcript, page 230

In fact Dr Campbell thought that the surgeon, Dr Lekamge, looked '*reasonably happy*'[50]. There was no elevated level of concern beyond what might exist in a typical emergency caesarean procedure. Dr Campbell's state of mind seems to have been one where although it was clear to her that this was an emergency caesarean section, as say opposed to a caesarean occasioned by a failure to progress in labour, the seriousness of this particular emergency was never really conveyed to her. It was in my view reasonable for Dr Campbell in effect to have taken her cue from the surgeon. In this case that surgeon was Dr Lekamge and he had virtually said nothing to her about the true urgency of the situation. Dr Campbell's evidence is that she would only have performed a general anaesthetic in these circumstances if she had been told by the obstetric surgeon that she needed to perform a general anaesthetic because of the urgency of the situation. If in these circumstances the surgeon had directed her to perform a general anaesthetic, Dr Campbell said:

> 'Again it requires an assessment of the mother. In this case my worries about her airway were not sufficient to point blank refuse to do a general anaesthetic under all circumstances. There are cases where that might be so because the life of the mother is always paramount to the anaesthetist. But in this case had I been directed to do a general anaesthetic I would have done so, with qualms but I would have done so.' [51]

8.20. That last statement of Dr Campbell appears to be consistent with statements that she made in her interview with the police on 31 July 2006, albeit with a slightly different emphasis. On that occasion Dr Campbell had stated that she could not read CTGs and that nobody had told her that the CTG trace and heart rate, notwithstanding a return to a level approaching normality, was in fact not a normal rate. Dr Campbell had stated that as far as she was concerned the foetal heart rate during her time in the operating theatre 'was back to a normal rate'[52]. Dr Campbell went on to say on that occasion:

> 'And, you know I would say as well that you know delivery should have been expedite (sic) immediately when anaesthetist arrives general anaesthetic given. Somebody needed to tell me that and nobody did. So, yes if I'd been asked I would've done the anaesthetic.'

[50] Transcript, page 231
[51] Transcript, page 241
[52] Exhibit C11, page 10

Dr Campbell seemed to have been at pains to point out to the interviewing police officer that she had no proper appreciation of the fact that the foetal heart rate was not normal. She said:

> 'I wasn't told that the CTG trace was abnormal at that stage. And, and I would've done a general anaesthetic had I been asked. Having said that there was always the possibility if I did a general anaesthetic that something would go wrong with mother.' [53]

8.21. My view is that Dr Campbell's answers to the police reveal that she would have performed the general anaesthetic if Dr Lekamge had asked her to do so. In evidence she told me that she would have done so with qualms if directed to do so. I have no doubt that had Dr Lekamge asked Dr Campbell to perform a general anaesthetic, Dr Campbell would have done so. She may have done so with some hesitation, but to my mind she would have carried it out especially if Dr Lekamge had told her the reason it needed to be carried out. Expert evidence that I will come to in a moment would suggest that to an experienced Consultant Anaesthetist there was really no impediment to the performance of a general anaesthetic in Ms Krol's case, especially given the urgency of the situation. It was unfortunate that Dr Lekamge did not ask Dr Campbell to perform a general anaesthetic. It would have hastened Riley's delivery significantly. Whether it would have altered the outcome is another matter that I address in these findings in due course.

9. The evidence of Professor Emeritus Roger Pepperell

9.1. Professor Pepperell is a Specialist Obstetrician and Gynaecologist. He had been the Chairman of the Department of Obstetrics and Gynaecology at the Royal Women's Hospital in Melbourne for a period in excess of 20 years before his retirement from that position approximately 4 years ago. Since his retirement from that position, he has continued in obstetric practice. Professor Pepperell has been a member of the Perinatal Mortality and Morbidity Committee for the State of Victoria for in excess of 20 years.

9.2. Professor Pepperell has examined the clinical records in relation to Ms Krol and Riley Krol insofar as they concern Riley Krol's delivery. It is pertinent to observe that Professor Pepperell examined the matter from the viewpoint of an obstetrics expert and practitioner. Another eminent practitioner from Victoria, namely Dr Andrew Buettner, a Consultant Anaesthetist also from the Royal Women's Hospital in

[53] Exhibit C11, page 10

Melbourne, gave evidence about the anaesthetic aspects of a delivery such as Riley Krol's.

9.3. Professor Pepperell provided four reports to the Court[54] and gave evidence by way of a video link.

9.4. Professor Pepperell could raise no criticism in relation to the management of Ms Krol's confinement up to the point where the decision was quite properly made by Dr Lekamge to perform an emergency caesarean section. In particular, Professor Pepperell suggested that decisions that had been made by Modbury clinical staff such as the continuation of the induction procedure utilising Prostaglandin, were not unreasonable decisions[55]. Although there had been some decelerations on the CTG at a time prior to the ARM procedure, none of those decelerations had in themselves given rise to significant concern. However, Professor Pepperell was clearly of the view that Riley Krol had become significantly and dangerously bradycardic after the ARM procedure had been carried out. Professor Pepperell said that a level of bradycardia existing between 70-80 beats per minute for in excess of 30 minutes was a 'very serious bradycardia'[56]. Professor Pepperell said that the episode of bradycardia, lasting as long as it did, was unacceptable. As to the effect of the bradycardia, Professor Pepperell said this:

> 'Yes, during a period as long as that the oxygen supply to the baby will be much less than it needs to be. If it is born early in that phase it can cope for about 10 or 15 minutes with a very severe deceleration like that. If it lasts for much longer than that there is progressive damage to parts of the brain of the baby and it is - it is now believed that bradycardia lasting for an excess of 20 minutes, where it is constantly low, is highly likely[57] to result in foetal deterioration, longstanding compromise to brain function.' [58]

9.5. Professor Pepperell was of the view that even after the re-establishment of a foetal heart rate around 100-110 beats per minute, this was not to be regarded as a comforting or reassuring scenario. He said:

> 'I would have been just as worried when I saw that between 0210 and 0220 right up to 0230 that this was still - still bradycardia, still below 120, it is still not normal, and I would have been very concerned.' [59]

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[54] Exhibits C17, C17a, C17b and C17c
[55] Transcript, pages 306-307
[56] Transcript, page 315
[57] Please note that the transcript incorrectly notes the word 'unlikely'
[58] Transcript, page 310
[59] Transcript, page 315

Professor Pepperell expressed the view that although the heart rate had gone up towards the bottom end of normality, it was still an abnormal CTG pattern even at that point in time, given that there was no reactivity or satisfactory variability in the trace over a period of time. In his report, Exhibit C17a, Professor Pepperell stated that the CTG record was:

> 'Not a normal CTG recording at all, and is certainly not a pattern of a non-hypoxic baby.'[60]

As to whether any comfort at all could have been derived from the increase in the heart rate after 2:10am, Professor Pepperell suggested that one might have been less concerned because it had come up a bit, but that it was still not normal. In this regard one could not ignore the fact that there had been a substantial period of bradycardia preceding 2:10am such that it was to be expected that even if the rate had '*come back to being slightly better, the risk was still there, the risk to that baby being profoundly acidotic and likely to be adversely affected and/or dead*.'[61]

9.6. Professor Pepperell held the view that the delay in carrying out the caesarean section, being a period of 1½ or 1¾ hours from the time the decision to deliver Riley by this method had been made, was:

> 'Just not acceptable as the baby needed to be delivered within 15 to 30 minutes at the outside.' [62]

9.7. It is to be observed here that if Riley was to have been delivered within 15 to 30 minutes of the decision to perform the caesarean section, he would have had to have been delivered by 2:15am at the latest, on the assumption that the decision was made no later than 1:45am. In the event, delivery did not take place until an hour after that time. In addition, a delivery that occurred, say at 2:15am, would have meant that the significant period of bradycardia, lasting as it did for between 25 and 45 minutes, would already have occurred and the damage could well have been done to Riley in any event.

9.8. It will also be observed that at 2:15am Dr Knight had been conducting her attempts to perform a spinal anaesthetic upon Ms Krol. The arrival of the anaesthetic consultant, Dr Campbell, was still some minutes away. Professor Pepperell suggested that in a

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[60] Exhibit C17a, page 3
[61] Transcript, page 317
[62] Exhibit C17a, page 4

tertiary hospital such as the Royal Women's Hospital in Melbourne, the nature of Riley Krol's emergency caesarean delivery would have invoked a 'code green'. This would involve delivery within 20 minutes. If when the mother is in the operating theatre delivery is still regarded as urgent, a general anaesthetic would usually be performed[63]. However, he indicated that he might defer to the experiences and opinions of Dr Buettner in that regard. Nevertheless, a general anaesthetic would clearly have been Professor Pepperell's preferred option in those circumstances.

9.9. At another point in his evidence, Professor Pepperell suggested that the process of an emergency delivery would take approximately 30 minutes at the most in a tertiary hospital, but in a hospital such as the Modbury where staff is not on-site all of the time, it would normally take somewhere between 30 and 60 minutes to expedite delivery. Professor Pepperell seemed at a loss to justify a delay of the magnitude involved in this particular case. What gave rise to the delay, however, was fairly clear. A significant part of the delay was occasioned by the fact that the Anaesthetic Registrar, Dr Knight, was not appropriately experienced or qualified to perform a general anaesthetic and in any event had difficulty administering a spinal anaesthetic before the arrival of Dr Campbell. Dr Campbell, for her part, persisted with the attempts at spinal anaesthesia and in the event elected for the time consuming procedure that an epidural anaesthetic involved. However, it is to be observed that even if Dr Campbell upon her arrival at 2:20am had immediately ordered and performed a general anaesthetic, the period of profound bradycardia still would have persisted for a significant period of time. That raises a question to which I will come in due course as to whether or not the delay occasioned by Dr Campbell having to attend at the Modbury from her home was a significant factor in Riley Krol's demise.

9.10. Professor Pepperell suggested that the selection of an epidural after the spinal anaesthesia had proved unsuccessful was not satisfactory insofar as it caused further delay. He said in his report:

> 'It was not appropriate for the anaesthetic consultant to use anaesthetic techniques which were clearly going to take time when urgent delivery was necessary.' [64]

[63] Transcript, page 313
[64] Exhibit C17a, page 4

Professor Pepperell suggested that the spinal anaesthetic having failed, that they should have gone straight to '*general anaesthetic*'[65]. For Professor Pepperell, Ms Krol was not so overweight that the concern of the anaesthetist would have been such to preclude a general anaesthetic. Professor Pepperell also believed that with a foetal heart rate of 70 beats per minute, existing as it would have been for the whole of the time that Ms Krol was being conveyed to the operating theatre, most anaesthetists would have simply performed a general anaesthetic, although he would, as he said, defer to Dr Buettner about that as well. Dr Buettner suggested in his evidence that general anaesthetics, while carrying more risk to the mother, are generally utilised in cases of the most urgent kind. There can be no doubt that this was one of those cases.

9.11. Professor Pepperell expressed the belief that Riley Krol's unfortunate outcome was in a sense predetermined even before attempts were made after 2:10am to perform the necessary anaesthesia and to deliver the baby. Professor Pepperell said:

> 'By that stage there had been such prolonged hypoxia that, in fact, the baby was going to be in real strife, and the fact that despite the foetal heart rate coming up to almost back to normal, in terms of its baseline rate, the pH was still so acidotic at the time it was done.'[66]

Professor Pepperell suggested that at least a significant brain injury was very possible even by that time[67]. In this regard, Professor Pepperell suggested that periods of hypoxia in excess of 15 minutes involved a high likelihood that brain damage would occur in the baby.

9.12. Professor Pepperell recognised that in the circumstances that prevailed at the Modbury on the morning in question, there was not a great deal that could have been done to avoid the outcome, save and except for a possible recognition of the possible complications in advance and a caesarean section being performed not in emergency circumstances[68]. Professor Pepperell said the following:

> 'I think the only way you could absolutely prevent that from happening again, where there is a delay because staff aren't in the hospital and because - and that includes nursing staff and anaesthetic staff and potentially qualified paediatric staff, and potentially a consultant obstetrician, would be to not deliver patients in small institutions where they haven't got around the clock availability of all of those personnel. The tertiary hospitals have got that availability. The private hospitals haven't got that availability. And yet

[65] Transcript, page 317
[66] Transcript, page 328
[67] Transcript, pages 327-328
[68] Transcript, page 328

> these problems occur relatively infrequently, but when they occur that they're a disaster. I don't believe that, unless you said if you haven't got those facilities available you shouldn't be doing obstetrics, that you would ever resolve the problem completely and it certainly wouldn't resolve it in most of the private hospitals that I'm aware of anywhere in Australia. Therefore, there is a risk of having a baby. It's not risk free and in - ideally you would want them in a hospital where you could cope with everything as soon as the problem arose. But in practice that's very difficult to achieve.' [69]

The effect of what Professor Pepperell said there in my view is reasonably clear, albeit somewhat understated. The message is that people should perhaps think twice about having their children delivered in small institutions that do not have around the clock availability of relevant personnel. This would especially be so where the delivery might be attended with risk, such as where the child is overdue or where an emergency caesarean section might be anticipated for different reasons. This scenario is to be contrasted with the situation in tertiary hospital institutions where anaesthetic trainees and registrars have a significantly greater level of experience than what was witnessed at the Modbury in this case[70].

9.13. Professor Pepperell in his evidence also dealt with the cause of the period of bradycardia. It is fair to say that Professor Pepperell did not favour the true knot in the umbilical cord as that cause. Professor Pepperell suggested that the fact that a finger could be inserted through the knot indicated that it was not tight enough to cause significant restriction. Professor Pepperell suggested that there was an alternative explanation for the episode of hypoxia, namely an adverse reaction to the Prostaglandin administration utilised in the endeavours to induce Riley's birth. This is a well-known possible complication of the use of that substance. As I have already foreshadowed in these findings, in my opinion, the cause of the hypoxia has no particular relevance. The cause of the hypoxia, if identified, would not have altered the course of the management of the delivery. Professor Pepperell did not suggest otherwise. Whatever the explanation is, the cause of death is clear, being the hypoxic injury to the brain.

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[69] Transcript, page 330
[70] Transcript, page 331

10. The evidence of Dr Buettner

10.1. Dr Andrew Buettner is a Consultant Anaesthetist also employed at the Royal Women's Hospital in Melbourne. He is the Deputy Director of the hospital's Department of Anaesthesia. He is primarily an obstetric anaesthetist at that hospital.

10.2. Dr Buettner provided a report dated 15 April 2007 together with annexures[71]. He also gave evidence to the Inquest by way of video link.

10.3. Dr Buettner noted in his report that the interval between the decision to perform the caesarean section and delivery was approximately 1¾ hours and also noted that the conventional timeframe for what he described as a 'category 1' caesarean section is delivery within 30 minutes. Dr Buettner also suggested in his report that conditions were such at the Royal Women's Hospital in Melbourne that for category 1 caesarean sections the mean decision to delivery time for patients in whom a general anaesthetic was administered was 17 minutes. In his evidence Dr Buettner said that this figure applied across the board at any time of the day, meaning at night as well. Dr Buettner explained why this particular timeframe was achievable and I will return to those considerations in due course. In his report, Dr Buettner identified a number of shortcomings in what took place in respect of Ms Krol's delivery that together and separately contributed to the delay in Riley's delivery. Those causes are summarised on page 8 of his report. He lists them as follows:

> '1. No apparent system for rapid notification of all necessary personnel required for a category 1 caesarean section.
>
> 2. No apparent system for classification of the urgency of caesarean section leading to confusion between different parts of the team involved in the care of the patient.
>
> 3. Rostering of junior anaesthetic registrars at Modbury hospital who are unable to perform unsupervised anaesthesia for caesarean section.
>
> 4. Lack of theatre staff in the hospital at night preventing rapid commencement of surgery.
>
> 5. Failure of Dr Lekamge to inform Dr Campbell of the clinical urgency of the case meaning that persistent attempts were made to achieve regional anaesthesia rather than covert to a more rapid general anaesthetic technique.' [72]

[71] Exhibits 2a and 2b
[72] Exhibit C2a, page 8

10.4. Dr Buettner made a number of observations about what had taken place in respect of the circumstances surrounding Riley's birth and commented upon procedures that appeared to be lacking or inadequate at the Modbury as far as the carrying out of an emergency caesarean section was concerned. Dr Buettner was of the view that given that the severe foetal bradycardia posed an immediate threat to the life of the foetus, this had been a category 1 emergency caesarean section with the highest degree of urgency. Dr Buettner pointed to the need for clarity when clinical staff articulate the degree of urgency required in an emergency caesarean section. In his report, he points to the fact that terms such as 'urgent', 'crash', 'immediate' and 'emergency' mean different things to different people and do not necessarily convey exactly what is required in terms of the speed at which a caesarean delivery is setup and carried out. In my opinion, clearly what needed to take place in respect of Riley Krol's delivery was a mutual understanding of the existence of an immediate threat to the life of the unborn child and that his delivery needed to be effected immediately. Phrases such as 'as soon as possible' were to my mind misleading in the sense that they did not convey the true sense of urgency and the need for immediate action. In this regard, there is one stipulation the Obstetric Emergency Protocol the validity of which in my view is open to question. The protocol sates that while it is the responsibility of the attending midwife or obstetric registrar to make the decision to "trigger" the protocol, it is not the obstetric registrar's responsibility to further "hurry" anaesthetic personnel in their preparations. The protocol suggests that the very act of triggering the protocol in itself carries the clear message to anaesthetic staff that the situation is urgent. While that is true, in my view it ought nevertheless be regarded as part of the obstetric registrar's responsibility the need to ensure that anaesthetic decisions that are manifestly being made on insufficient information are rectified. It is no part of a clinician's duty to sit back and acquiesce in a clinical decision made by another practitioner that is clearly wrong.

10.5. Dr Buettner told me that although spinal anaesthesia is the most common technique used in caesarean sections, general anaesthetic is usually the most rapid form of effecting anaesthesia[73]. General anaesthesia is used more commonly for the most urgent cases. Dr Buettner suggested that at least at his hospital a significant number of general anaesthetics are conducted after hours. While Dr Buettner was not critical

[73] Transcript, page 281

of a decision on the part of Dr Campbell to persist with the attempted administration of the spinal anaesthetic[74], he suggested that if one knew that it was a category 1 caesarean section, unless one considered it an extreme risk to the mother from a general anaesthetic, one would not perform an epidural knowing the length of time required for such an anaesthetic to take effect[75]. Dr Buettner said:

> 'With the benefit of hindsight I don't believe it is appropriate to perform an epidural anaesthetic de novo in a category 1 caesarean section without major contraindications to general anaesthesia.'

10.6. I add here that there does not appear to be any sensible suggestion, notwithstanding Ms Krol's weight difficulties, that the risks associated with a general anaesthetic in her case would have meant that this form of anaesthesia was out of the question. Ms Krol had not been given an epidural during her labour, and at a time before any emergency had arisen, or before any urgent need to perform an emergency caesarean section had been identified. I do not know the reason for this, but her labour had only just begun at the time the critical situation started to develop. Dr Buettner considered that an epidural administered during labour would especially be indicated for women who were more likely ultimately to require caesarean section. The epidural can simply be topped up to deliver the necessary anaesthesia. I have already referred to other evidence that suggests that the risk of a caesarean section delivery is greater where a woman's body mass index is significantly high and also where an overdue delivery has to be induced. It would therefore appear that in those pre-identified adverse circumstances there is a compelling case to argue that women would be well advised to undergo labour with an epidural in place. However, it must be recognised that for many, the issue as to whether one should have an epidural is not entirely free of emotive elements. The decision whether or not to endure labour without pain relief is not necessarily made on pragmatic grounds alone. All that can be said is that the necessary anaesthesia for an emergency caesarean delivery can be significantly expedited if an epidural is already in place at the time an emergency arises.

10.7. As far as the delay caused by the decision to perform an epidural anaesthetic in this case is concerned, Dr Buettner suggested that there was a need for good communication between the obstetric practitioner and the anaesthetic practitioner

[74] Transcript, page 278
[75] Transcript, page 286

about the degree of urgency required in the performance of the caesarean section. As well, the circumstances that existed here, including the fact that an anaesthetic consultant had to be called in the middle of the night, should have in any case carried the clear implication that urgency of the category 1 variety existed[76], and that this should naturally have generated appropriate discussion between the anaesthetic registrar and the anaesthetic consultant. So much goes without saying in my opinion. One would have thought that commonsense requires open and frank discussion between obstetric and anaesthetic staff about the urgency of any caesarean delivery, especially one of the most urgent kind as was the case here.

10.8. Dr Buettner observed in his report that had a general anaesthetic been administered instead of the epidural, it would have significantly reduced the delay but he was unable to say whether it would have prevented the fatal outcome.

10.9. Dr Buettner said Ms Krol's body mass index of 36 would place her into a category where her weight should have influenced her management. In his experience this fact alone could provide a compelling reason why a delivery might not be permitted to take place in a smaller non-tertiary hospital such as Modbury. The fact that the Modbury Hospital did not in the early hours of the morning have anybody actually present who was permitted to administer a general anaesthetic if required was for Dr Buettner:

> 'A significantly less than optimal situation for a hospital that is practising obstetrics.' [77]

Again, this observation to my mind is unassailable. Dr Buettner did not go so far as to suggest that a hospital such as the Modbury was completely without resources, given that there are many things that could be achieved by a trainee anaesthetist including the drawing up of the drugs, preoxygenation and other preparatory procedures to a general anaesthetic. However, he pointed to the fact that the Modbury did not appear to have around the clock operating theatre staff who, in the particular instance in question here, had to be summonsed. All of this took time. Dr Buettner also referred in some detail to the technical difficulties that might be presented in respect of a delivery such as Ms Krol's where an emergency caesarean section was perhaps more likely to occur. In an emergency setting such as this, it is simply too

[76] Transcript, page 287
[77] Transcript, page 269

late at that stage to start debating the relative merits or otherwise of general as opposed to regional anaesthesia. In this context, Dr Buettner suggested that women with a body mass index of greater than 35 are, at the Royal Women's Hospital in Melbourne, meant to be referred to the anaesthetist antenatally and to have a detailed assessment well before they come to delivery[78]. He said:

> 'I don't think that you can do a great assessment when an emergency or code green caesarian section has been called in that heat of the moment, that is the wrong time.' [79]

10.10. Dr Buettner contrasted the situation that took place with Ms Krol's delivery with what might occur in a tertiary referral hospital such as the Royal Women's Hospital in Melbourne. Dr Buettner in this regard referred to the category 1 protocols that suggest that the time from the decision to effect a caesarean section delivery to actual delivery should be 30 minutes. Dr Buettner pointed to the fact that at the Modbury, Ms Krol did not even arrive at the operating theatre until well after 20 minutes from when that decision was made. Indeed, it appeared to him that the benchmark 30 minute period would not be achievable at the Modbury under any circumstances[80]. By contrast, compliance with the protocol was achievable at Dr Buettner's hospital within 16-17 minutes because they have theatre staff present at the hospital at night and have more senior anaesthetic registrars who can at least commence an anaesthetic in the knowledge that an anaesthetic consultant is not far away. However, the observation needs to be made that even in a hospital such as Dr Buettner's, where procedures have a more sophisticated degree of streamlining, an anaesthetic consultant might still be as much as 30 minutes away from the hospital, and in circumstances where a general anaesthetic is required, a caesarean section delivery might accordingly still suffer from some delay. To this, Dr Buettner suggested that the more senior registrars present at his hospital would at least be able to prepare everything in readiness for a general anaesthetic delivery and would in any case be able to administer regional anaesthetic. In addition, Dr Buettner would suggest that timely identification of deliveries which contain an element of risk might result in an epidural being inserted during labour. This would only require topping up, a relatively straightforward, safe and speedy procedure.

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[78] Transcript, page 277
[79] Transcript, page 277
[80] Transcript, page 274

10.11. The evidence led me to conclude that even in tertiary institutions such as the Royal Women's Hospital in Melbourne where emergency caesarean sections need to be performed in the middle of the night, circumstances are not always ideal. There is always going to be an element of risk in childbirth, particularly where the risk of an emergency caesarean section is present. However, what is clear is that, as Dr Buettner has pointed out, a rapid emergency caesarean section in the Modbury was simply not going to be achieved that night, even if a general anaesthetic could have been immediately administered upon the anaesthetic consultant's arrival.

11. Was Riley's death avoidable?

11.1. There is no reason to suppose that prior to the onset of this ultimately catastrophic period of hypoxia, Riley Krol had been other than a healthy unborn child. His death was ultimately caused by a sustained in utero period of oxygen deprivation to the brain. Had Riley been delivered within 30 minutes of the commencement of that period of hypoxia, his chances of survival would have been improved. It is clear that his chances of survival diminished with the effluxion of time. As seen, Professor Pepperell suggested that the die may have been cast even before attempts to anaesthetise Ms Krol had been made, beginning at about 2:10am. This was due to the fact that a significant and life threatening period of hypoxia had by then already taken place.

11.2. Although it is not possible to identify the point in time beyond which Riley's unfortunate fate became assured, one can reasonably conclude that as time progressed his chances of survival progressively worsened. It may well be, therefore, that by the time Dr Campbell made the decision to perform a time consuming epidural, again the die may already have been cast. The Obstetric Emergency Protocol contemplated that the time between the decision to perform the emergency caesarean section and delivery should have been 30 minutes or less. The clear implication is that with appropriate resources brought to bear, such an outcome is achievable, even at night. It is routinely so achievable at the Royal Women's Hospital in Victoria. However, a favourable outcome was never going to be achievable at Modbury that night because of a lack of sufficient human resources and expertise. Had that been available, and an early, robust decision been made to administer a general anaesthetic, the outcome for Riley Krol may well have been different. However, one has to agree with Dr

Pepperell's observation that with the resources on hand at Modbury that night, an adverse outcome was virtually assured.

12. Conclusions

12.1. Ms Melinda Krol was admitted to the Modbury Hospital on the evening of 27 February 2005 in order to give birth to Riley Krol. At this time, the birth of Riley Krol was approximately, if not in excess of, 7 days overdue. The risks of continuing Ms Krol's pregnancy were such that the decision was made to induce Riley's delivery.

12.2. In the early hours of the morning of 1 March 2005 Riley commenced to suffer from a significant period of hypoxia that was accompanied by bradycardia which is a slow heart rate. The bradycardia was detected by way of a CTG trace and began shortly after Ms Krol's membranes had been artificially ruptured.

12.3. As a result of the detection of the bradycardia, the obstetric registrar, Dr Lekamge, in consultation with the on-call obstetric consultant, Dr Hughes, decided to perform an emergency caesarean section in order to effect Riley's delivery. This decision was perfectly proper in the circumstances.

12.4. At the time that the decision to perform the caesarean section was made, Ms Krol was not receiving any pain relief other than by way of Pethidine. Ms Krol had up to that point not been administered with any form of epidural anaesthesia.

12.5. The protocol in operation at the Modbury Hospital at this time, namely the Obstetric Emergency Protocol, called for the delivery in an emergency caesarean section to be effected within 30 minutes (or less) of the decision to perform that procedure. On the occasion in question, the circumstances and the available human resources and expertise were such that compliance with the Obstetric Emergency Protocol in the event of an emergency caesarean section was unlikely. In the event, the time lapse between the decision to perform the caesarean and the delivery of Riley Krol was no less than one hour and thirty minutes. This delay was unacceptable by any reasonable standard.

12.6. At the time the decision to perform the emergency caesarean section was made, there were no theatre staff actually on duty. The theatre staff had to be called to the

operating theatre. In addition, there was no consultant anaesthetist on duty at the Modbury Hospital. A consultant anaesthetist was on-call and, on this particular night, was 30 minutes away from Modbury Hospital by road. Moreover, the on-duty anaesthetic registrar was not, without an anaesthetic consultant being present, permitted to administer a general anaesthetic in the event that such an anaesthetic was required.

12.7. The anaesthetic registrar, Dr Knight, attempted to administer a spinal anaesthetic to Ms Krol. She was unsuccessful in administering this form of anaesthetic. Had the on-duty anaesthetic registrar had sufficient seniority and training to undertake a general anaesthetic, I have no doubt this form of anaesthetic would have been attempted. Dr Knight was not permitted to perform a general anaesthetic and so efforts at effecting the spinal were continued. No attempt was made by Dr Knight to administer an epidural. The CTG trace showed an improvement in the heart rate of the unborn child, but in the light of the earlier significant period of bradycardia, the improved foetal heart rate should have been viewed with limited optimism. Insofar as the obstetric registrar, Dr Lekamge, derived any significant comfort from the improved CTG trace and heart rate, his sense of comfort was misplaced. At that particular time there was still a need for the child to be delivered urgently.

12.8. The consultant anaesthetist, Dr Campbell, arrived in the operating theatre and at first continued Dr Knight's efforts to perform a spinal anaesthetic. In the event, Dr Campbell's efforts at this also proved to be unsuccessful. Dr Campbell then made a decision to effect an epidural anaesthetic which is a more time consuming process than a general anaesthetic. Epidural anaesthesia requires time for it to take effect. Dr Campbell was not asked to perform a general anaesthetic by the obstetric registrar. However, she was asked by nursing staff whether she would perform a general anaesthetic and her answer was in the negative. The nursing staff I find had a better understanding of the need for urgency than did the obstetric registrar. There was at that time a clear need in my opinion for a general anaesthetic to be administered. I conclude that Dr Campbell had an imperfect understanding of the necessary degree of urgency required for this emergency caesarean delivery. She had not been adequately briefed as to that degree of urgency, and in particular, was not informed of the period of time over which the significant bradycardia had existed. Nor was she adequately informed of the limited significance of the improved heart rate.

12.9. I find that if Dr Campbell been made aware of the matters referred to in the preceding paragraph, she would probably have effected a general anaesthetic instead of the epidural anaesthetic. This would have meant that Riley Krol's delivery would have taken place significantly earlier than the delivery that was ultimately effected under an epidural anaesthetic.

12.10. The period of bradycardia in itself may have resulted in significant and permanent brain damage on the part of Riley Krol. Moreover, it may have even resulted in his demise. The period of bradycardia commenced some time between 1:23am on 1 March 2005, when the ARM was performed, and 1:45am. The CTG trace shows evidence of bradycardia at 1:35am. Bradycardia of this nature that persists for a period of about 30 minutes may result in very unfavourable outcomes. Accordingly, Riley Krol's fate may well have been sealed by 2:15am if not before. In the event, it is difficult to reach any conclusion as to whether or not delay after this time, and in particular the delay occasioned by a failure to perform a general anaesthetic either by Dr Knight in the first instance, or by Dr Campbell after her arrival, would have made any difference to the outcome.

12.11. The death of Riley Krol may have been avoided, or his prospects of survival may have been enhanced, if the Modbury Hospital had theatre staff on duty to immediately attend an emergency caesarean section procedure and if there had been in attendance at the hospital a medical practitioner who was permitted to conduct a general anaesthetic for this purpose.

12.12. Riley Krol responded to resuscitative efforts following his delivery but unfortunately by that time he had suffered a catastrophic hypoxic brain injury. He died at the Women's and Children's Hospital on 11 March 2005. The cause of death was hypoxic ischaemic encephalopathy.

13. Recommendations

13.1. Pursuant to section 25(2) of the Coroner's 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.

13.2. I was informed during the inquest that obstetrics are no longer practised at the Modbury Hospital. It was said that the reason for this is based on logistical and not

safety considerations. Naturally, this state of affairs relieves me of any obligation to consider what change might be indicated at that particular hospital.

13.3. Any recommendation that I might consider making has to be linked to the circumstances of this particular case. I speak here of the fact that these unfortunate events occurred against a background whereby a natural delivery was going to contain an element of risk. Delivery by caesarean section in the middle of the night was hardly unforeseeable in this particular case. The Obstetric Emergency Protocol that was in operation at the time was not necessarily limited to emergency procedures that would be carried out during the day. It applied equally to emergencies that occur in the middle of the night as this did. It is noted that in more recent editions of the protocol the stipulation that the decision to delivery time should be 30 minutes or less has been deleted (see Exhibit C14a and C15). The more recent editions also drop the expression 'crash caesareans' and instead refer to Category 1 caesareans which in other documentation are defined as involving an immediate threat to the life of the woman or foetus. There is now in existence a regime whereby caesarean section deliveries are categorised in terms of both the underlying identified risk to the wellbeing of the mother or the foetus and the degree of urgency involved in the carrying out of the procedure. There are four categories, ranging from Category 1 to Category 4, the latter being essentially elective procedures carried out at the convenience of the patient and the clinical staff. I am persuaded that this is a positive innovation. To say that a caesarean is of a Category 1 variety carries the unmistakeable message that the procedure is of the highest priority and that a failure to carry it out promptly will endanger the mother or the child. It will hopefully reduce the likelihood of misunderstandings occurring through poor communication between clinicians. This is not to say, however, that appropriate dialogue and communication between obstetric staff and anaesthetic staff can be suspended. The regime is merely an aid, and in cases of doubt, there ought to be no substitute for meaningful dialogue between clinicians.

13.4. Although in this case an acknowledgment that this was a Category 1 incident may have implied a greater degree of urgency in the mind of Dr Campbell, and have avoided the misunderstanding on her part that I find undoubtedly existed, the new regime of categorisation is somewhat of a distraction when it is considered that the real difficulty in this case was the inability of the Modbury Hospital to provide the necessary expertise to carry out an emergency caesarean section without undue delay.

Whether the procedure was to be described as a 'crash' procedure or whether it was to be referred to as Category 1, this would not have altered the fact that at the time the emergency was called there had been an absence of the expertise necessary to respond appropriately to that emergency. This to my mind is the real issue in this case.

13.5. Recognising that Riley's death may have been avoided, or his chances of survival may have been better if appropriate theatre staff and anaesthetic expertise had been immediately available, it is difficult to avoid the conclusion that outcomes such as Riley's will likely be repeated in clinical settings in which resources of this kind are not available. This is not to say that an anaesthetic consultant should always be present at an obstetric hospital for 24 hours of every day. I was persuaded that there would be prohibitive resource implications, especially in rural centres, if such a resource was made mandatory for all hospitals. In addition, for every anaesthetic consultant who works at a hospital during a night shift, there is inevitably one less consultant available during the preceding and following day shifts. That said, it seems to me that the necessary anaesthetic expertise can be deployed at night by having anaesthetic registrars on duty who are of suitable seniority and experience to administer, or at least commence, general anaesthesia in the event that such is required. This happens in Victoria. It happens at the Women's and Children's Hospital here and it should happen at any medical centre that holds itself out as an obstetric hospital. In conjunction with this, on-call anaesthetic consultants should be sufficiently proximate to their medical centres to enable them to attend at short notice.

13.6. I <u>recommend</u> that the Minister for Health cause a review to be undertaken in respect of hospitals that provide obstetric services with a view to establishing their capability of responding appropriately and timeously to emergencies that involve the carrying out of caesarean section procedures with particular regard to the following:

a) existence of emergency protocols relating to delivery by caesarean section;

b) availability of operating staff at night;

c) availability of suitably qualified and experienced clinicians capable of performing and permitted to perform various types of anaesthesia including general anaesthesia.

13.7. I further recommend that the Minister for Health in the light of that review implement or cause to be implemented measures designed to facilitate efficient and expeditious carrying out of emergency caesarean section procedures.

Key Words: Birth Accident; Foetal Monitoring; Hypoxia; Infant Deaths; Emergency Caesarean Sections

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

Seal the 23rd day of May, 2008.

Deputy State Coroner

Inquest Number 1/2008 (0738/2005)