

FINDING INTO DEATH WITH INQUEST

Section 67 of the Coroners Act 2008

Court Reference: 341/2007

Inquest into the Death of Owen APPLEBY

Delivered on::	16 th June 2011
Delivered at	Warrnambool
Hearing Dates:	30 th and 31 st May 2011
Findings of:	
Place of death/Suspected death:	Warrnambool Hospital
*Counsel Assisting the Coroner	Sgt S. Skelton, Victoria Police Prosecution
For family of Owen Appleby	Mr T. Monti, appearing with Ms K. McNaught, both of Counsel
For Portland District Hospital	Mr N. Murdoch of Counsel
For Dr M. Van der Veer	Ms F. Ellis of Counsel
For Nurse Edge	Ms T. Leane of Counsel

FINDING INTO DEATH WITH INQUEST

Section 67 of the Coroners Act 2008

Court Reference: 341/2007

In the Coroners Court of Victoria at Warrnambool.

I, Ronald Saines, Coroner, having investigated the death of:

Details of deceased:

Surname: APPLEBY
First Name: Owen
*Address: 38 Wellington Road, Portland

AND having held an inquest in relation to this death on 30th & 31st May 2011

at Warrnambool

find that the identity of the deceased was Owen APPLEBY

and the death occurred 25th January 2007

at Warrnambool Hospital from

HYPOVOLEMIC SHOCK, METABOLIC ACIDOSIS AND COAGULOPATHY IN
ASSOCIATION WITH SUBGALEAL AND RELATED HAEMORRHAGE

in the following circumstances:

- 1 Owen Appleby died at the Warrnambool Hospital at approximately 9.50pm on January 25th 2007. He had been born at Portland Hospital at 4.40am that same day, such that his short life was to last only approximately 17 hours.

By reason of S.67 of the Coroner's Act 2008, it is proper that a determination be made regarding the cause and circumstances of his death.

A. Prenatal

- 2 Owen's father was Adam Appleby, who was a 24 year old fisherman. His mother was Ella Herbert-King, born 30.1.86, then aged 20. Owen was Ella's first child. The pregnancy was unplanned and was not easy at first. Ella learned she was pregnant after she suffered vomiting symptoms in May 2006, which continued until she was admitted to hospital on June 1st 2006, after the pregnancy was confirmed, and dehydration diagnosed. The date the baby was due was not known exactly, but was calculated to be January 13th 2007. After early difficulties, the pregnancy appears to have progressed satisfactorily. Ella had consulted with her GP, Dr Cathy Woolner at Portland and with Linda Bowman, midwife from Portland Hospital throughout the pregnancy.

3 At 4.00pm on January 23rd, midwife Bowman admitted Ella to Portland Hospital because she was then 10 days overdue. The intention was to induce labour. Dr Meinder Van der Veer was then employed at Portland Hospital as GP Obstetrician, as well as part time director of Medical Services. He was qualified in medicine in 1985 and has practiced broadly since then, largely in obstetrics. He is an experienced practitioner. Dr Van der Veer and midwife Bowman worked together in preparing Ella for delivery. This included use of CTG (Cardiotocograph) to monitor fetal heart rate, examination of cervical dilation and employment of Prostin Gel and then Syntocinon intravenously, both to assist in inducing labour. Save for a period the baby was likely to be asleep, fetal heart monitoring produced reassuring results.

4 After insertion of 2mg of Prostin Gel at 4.50pm on January 23rd, Ella otherwise remained in the ward overnight without incident or adverse development. The following day, January 24th, midwife Bowman commenced Syntocinon intravenously at 8.50am. Labour contractions continued through the day and cervical dilation increased gradually. Dilation was noted to have been 4cm at midday, 7cm at 3.50pm, 6-7cm at 8.45pm and 9cm at 9pm. This was regarded by Dr van der Veer as slow but acceptable. Two pethidine injections of 100mg were provided to assist Ella with pain management, at 12.25pm and 5.30pm. At midday, Dr Van der Veer performed artificial rupture of membranes ("broke mother's waters") and observed old meconium stained liquor. He subsequently examined Ella at 1.50pm, 5.20pm and 9.00pm and was satisfied with progress. He further examined her at 11.00pm and authorized a third pethidine injection and continuation of Syntocinon intravenously. By the end of the night, both midwife Bowman and Dr Van der Veer left the hospital. Ella was principally managed by midwife Hai Ping Bullock overnight.

B. Delivery

5 After midnight, in the early hours of January 26th, midwife Bullock administered a third pethidine injection (75mg) at 12.15am and observed fetal heart rate to be satisfactory. By 2.50am she examined Ella and found her cervix to be fully dilated. However Ella's ability to push, bear down was of concern as was her fatigue, such that midwife Bullock spoke with Dr Van der Veer at 4.00am and he attended again at 4.15am to review Ella.

6 Upon his arrival at 4.15am, Dr Van der Veer confirmed Ella's cervix was fully dilated and the baby's head could be seen in the birthing canal. Dr Van der Veer's account was that he discussed the birthing options with Ella and decided it most appropriate to proceed and assist the natural birth process by ventouse extraction, this being by employment of a "Kiwi Cup" suction device attached to the baby's head, with manual traction applied by hand, to pull the child concurrently with mother's pushing. This, and other birthing options, were considered because of the delayed birthing process and mother's fatigue and inability to push the baby out. Dr Van der Veer maintained in his testimony, that Ella expressed a preference to avoid a caesarean section procedure and preference to complete a natural birth. Having regard to Ella's serious fatigue, I find it likely she accepted the clear medical opinion she was given at that time and consented. I am unable to accept it as reliable that mother sought, or was refused, caesarean section procedure. In any event, the birthing was completed by 4.40am with the second contraction after using the suction cup. I accept Dr Van der Veer's opinion that this was a much more appropriate means of completing the birth than caesarean section. That surgical option required the summoning of an "on-call" anaesthetist, arrangement of theatre staff and equipment and was unlikely to have been completed without significant delay of birthing. The post surgical recovery period and other possible complications of surgery were also avoided.

C. Postnatal

7 Upon baby Owen being born, Dr Van der Veer observed him to be "flat", that is pale and slow. He undertook an APGAR assessment, an assessment of five categories of neonatal condition which can produce an optimum score of 2 for each category and 10 in total. At one minute after birth, he assessed an overall APGAR score of 3. His assessment prompted him to act immediately. He acted to deal with pallor and diminished respiratory effort which he attributed to administration of analgesia to mother before birth, and suspected meconium aspiration. He administered Naloxone (pethidine antidote) undertook CPR manually while oxygen was supplied and suctioned upper airways to clear them. By 5 minutes after birth, he assessed baby Owen as having an APGAR score of 7, as a result of improvement in all 5 categories of assessment, including normal heart rate, respiratory rate and reflexes. Crying by the baby was noted and confirmed satisfactory reflex function. He then gave the baby to Ella and Adam and proceeded to complete his dealing with mother's recovery from the procedure and removal of the placenta.

A short time later, he accompanied Adam in taking Owen to the nursery, where he was placed in a humidicrib with supplemental oxygen, required because of him remaining pale. Thereafter, Dr Van der Veer left the hospital at or soon after 5.30am.

8 Baby Owen remained in the nursery, subject to supervision of midwives Bullock and Edge. Additionally, midwife Cahill was working the ward when Owen was placed in the nursery. It appears from their testimony, that his condition varied from time to time, that his pallor remained pale, although observations regarding whether and when he appeared to have pink lips, or to be white, varied. His respiration was generally observed to be suboptimal-satisfactory upon some accounts, and strained at others. I accept that in general, he was laboured in his breathing, displaying signs of grunting, nostril flare and rib retraction, that are all consistent with respiratory difficulty. Additionally, observations were that he also became hypothermic, with body temperatures remaining below 37°C, and indeed in the 34°-36°C range. This prompted midwife Cahill to elevate oxygen supply, increase temperature and call for assistance from Dr Van der Veer and her superior, midwife Leigh Pettingill. Such calls being made at approximately 6.00am.

To the extent that midwife Leslie Edge, in her witness statement and in her testimony before me, asserted that baby Owen was white, remained so, was handed to mother when white and without explanation regarding his condition, and required additional treatment urgently, I am unable to accept that as a reliable account. Midwife Edge asserted Dr Van der Veer did not undertake CPR upon baby Owen immediately after birth. In general I found her recollection to be inconsistent with her own notes, inconsistent with testimony of others, and to the extent she claimed to have observed "ominous" and "deathly" signs from soon after birth, I do not find that to be the case. I am unable to accept her account as reliable.

9 Dr Van der Veer came from his home, back to the hospital, promptly after he received a call at about 6.00am. He arrived at 6.50am and then observed baby to have been extremely pale, requiring 50% oxygen, displaying signs of respiratory distress and was hypothermic. His suspicion that baby Owen was showing symptoms of meconium aspiration continued and he initiated steps for ambulance transfer to Warrnambool Hospital for paediatric care. Ambulance staff were summoned to attend urgently, to facilitate the journey from Portland to Warrnambool, some 95km.

Midwife Linda Bowman was also contacted and requested to assist with the transfer to Warrnambool. She arrived at the Ward at about 7.25am, soon after the ambulance and two ambulance paramedics arrived. Midwife Bowman observed baby Owen to be receiving 44% oxygen, to be pale but with pink lips and displaying respiratory grunt. He was quiet but was looking around.

10 Dr Van der Veer contacted Dr Christian Fielder by telephone. Dr Fielder was consultant

paediatrician at Southwest healthcare (Warrnambool Hospital). The time of this call cannot be identified more accurately than just before 8.00am. Dr Van der Veer was unable to recall exactly and I conclude it was between approximately 7.30am and 8.00am. The detail of their telephone conversation is not now available. The substance of it was Dr Van der Veer's description that baby Owen had low oxygen saturation levels, required up to 50% oxygen, was displaying symptoms of respiratory distress and his delivery involved ventouse extraction with meconium stained liquor. Dr Fielder agreed to accept baby Owen by road ambulance transport. I am satisfied neither of them considered insertion of an intravenous line to deliver fluids or antibiotics, and neither of them considered contact with, or assistance from NETS (Newborn Emergency Transport Service).

The NETS scheme is one which is administered from the Royal Women's Hospital at Melbourne. It has a 24 hour, 7 day per week operation, and is serviced by most highly trained and experienced specialists. Its aim is to intervene when requested, with treatment and emergency transport to appropriate treatment centres. It has access to air and road based ambulance services and can readily attend anywhere in Victoria.

D. Transfer to Warrnambool

- 11 The ambulance was not able to depart Portland until 8.06am. Mechanical arrangements for the transport and securing of the Isolette (humidicrib) in the ambulance, arrangements regarding who was to travel in it and gathering of necessary equipment caused delay after arrival of the vehicle and ambulance paramedics at about 7.16am. This delay was for understandable reasons, but may have been significant.

The trip to Warrnambool took until 9.28am, a total of 1 hour and 22 minutes. It was delayed because midwife Zarei Roya, who was selected to accompany midwife Bowman developed motion sickness. The driver, David Petrie stopped twice in or near Port Fairy and turned off the Princes Highway into the township to seek to assist midwife Roya.

Bay Owen was observed to have still been pale but with satisfactory heart rate, 93% oxygen saturation at 45% and temperature of 35.6°C upon departure. During the journey, he displayed some respiratory grunt and oxygen saturation fell to 89%, such that 50% oxygen was supplied. This produced some improvement, although difficulties in maintaining warmth in the Isolette, resulting from interrupted power supply from the ambulance to the Isolette arose temporarily.

As the journey progressed, baby's condition was observed to deteriorate markedly. His oxygen saturation levels remained diminished at 89% and his skin colour deteriorated, with bluish features in his feet and legs. His temperature remained low at 35.4°C. This deterioration was noted in the last minutes of the journey.

- 12 After arrival at the Warrnambool Hospital at 9.28am, baby Owen was transferred to the Neonatal ward and placed into a resuscitation cot under the care of Dr Fielder. He was described by Dr Fielder as 'very sick', he showed acute signs of deficient peripheral circulation, Hypertonia (diminished muscle tone) and shallow breathing. He was provided with emergency fluids, including albumin, dextrose and was intubated to provide more effective oxygen supply. Blood gas analysis showed signs of severe acidosis and blood pressure was in the low-normal range. Assessment and emergency intervention was undertaken by Dr Fielder for more than an hour and shortly after 11.00am Dr Fielder made telephone contact with Dr Omar Kamplin, Consultant Neonatologist for NETS at Royal Women's Hospital at Melbourne seeking urgent advice.

- 13 Dr Kamplin provided telephone advice and support to Dr Fielder and mobilized a NETS retrieval team, which departed Royal Women's Hospital at 12.35pm and commenced air travel to

Warrnambool from Essendon airport. Dr Fielder and Dr Kamlin discussed a working diagnosis of hypovolemic shock, with anaemia caused by either fetomaternal haemorrhage and/or intracranial haemorrhage. Emergency blood transfusion and intravenous chemical intervention was continued and the NETS team arrived at the Warrnambool Hospital at 2.45pm to continue assistance to Dr Fielder. Continued intervention was unsuccessful generally. Baby Owen suffered the first of four bradycardic (low heartbeat) arrests at approximately 3.45pm, which was initially stabilized. But severe deterioration in respiration, oxygenation, blood coagulation and cardiac function continued, until a decision was made at approximately 8.50pm that intensive care should be withdrawn. The parents, Adam and Ella were consulted and were advised that Owen's prospects of survival were so low that treatment could not assist in restoration of normal or reasonable health. Transport to Melbourne was also considered unlikely to succeed.

E. Post Mortem

- 14 An autopsy was undertaken by Dr Sarah Parsons, specialist in forensic pathology at Victorian Institute of Forensic Medicine, on January 31st 2007. Dr Parsons did not have the placenta available for examination. It was never retained and I conclude that because no-one at Portland hospital anticipated that death might ensue, it was disposed of in a routine manner. But its absence impaired the ability of Dr Parsons, and other specialists, to fully investigate the cause of death. A perinatal autopsy cannot be regarded as complete without forensic examination of the placenta.

Dr Parsons found subgaleal haematoma, approximately 1cm deep and 7.5cm in diameter, also found a shallow subdural haematoma with some associated haemorrhaging. Further expert analysis, undertaken by Dr Parsons with assistance from Consultant Radiologist Dr Christopher O'Donnell, made a calculation of 100ml of blood loss caused by haematoma. Although this was expressed to be a maximum, the process of estimation is one which can produce technical error. But blood loss of 75-100ml, would likely be 15%-20% or more of the total circulating blood volume, an amount which alone may not cause hypovolaemic shock. However, the amount of blood loss could well have been a higher proportion of total circulating blood volume, in fact. Because of this, Dr Parsons was unable to clearly identify brain haemorrhage as the cause of death. She was also unable to exclude perinatal asphyxia, which arises either when a newborn is unable to initiate and sustain effective breathing after birth, or when the placenta has malfunctioned before birth. In both these cases, blood oxygen levels drop significantly and carbon dioxide levels and accumulation of acid levels in the blood increase, causing death. For these reasons Dr Parson's concluded cause of death to be unascertained.

- 15 Solicitors for the family, and investigations undertaken by this Court, subsequent to Dr Parsons' opinions, resulted in expert opinions and reports being available

- Professor Peter Davis, consultant Neonatologist reports 7.1.2010 and 20.5.2010
- Associate Professor John Hilton, Consultant in Forensic Medicine report 19.5.2010
- Dr Andrew McPhee, Neonatal Paediatrician report 27.9.2010
- Dr Nicholas Demediuk, Specialist GP Obstetrician report 16.6.2011

Save for Dr Demediuk, all these specialists considered witness statements, hospital records and all reports obtained in respect of baby Owen's death and gave opinions regarding the cause of death. All three specialists ascribed the death to hypovolemic shock and coagulopathy, at least in part caused by subgaleal and related haemorrhage. There were divergences in opinions, whether other factors contributed. Dr McPhee raised the possibility that a degree of placental

insufficiency, causing increased risk of intrapartum asphyxia stress, may have played a role. He also raised the possibility of other non-proven cause of reduced circulating blood volume, either being fetomaternal haemorrhage or disproportionate redistribution of the fetoplacental blood volume to the placenta. He considered it necessary that some other factor, beyond subgaleal and related haemorrhages, would be necessary to have caused sufficient blood loss. But he nevertheless considered the subgaleal and related haemorrhages to have been "the last straw" that tipped an already precarious circulation into irreversible shock.

Associate Professor Hilton considered the subgaleal and related haemorrhages to be the major factor in bringing about the death, and Professor Davis considered this to have been the most likely cause of death.

Each of these three specialists also considered whether some level of perinatal asphyxia, or intrapartum asphyxial stress, existed and contributed to the sequence of events which resulted in death. Dr McPhee, at page 12 of his report, includes this in his opinion regarding the chain of causation here. But in circumstances where CTG monitoring during labour was generally satisfactory, where baby Owen cried within minutes of birth, and where neurological autopsy and histology upon the brain did not show signs supporting a diagnosis of asphyxia, I prefer the opinion of Prof. Davis, that existence or involvement of perinatal asphyxia is not proven here.

In the light of these opinions, I determine the cause of death to have been hypovolemic shock, metabolic acidosis and coagulopathy in association with subgaleal and related haemorrhage.

- 16 Dr Van der Veer's initial diagnosis, or at least his suspicion, that baby Owen's symptoms were attributable to meconium aspiration may have been initially reasonable. The significant improvement in APGAR score in the first 5 minutes of life, supported his view. However, the improvement did not last and upon Dr Van der Veer's return to the hospital at 6.50am, evidence of suboptimal circulation, respiratory impairment and hypothermia was consistent with a number of other complications which were more serious.

Haemorrhage caused by ventouse extraction is recognized as a risk factor, in research and statistically. The Royal Australian & New Zealand College of Obstetricians & Gynaecologists, in College statement C-Obs 28 first published in 2009, the matter is canvassed at length. I accept this publication was after Dr Van der Veer's use of ventouse suction cap here, however research and opinion described in it was some years older. The paper identifies that subgaleal haematoma is most frequently associated with vacuum delivery, with research regarding relative frequency describing Chang et al (2007) reporting an incidence of 0.6/1000 of all deliveries, and 4.6/1000 of vacuum assisted deliveries (see paragraph 4). Additionally, paragraph 6.1 of the statement refers to 2003 data that subgaleal haemorrhage is almost always preceded by difficult vacuum extraction.

Dr Van der Veer was not aware of risks of subgaleal haemorrhage being associated with suction devices, but asserted he was aware of small risk of haematoma occurring with them. Dr Van der Veer, indeed all staff at Portland Hospital, were aware that the condition of a neonate can change markedly within minutes, such that agreement was quickly reached at about 7.00am on 25/1/2007 that urgent steps were required. However, because Dr Van der Veer was not aware of any differential diagnosis, and appears not to have been prompted to review his initial diagnosis, he did not

- (a) Treat baby Owen's state, at or about 7.00am, as a medical emergency
- (b) Contact NETS direct, or

- (c) Discuss the contacting of NETS with Dr Fielder when they discussed the baby's condition and management.
- (d) Consider the introduction of an intravenous cannula for administration of fluids or antibiotics.

It is important to guard against retrospective wisdom regarding best practice or appropriate decisions here. Dr Van der Veer did not claim, in his evidence, nor in any statement he made, to have been fatigued or pressured in a manner that could impair his judgement. However, it does appear he was on duty for Ella and her needs, as well as for other patients, during the morning, afternoon, evening and night, till about 11.30pm of January 24th. He then returned at 4.15am for the delivery and early monitoring and treatment of mother and baby, and then returned at 6.50am. He gave a prolonged and commendable effort to his medical obligations and would be somewhat superhuman not to have been fatigued by 7.00 or 8.00am on the 25th.

It also appears that upon a telephone discussion with Dr Fielder, nothing arose in that conversation which prompted Dr Fielder to consider a differential diagnosis and the alternative steps identified above.

The RANZCOG discussion paper referred to above describes clinical features of subgaleal haemorrhages as being of insidious onset and therefore requires a high index of clinical suspicion.

But I find there were other symptoms which were inconsistent with meconium aspiration and were indicative of a more serious medical condition, evident from approximately 6.00am onwards. Diagnosing these accurately is no easy task. The complexity of the paediatric analysis referred to in paragraph 15 above, which had the benefit of post mortem analysis and hindsight, evidences this. However the warning signs were such that contact with the most available expert and highest quality assistance was appropriate.

I thus conclude that had Dr Van der Veer and/or Dr Fielder, contacted NETS at or soon after 7.00am, differential diagnosis, emergency procedures and/or urgent investigations could have been available, with a prospect of the NETS retrieval team arriving at Portland, or possibly even Warrnambool, in or just more than 2 hours later.

F. Recommendations

17 It is in this context, of there being an avoidable death here, that I am required to consider issues of comments and recommendations regarding public health and safety, in accordance with the Coroners Act S67(2).

Over time, after this death, the Portland Hospital created a 14 page Maternity Services Safety Framework protocol. It was produced after review of procedures and approved by the Hospital Board in May/June 2010. A copy was adduced in evidence before this inquest. The protocol is now available in electronic form in the maternity ward, provided to relevant visiting medical officers and made available to staff.

The document broadly seeks to assist in the identification or prediction and minimization of preventable adverse outcomes of pregnancy and/or birth. While accepting it is not possible to eliminate all potential adverse outcomes.

The document identifies risk criteria for pregnancy and birthing. It contemplates assessment for a determination whether birthing should proceed at Portland, or at a location with greater medical and paediatric services available. In respect of neonatal factors, it identifies a multiplicity of high

risk criteria, warranting transfer out of Portland Hospital to a higher level care facility and warranting contact with NETS for stabilization and transport assistance.

Although it is a protocol document which cannot apply to all eventualities, it does identify a number of symptoms evident in baby Owen's case, which alone, but certainly in combination, would mandate NETS contact and assistance. It appears to substantially address the foreseeing and management of relevant risks which arose here, and I do recommend that similar small country hospitals or birthing facilities have regard to it, or similar protocols.

I recommend that a copy of the Portland Hospital Safety Framework protocol be examined by similar hospitals and birthing centres, in more regional or remote areas in Victoria (and elsewhere) with a view to identification of symptoms and circumstances in neonates, where early and prompt NETS notification is warranted.

I recommend a copy of these findings, with a copy of (Exhibit J) Portland District Health, maternity Services Safety Framework, be forwarded to Australian Health Practitioner Regulation Agency for consideration and wider distribution.



R. Saines
Coroner



Date: 16th June 2011

Distribution

1. To the parties represented before the Court
2. To the Minister for Health:
The Honourable David Davis, MLC
GPO Box 4057, Melbourne, Vic 3001
3. To AHPRA,
GPO Box 9958, Melbourne, Vic 3001

