Rule 63(1)
IN THE CORONERS COURT
OF VICTORIA
AT MELBOURNE

Court Reference: COR 2014 5137

# FINDING INTO DEATH WITH INQUEST

Form 37 Rule 63(1)
Section 67 of the ***Coroners Act 2008***

(Amended pursuant to section 76 of the *Coroners Act 2008* as at 30 March 2020)[1]

**Inquest into the death of: SOMMER BETHANY WARREN**

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| Findings of: | AUDREY JAMIESON, CORONER |
| Delivered On: | 18 March 2020 |
| Delivered At: | Coroners Court of Victoria |
| Hearing Dates: | 25 March 2019, 26 March 2019, 28 March 2018, 29 March 2019, 9 April 2019 and 20 May 2019 |
| Counsel Assisting the Coroner | Dr Sharon Keeling of Counsel |
| Appearances: | Mr Trevor Monti QC and Mr Michael Seelig of Counsel on behalf of Ms Leisa Scammell (Instructed by Sofia Solicitors);<br>Mr Con Mylonas of Counsel on behalf of Mr Leigh Hitchcock (Instructed by JG Thompson);<br>Mr Robert Harper of Counsel on behalf of Dr Nazia Ijaz (Instructed by K&L Gates);<br>Ms Fiona Ellis of Counsel on behalf of Dr Jayakumar Rangaswami (Instructed by Kennedys Law);<br>Mr Sean Cash of Counsel on behalf of Dr Colleen Chew (Instructed by Ball + Partners);<br>Mr Paul Lamb of Counsel on behalf of Dr Ruary Mackenzie (Instructed by Avant Law) on Monday 25 March 2019 only.<br>Mr Paul Halley of Counsel on behalf of Goulburn Valley Health (Instructed by Minter Ellison). |

[1] The cover page has been amended to state that this document is produced under *Coroners Rules 2019* s 63(1).

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I, AUDREY JAMIESON, Coroner having investigated the death of SOMMER BETHANY WARREN

AND having held an Inquest in relation to this death on 25 March 2019, 26 March 2019 at Shepparton and on 28 March 2019, 29 March 2019, 9 April 2019 and 20 May 2019 at the Coroners Court of Victoria at Southbank

find that the identity of the deceased was SOMMER BETHANY WARREN

born on 12 March 1996

and the death occurred on 6 October 2014

at Goulburn Valley Health, Shepparton Hospital 2/2-48 Graham Street, Shepparton, Victoria 3630

from:

1 (a) GENERALISED TONIC CLONIC SEIZURE AND CARDIAC ARREST ARISING FROM SEVERE HYPERTENSIVE ENCEPHALOPATHY IN LABOUR

**In the following summary of circumstances:**

On 6 October 2014, Sommer Bethany Warren was admitted to Shepparton Hospital of Goulburn Valley Health for induction of labour at an estimated 41 weeks and 2 days gestation. During the preceding two weeks, Sommer had intermittently raised blood pressure, proteinuria, swelling in her feet and hands, intermittent headaches and blurred vision on two occasions. Her labour was induced and progressed.

At 1755 hours, Sommer was hypertensive at 200/120 mmHg. At 1810 hours, she became drowsy with flickering of her eyelids. At 1817 hours, Sommer suffered a seizure. At 1823 hours, Sommer was in cardiac arrest and resuscitation was commenced. At 1839 hours, Sommer's baby boy was delivered liveborn by emergency caesarean section. At 1901 hours, Sommer had not responded to resuscitation and she was declared deceased.

**Background circumstances**

1. Sommer Bethany Warren[1] was 18 years old at the time of her death. She lived in Shepparton with her partner Leigh Hitchcock. Sommer's medical history included endometriosis.

[1] With the consent of Ms Leisa Scammell and Mr Leigh Hitchcock, Sommer Bethany Warren was referred to as 'Sommer' during the Inquest. Save where I have determined formality requires the use of her full name, I have endeavoured to refer to her only as 'Sommer' throughout the Finding.

2. Sommer attended Shepparton Hospital of Goulburn Valley Health (**the Hospital**) for her antenatal care, labour and delivery.

**Surrounding circumstances**

3. On 31 May 2014, Sommer first presented to her General Practitioner during her pregnancy. On that date, her blood pressure was 152/92 mmHg. The first ultrasound scan of Sommer's pregnancy was estimated to be at 24 weeks and 6 days gestation.

4. Between 15 July 2014 and 15 September 2014, (between approximately 29 weeks – 38 weeks gestation), Sommer's blood pressure was at or below 120/80 mmHg.

5. Between 23 September 2014 and 3 October 2014, Sommer attended the Hospital antenatal clinic and/or the birthing suite on six separate occasions. In this period, Sommer complained of intermittent mild headaches, two episodes of epigastric pain and one episode of right upper quadrant abdominal pain. Sommer had proteinuria and swelling in her feet and hands from 23 September 2014. On that date, Sommer had a blood urate measurement of 0.36 mmol/L.[2]

6. On 24 September 2014, a booking was made for induction of labour, for when Sommer would be, at an estimate, 10 days over full term. During the two-week period prior to induction, Sommer had a systolic blood pressure at or above 140 mmHg on three separate dates and a recording of a diastolic blood pressure on one occasion at or above 90 mmHg. Sommer reported blurred vision on 24 September 2014.

7. On 1 October 2014, Sommer consulted with private obstetrician Dr Ruary Mackenzie (**Dr Mackenzie**), where her blood pressure was 150/90. Dr Mackenzie referred Sommer to the Hospital, stating that she needed delivery. At the Hospital, Sommer had peripheral oedema, heartburn and a blood pressure of a maximum of 132/72 over some hours. Her urate level was 0.32 mmol/L. A plan was made to review Sommer on 3 October 2014 and to induce labour on 6 October 2014.

8. On 3 October 2014, Sommer had oedema to the mid-shins, and painful fingers and hands. She also reported blurred vision. Sommer had blood urate measurements of 0.36 mmol/L. No urate measurement was recorded after this date.

9. On 6 October 2014 at 0600 hours, at an estimated 41 weeks and 2 days gestation, Sommer was admitted to the Hospital for induction of labour. At 0625 hours blood was

[2] The normal range is 0.14-0.34 mmol/L.

taken from Sommer for, amongst other things, 'PET' bloods.[3] At 0640 hours, artificial rupture of the membranes (**ARM**) was undertaken, and a Syntocinon infusion[4] was started at 0905 hours.

10. At 1450 hours, Sommer had the urge to push. On examination at 1530 hours, Sommer's cervix was found to be fully dilated. At 1640 hours, Sommer consented to epidural anaesthesia and signed a consent form for a trial of forceps +/- caesarean section delivery (in the operating theatre).

11. Prior to 1730 hours, Sommer's blood pressure was measured on five occasions; the highest reading was 138 systolic and 85 diastolic.

12. At 1745 hours, Anaesthetist Dr Jayakumar Rangaswami (**Dr Rangaswami**) sited an epidural catheter in Sommer and gave her the first dose of epidural ropivacaine (3 mls of 0.2%) and fentanyl.

13. At 1755 hours, Midwife Debra Milroy (**Midwife Milroy**) recorded Sommer's blood pressure as 200/120 mmHg onto a piece of paper towel.[5]

14. At 1800 hours, Sommer's blood pressure was manually measured by Midwife Milroy as being 190/110 mmHg. Dr Rangaswami said that when he learnt Sommer's blood pressure was elevated, he started taking her blood pressure himself by way of the cardiotocographic machine (**CTG machine**). The CTG machine recorded Sommer's blood pressure at 183/107 mmHg at 1800 hours.

15. Dr Rangaswami stated that he treated Sommer's raised blood pressure with frequent blood pressure measurements and by administering a further dose of ropivacaine/fentanyl mix into the epidural catheter between approximately 1800 and 1805 hours. He said that he expected the second dose of epidural anaesthesia to treat Sommer's elevated blood pressure.

16. At 1805 hours, Sommer's blood pressure was recorded by Midwife Milroy as 184/105 mmHg. At 1808 hours, the CTG machine recorded Sommer's blood pressure as 173/98 mmHg. A further blood pressure was recorded by Midwife Milroy at an unknown time

[3] **PET** (pre-eclamptic toxaemia) is a complication of late pregnancy that is diagnosed on the basis of high blood pressure, swollen ankles and protein in the urine. Blood tests include liver function tests, renal function tests and platelets levels.
[4] Syntocinon is an artificial form of the hormone oxytocin that causes the uterus (womb) to start having contractions.
[5] Coronial Brief (**CB**) p. 355; Transcript (**T**) p. 181 lines 9 – 11.

as being 165/84 mmHg. At 1810 hours Sommer's blood pressure was recorded by Midwife Milroy as 185/90 mmHg and Sommer was noted to be drowsy.

17. At approximately 1810 hours, Sommer had flickering of her eyelid or eyelids that spontaneously resolved. In his *viva voce* evidence, Dr Rangaswami said that Sommer was drowsy and did not speak after this time. At the same time, Obstetrician Dr Tihomir Djordjic (**Dr Djordjic**) and Obstetric Registrar Dr Nazia Ijaz (**Dr Ijaz**) arrived at the labour room. In his *viva voce* evidence, Dr Djordjic said that he was aware Sommer's blood pressure was elevated and he assessed Sommer as being sleepy, not fully conscious but able to squeeze his finger on command.[6] Dr Djordjic told the Court that he said she may need some labetalol.[7]

18. At approximately 1815 hours, Sommer was placed into lithotomy position in preparation for a forceps delivery, whilst drowsy. At approximately this time, Dr Djordjic says that he was told that Sommer's blood pressure was around 190/110 mmHg.[8] Dr Rangaswami placed a Hudson mask on Sommer's face to give her oxygen in case she was having a partial seizure. At 1812 hours the CTG machine recorded Sommer's blood pressure as 185/109 mmHg.

19. Between approximately 1817 hours and 1820 hours, Sommer had a generalised tonic-clonic seizure. At 1817 hours, foetal bradycardia of approximately 90 beats/minute was recorded on the CTG trace. In *viva voce* evidence before the Court, Dr Djordjic postulated that the foetal bradycardia may be due to loss of contact with the CTG band or a recording of the maternal pulse rate,[9] whereas Dr Rangaswami said that the foetal bradycardia was most likely artefact due to Sommer's obesity and seizure.[10]

20. At 1820 hours, the CTG machine recorded Sommer's blood pressure as 193/112 mmHg. This was the last recording of Sommer's blood pressure.

21. At 1822 hours, Sommer was administered 4grams of intravenous (**IV**) magnesium sulphate over a period of 5 to 7 minutes and 50mgs of IV labetalol was also administered to Sommer.[11]

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[6] T257 line 15 – T259 line 11.
[7] T257 lines 22 – 26. Labetalol is a medication used to treat high blood pressure and in long term management of angina. This includes essential hypertension, hypertensive emergencies, and hypertension of pregnancy.
[8] T260 lines 6 – 11.
[9] T264 line 10 – T 265 line 3.
[10] T537 lines 10 – 13.
[11] On 6 October 2014, Dr Djordjic recorded that Sommer was given IV labetalol in his retrospective notes at CB. 303. T286 line 20 – T287 line 10 per Dr Djordjic.

22. Dr Rangaswami said that Sommer had difficulty maintaining her airway during the tonic-clonic seizure and she was cyanosed at the end of the tonic-clonic seizure. At the end of the seizure at 1823 hours, Sommer was found to be in respiratory and cardiac arrest. At the same time, foetal bradycardia of approximately 60 beats/minute was recorded on the CTG. Bag and mask ventilation was commenced by Dr Rangaswami and Midwife Milroy. A Code Blue was called at approximately 1824 hours.

23. At approximately 1824 – 1825 hours, Anaesthetic Registrar Dr Colleen Chew (**Dr Chew**) arrived in the labour suite. Dr Chew said that Sommer was not receiving chest compressions and was cyanosed when she arrived. Midwife Leselle Herman (**Midwife Herman**) arrived in the labour suite within 30 seconds of the public address announcement of the Code Blue. She immediately assumed the position of scribe and began a record of resuscitation. In her *viva voce* evidence, Midwife Herman said that CPR, including cardiac compressions, was *'occurring'* when she arrived at 1826 hours.[12]

24. During the resuscitation process, there were two unsuccessful attempts to intubate Sommer. Bag and mask oxygenation were maintained. Dr Rangaswami did not attempt to insert a laryngeal mask. At 1829 hours, a crash cart arrived from another ward. Sommer was given IV fluids, Intralipid[13] and adrenaline.

25. At 1834 hours, a decision was made to deliver Sommer's baby by emergency caesarean section in the labour ward. At 1839 hours, a baby boy was born. At 1901 hours, Sommer had still not responded to resuscitation attempts and a decision was made to discontinue the attempts. Sommer was declared deceased at 1901 hours.[14]

## Jurisdiction

26. Sommer's death was reported to the Coroner. An e-Medical Deposition Form was completed by Dr Rangaswami on 6 October 2014. The possible cause of death was stated to be '*eclampsia with respiratory/cardiovascular arrest*'.

27. Sommer's death was a reportable death under section 4 of the *Coroners Act 2008* (Vic) (**the Act**), because it occurred in Victoria, and was considered unexpected, unnatural or to have resulted, directly or indirectly, from an accident or injury. In addition, section 4(2)(b)(ii) of the definition of reportable death was applicable because Sommer's death

[12] CB 312; T232 lines 16 – 19 per Leselle Herman.
[13] A sterile fat emulsion, which provides the body with energy and fatty acids.
[14] As per the e-Medical Deposition Form completed by Dr Rangaswami.

occurred following a medical procedure where her death may have been causally related to that medical procedure and a registered medical practitioner would not, immediately before the procedure was undertaken, have reasonably expected the death.

**Purpose of the coronial jurisdiction**

28. The Coroners Court of Victoria is an inquisitorial jurisdiction.[15] The purpose of a coronial investigation is to independently investigate a reportable death to ascertain, if possible, the identity of the deceased person, the cause of death and the circumstances in which death occurred.[16] The cause of death refers to the medical cause of death, incorporating where possible the mode or mechanism of death. For coronial purposes, the circumstances in which death occurred refers to the context or background and surrounding circumstances but is confined to those circumstances sufficiently proximate and causally relevant to the death and not merely all circumstances which might form part of a narrative culminating in death. [17]

29. The broader purpose of coronial investigations is to contribute to the reduction of the number of preventable deaths through the findings of the investigation and the making of recommendations by Coroners, generally referred to as the 'prevention' role.[18] Coroners are also empowered to report to the Attorney-General on a death; to comment on any matter connected with the death they have investigated, including matters of public health or safety and the administration of justice; and to make recommendations to any Minister or public statutory authority on any matter connected with the death, including public health or safety or the administration of justice.[19] These are effectively the vehicles by which the prevention role may be advanced.[20]

30. It is not the Coroner's role to determine criminal or civil liability arising from the death under investigation. Nor is it the Coroner's role to determine disciplinary matters.

31. Section 52(2) of the Act provides that it is mandatory for a Coroner to hold an Inquest into a death if the death or cause of death occurred in Victoria and a Coroner suspects

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[15] Section 89(4) Coroners Act 2008.
[16] Section 67(1) of the *Coroners Act 2008*.
[17] See for example *Harmsworth v The State Coroner* [1989] VR 989; *Clancy v West* (Unreported 17/08/1994, Supreme Court of Victoria, Harper J).
[18] The "prevention" role is explicitly articulated in the Preamble and Purposes of the Act.
[19] See sections 72(1), 67(3) and 72(2) of the Act regarding reports, comments and recommendations respectively.
[20] See also sections 73(1) and 72(5) of the Act which requires publication of Coronial Findings, comments and recommendations and responses respectively; section 72(3) and (4) which oblige the recipient of a Coronial recommendation to respond within three months, specifying a statement of action which has or will be taken in relation to the recommendation.

the death was as a result of homicide, or the deceased was, immediately before death, a person placed in custody or care, or the identity of the deceased is unknown. The elements which mandate holding an Inquest are not present in the circumstances of Sommer Warren's death.

32. Pursuant to section 52(1) of the Act, Coroners have absolute discretion as to whether to hold an Inquest. However, a Coroner must exercise the discretion in a manner consistent with the preamble and purposes of the Act. In deciding whether to conduct an Inquest, a Coroner should consider factors such as (although not limited to), whether there is such uncertainty or conflict of evidence as to justify the use of the judicial forensic process; whether there is a likelihood that an Inquest will uncover important systemic defects or risks not already known about and, the likelihood that an Inquest will assist to maintain public confidence in the administration of justice, health services or public agencies.

33. I exercised my discretion pursuant to section 52(1) of the Act to hold an Inquest into the death of Sommer Bethany Warren because I considered it appropriate and necessary to examine the medical evidence to assist me in making findings to establish, if possible, the medical cause of Sommer's death. I also considered that there were matters of public health and safety related to the management of Sommer's pregnancy that warranted further exploration through a public hearing.

34. This Finding draws on the totality of the material; the product of the Coronial investigation into the death of Sommer. That is, the court records maintained during the Coronial investigation, the Coronial Brief and further material sought and obtained by the Court, the evidence adduced during the Inquest as well as closing submissions from Counsel Assisting and Counsel Representing the Interested Parties.

35. In writing this Finding, I do not purport to summarise all of the evidence but refer to it only in such detail as appears warranted by its forensic significance and the interests of narrative clarity. The absence of reference to any particular aspect of the evidence does not infer that it has not been considered.

**Standard of proof**

36. All coronial findings must be made based on proof of relevant facts on the balance of probabilities.

37. In determining whether a matter is proven, I should give effect to the principles enunciated in *Briginshaw v Briginshaw*.[21] These principles state that in deciding whether a matter is proven on the balance of probabilities, in considering the weight of the evidence, I should bear in mind:

(a) the nature and consequence of the facts to be proved;

(b) the seriousness of any allegations made;

(c) the inherent unlikelihood of the occurrence alleged;

(d) the gravity of the consequences flowing from an adverse finding; and

(e) if the allegation involves conduct of a criminal nature, weight must be given to the presumption of innocence, and the court should not be satisfied by inexact proofs, indefinite testimony or indirect inferences.

38. The effect of the authorities is that Coroners should not make adverse findings against or comments about individuals, unless the evidence provides a comfortable level of satisfaction that they caused or contributed to the death.

## INVESTIGATIONS PRECEDING INQUEST

### Identity

39. On 6 October 2014, a Statement of Identification was completed by Leisa Scammell at Shepparton Hospital of Goulburn Valley Health. A Determination by Coroner of Identity of Deceased, Form 8, Rule 32 was subsequently completed by Judge Ian Gray, State Coroner (as he then was) on 8 October 2014.

40. The identity of Sommer Bethany Warren was not in dispute and required no additional investigation.

### Forensic Examination

Post mortem examination

41. Dr Gregory Ross Young (**Dr Young**), Forensic Pathologist at the Victorian Institute of Forensic Medicine (**VIFM**) performed a full post mortem examination of the body of Sommer Bethany Warren. At autopsy, Dr Young found that Sommer was obese at a weight of 113 kg with a body mass index of 40 kg/m$^2$.[22] He relevantly found no

[21] (1938) 60 CLR 336.
[22] According to the World Health Organisation, the normal range of BMI in adults is 18.5 to 24.99 kg/m$^2$.

evidence of underlying neuropathological abnormality, no evidence of haemorrhage with the sampled lumbar epidural fat or dura, no overt evidence of amniotic fluid embolism in the lungs, no evidence of upper airway oedema and no evidence of pulmonary thromboembolism or deep venous thrombosis in the lower legs.

Neuropathology

42. Dr Linda Iles (**Dr Iles**) Forensic Pathologist and specialist in Forensic Neuropathology at VIFM performed an examination of Sommer's brain. Dr Iles reported the following neuropathological findings: agonal early ischaemic changes but no underlying neuropathological abnormality and no evidence of haemorrhage with the sampled lumbar epidural fat or dura.

Examination of the placenta

43. Examination of the placenta was undertaken by Pathologist Dr Virginia Bilson (**Dr Bilson**) at the Royal Women's Hospital. Dr Bilson did not identify any changes typical for pre-eclampsia.

Toxicology

44. Toxicological analysis of ante mortem blood showed no common drugs or poisons.

45. Toxicological analysis of post mortem blood detected local anaesthetic medication lignocaine, epidural anaesthetic medication ropivacaine and antihypertensive medication labetalol, all of which Dr Young stated were consistent with hospital-administered medications.

46. Toxicologist A/Prof Betty Shuk Han Chan reported that Sommer did not have ropivacaine or lignocaine toxicity.

Forensic pathology opinion

47. Dr Young stated that the cause of Sommer's seizure was not clear, and that the seizure itself can cause death via a variety of postulated mechanisms including cardiac arrhythmia, pulmonary dysfunction, suppression of brainstem respiratory and arousal centres as well as airway obstruction. Dr Young stated that the definitive cause of death was unclear and recommended that the obstetric and anaesthetic management be reviewed. Dr Young reported that the medical cause of Sommer's death was unascertained.

Conduct of the Investigation

48. State Coroner (as he then was) Judge Ian Gray had the original carriage of the investigation. Upon Judge Gray's retirement, State Coroner (as she then was) Judge Sara Hinchey took over the conduct of the investigation. On 5 October 2018, I took carriage of the investigation into the death of Sommer Bethany Warren.

49. Police assistance with the investigation was originally undertaken by Coronial Investigator[23] Leading Senior Constable Kevin Winch (**LSC Winch**). On 27 April 2015, the Court was advised that Detective Senior Constable Shane Kervin (**DSC Kervin**) was taking over the role as Coronial Investigator. Both LSC Winch and DSC Kervin contributed to the preparation of the Coronial Brief.

50. The Court obtained independent expert medical opinions regarding Sommer's management and cause of death from:

    (a) Obstetricians Dr Bernadette White and Professor Jonathan Hyett; and

    (b) Anaesthetists with specialist practices in obstetrics (**Obstetric Anaesthetists**) Dr Andrew Ross and Dr Forbes McGain.

51. Interested parties did not provide other independent expert opinions to the Court.

**Direction Hearings**

52. On 29 November 2018 and 11 February 2019, Direction Hearings were held at the Coroners Court of Victoria to progress the matter including, *inter alia:* formally advising parties that I now had carriage of this matter, discussing the scope of the Inquest and confirming witnesses. Dr Sharon Keeling appeared as Counsel Assisting at each of these Hearings.

**INQUEST**

**Scope of the inquest**

53. The scope of the Inquest predominantly related to the following issues.

    (a) Did Sommer have pre-eclampsia, eclampsia, and/or posterior reversible leukoencephalopathy (PRS or PRES)?

[23] A Coroner's Investigator is a police officer nominated by the Chief Commissioner of Police or any other person nominated by the Coroner to assist the coroner with his/her investigation into a reportable death. The Coroner's Investigator receives directions from a Coroner and carries out the role subject to those directions.

(i) *If Sommer did have pre-eclampsia*, was her obstetric management was reasonable? This included consideration of, *inter alia*:

a. the frequency of blood pressure and serum urate measurements;

b. the requirement and timing of induction of labour and delivery of her baby, including her labour on 6 October 2014, and

c. whether she required treatment with antihypertensive medication and magnesium sulphate.

(ii) *If Sommer did have pre-eclampsia*, would her eclamptic seizure have been avoided had she received the required treatment for pre-eclampsia at an earlier date and time?

(b) Between approximately 1730 hours and 1900 hours on 6 October 2014, was Sommer's anaesthetic management appropriate?

(c) Between approximately 1823 hours and 1900 hours on 6 October 2014, was the resuscitation provided to Sommer adequate? This included consideration of, *inter alia,* the:

(i) time at which cardiac compressions were commenced in relation to the onset of cardiac arrest;

(ii) cause of the delay in establishing an airway, and

(iii) decision to deliver the baby by caesarean section and the timing of the delivery.

(d) *If Sommer received inadequate resuscitation from approximately 1823 hours on 6 October 2014*, whether it was likely that she would have survived with adequate resuscitation.

**Witnesses**

54. *Viva voce* evidence was obtained from the following witnesses:

(b) Ms Leisa Scammell, Sommer's mother;

(c) Dr Ruary Mackenzie, Obstetrician;

(d) Ms Debra Milroy, Midwife;

(e) Ms Leselle Herman, Midwife;

(f) Dr Nazia Ijaz, then Obstetric Registrar;

(g) Dr Tihomir Djordjic, Obstetrician;

(h) Dr Colleen Chew, then Anaesthetic Registrar;

(i) Dr Jayakumar Rangaswami, Anaesthetist;

(j) Concurrent Evidence Panel (**the Panel**):

(i) Dr Bernadette White, Obstetrician;

(ii) Clinical Professor Jonathan Hyett, Obstetrician;

(iii) Dr Andrew Ross, Anaesthetist; and

(iv) Dr Forbes McGain, Anaesthetist.

**Concurrent Evidence**

55. On 9 April 2019, a panel of four expert medical witnesses was convened for the purpose of giving their evidence concurrently. The panel comprised of Dr Bernadette White, Obstetrician and Gynaecologist,[24] Dr Andrew Ross, Consultant Anaesthetist,[25] Clinical Professor Jonathan Hyett, Head of High-Risk Obstetrics at Royal Prince Alfred Hospital, Sydney[26] and Dr Forbes McGain Anaesthetist and Intensive Care Physician.[27] **(The Panel).**

56. Twenty questions were put to the Panel by Counsel Assisting.[28]

**Evidence arising from the Inquest**

Pre-Eclampsia

*Relative hypertension*

57. Dr White stated that Sommer did not have relative hypertension late in pregnancy as her blood pressure on presentation to her general practitioner was 152/92 mmHg.[29] Professor Hyett stated, and Dr Ross agreed,[30] that it is normal in pregnancy for the maternal blood pressure to dip in the second and early third trimesters of pregnancy. Therefore, when Sommer presented to the Hospital for the early antenatal visits, she would have been at the nadir of the normal pregnancy blood pressure cycle.[31] Professor Hyett said that the current guideline regarding the diagnosis of pre-eclampsia in Australia and New Zealand does not rely on a differential between later blood pressure and blood pressure at a time of presentation.[32] The Society of Obstetric

[24] Exhibit 18 – expert opinion of Dr Bernadette White dated 29 April 2016.
[25] Exhibits 19, 20 & 21 – expert opinion reports of Dr Andrew Ross dated 20 November 2016, 26 October 2018 & 1 April 2019 respectively.
[26] Exhibit 22 – expert opinion of Professor Jonathan Hyett dated 22 September 2018
[27] Exhibits 23 & 24 – expert opinion of Dr Forbes McGain dated 9 October 2018 & 27 October 2018 respectively.
[28] T pp 663 – 690.
[29] T 708 lines 1 – 13; Sommer's medical record held by her general practitioner at Wyndham House on 31 May 2014.
[30] T732 lines 17 – 23.
[31] The lowest point of a normal pregnancy blood pressure cycle.
[32] T708 line 26 – T709 line 6.

Medicine in Australia and New Zealand (SOMANZ) Hypertension Pregnancy Guideline (April 2014)[33] states at page three:

> *Detecting a rise in blood pressure from 'booking' or preconception blood pressure (> 30/15 mmHg), rather than relying on an absolute value has in the past been considered useful in diagnosing preeclampsia in women who do not reach blood pressures of 140 or 90 mmHg.* ***Available evidence does not support the notion that these women have an increased risk of adverse outcomes.*** *Nevertheless such a rise may be significant in some pregnant women, particularly in the presence of hyperuricaemia, proteinuria or a small for gestational age (SGA) infant and these women warrant closer monitoring.* (Emphasis added)

*Did Sommer's clinical features meet the criteria for pre-eclampsia?*

58. On 1 October 2014, Sommer consulted Obstetrician Dr Ruary Mackenzie. He considered her to be "high-risk" due to her presentation to medical practitioners relatively late in her pregnancy, age of 18 years and obesity. Dr Mackenzie said that being post-41 weeks gestation led to an increased risk of all complications in pregnancy.

59. On behalf of the Panel, Dr Bernadette White stated:

> *...pre-eclampsia is defined as a combination of hypertension plus other evidence of organ involvement. And hypertension is regarded as a systolic blood pressure of equal or greater than 140 millimetres of mercury, and a diastolic blood pressure equal to or greater than 90 millimetres of mercury. The hypertension, to be related to pre-eclampsia, should be present after the 20th week of pregnancy, and the evidence of other organ involvement might include evidence of renal, haematologic - that's related to blood - liver, neurological, or placental pathology. So it's the two components of a high blood pressure plus evidence of other aspects of the body being affected.*[34]
>
> *...eclampsia is the presence of pre-eclampsia, so the features I've already outlined, together with a tonic-clonic generalised seizure or convulsion.*[35]

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[33] Exhibit 14.
[34] T664 lines 8 – 23.
[35] T665 lines 1 – 5.

*...posterior reversible leukoencephalopathy is a syndrome that involves hypertension and alteration to cerebral circulation. So it's a syndrome rather than a diagnosis.*[36]

60. Obstetricians Professor Hyett and Dr White informed me that Sommer did not meet the formal diagnostic features for pre-eclampsia or eclampsia, and they considered her obstetric management reasonable.[37]

61. Treating obstetrician Dr Djordjic said that a diagnosis of pre-eclampsia required persistent signs and symptoms. Sommer had intermittent symptoms and so Dr Djordjic believed that she did not meet the criteria for pre-eclampsia.[38] However, he believed these symptoms should be investigated and Sommer required monitoring.

62. Obstetric Anaesthetists Dr Ross and Dr McGain believed that Sommer had pre-eclampsia and eclampsia. Dr Ross stated that Sommer had a relative rise in her blood pressure and had posterior reversible leukoencephalopathy, being a hypertensive encephalopathy (**PRES**), on the basis of her reports of headache and blurred vision.[39] Dr McGain stated that Sommer had pre-eclampsia on the basis of multiple episodes of hypertension, episodic headaches and abdominal pain.[40] Dr Ross' opinion that Sommer had pre-eclampsia is based upon his view that Sommer had relative hypertension during pregnancy.[41]

63. Dr White told the Court that most women who complain of features such as blurred vision, increasing peripheral oedema and epigastric and right upper quadrant pain do not have pre-eclampsia. She stated that, while these features may occur in pre-eclampsia, most women with pre-eclampsia will not have these symptoms. Dr White said these symptoms alert to the possibility of pre-eclampsia but a diagnosis of pre-eclampsia certainly would not be made on the basis of a woman reporting those symptoms without other objective evidence that she had pre-eclampsia.[42] Dr White also stated that increasing peripheral oedema in women is not a sign of pre-eclampsia as women with pre-eclampsia are no more likely to have oedema than women who do not have pre-eclampsia.[43] Dr White stated that these symptoms need to be taken seriously but they

[36] T665 lines 6 – 11; T749 lines 16 – 29.
[37] T665 lines 12 – 17; Exhibit 18 Report of Dr White and Exhibit 22 Report of Professor Hyett.
[38] T275 line 12 – T277 line 5.
[39] Exhibits 19, 20 and 21, being the written reports of Dr Andrew Ross.
[40] Exhibits 23 and 24, being the written reports of Dr Forbes McGain, and in particular at CB 110.
[41] As submitted during verbal submissions on behalf of the Hospital at T806 lines 26 – 27.
[42] T703 line 19 – T705 line 13.
[43] T705 line 14 – 23.

are not diagnostic, they are not pathognomonic of pre-eclampsia and do not, of themselves, require any intervention unless there are other objective features that they are part of the syndrome of pre-eclampsia.[44] Dr White stated that these features in Sommer were not indicative of pre-eclampsia as Sommer did not have hypertension, which is the essential feature of pre-eclampsia.[45] Dr White believed that Sommer could not be diagnosed with pre-eclampsia in light of multiple assessments and blood tests through the Hospital where her blood pressure was found to be normal.[46]

64. Dr Ross stated that these features raised a level of suspicion and a need for close observation:

> *Visual disturbances, headache, ...upper* (quadrant) *epigastric pain. And putting all of those together with the proteinuria and what turns out to be a weight gain of over 30 kilos and accelerating oedema to a point where her mother witnessed that her friends no longer recognised Sommer when they saw her in the street. Ah, makes a stronger case for a higher level of suspicion.*[47]

The cause of Sommer's generalised tonic-clonic seizure

65. Obstetricians Professor Hyett and Dr White did not believe that Sommer had an eclamptic seizure as she did not meet the criteria for pre-eclampsia.[48] The Obstetric Anaesthetists stated that Sommer did have an eclamptic seizure on the basis of her hypertension prior to the seizure, and the seizure occurred in a labouring woman.[49]

66. The Panel unanimously agreed that the cause of Sommer's generalised tonic-clonic seizure was hypertensive encephalopathy, with the severe hypertension having an effect on the blood flow to her brain, leading to the seizure.[50]

Can a diagnosis of posterior reversible leukoencephalopathy be made for Sommer

67. Obstetricians Professor Hyett and Dr White considered that Sommer may have had posterior reversible leukoencephalopathy, being a hypertensive encephalopathy (**PRES**)

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[44] T705 line 24 – T706 line 7.
[45] T706 lines 18 – 26.
[46] T706 line 27 – T707 line 31.
[47] T734 lines 1 – 13.
[48] T667 line 30 – T668 line 10.
[49] T668 lines 13 – 26.
[50] T674 line 29 – T675 line 10.

as she had clinical findings and symptoms consistent with PRES, but in the absence of an MRI scan, this diagnosis could not be proven.[51]

68. Obstetric Anaesthetist Dr Ross stated that Sommer may have had PRES[52] with a relative rise in blood pressure,[53] more consistent symptoms of headache and blurred vision from September,[54] proteinuria and accelerated oedema.[55] Dr Ross acknowledged that Sommer did not have a concerning rise in her blood pressure until the very end of labour.[56]

Did Sommer require delivery prior to 6 October 2014

69. When gestation of a pregnancy is estimated on the first ultrasound of pregnancy at approximately 24 weeks and 6 days, the range of error for the estimated date of delivery is, according to:

(a) Dr Ruary MacKenzie, plus or minus 3 weeks;[57]

(b) Dr Tihomir Djordjic, plus or minus 7 to 14 days;[58]

(c) Dr Ijaz, plus or minus 1 week;[59]

(d) Dr Bernadette White on behalf of the Panel: between 10 and 14 days.[60]

70. Professor Hyett told the Court that where the date of delivery has been estimated on the basis of an ultrasound scan first undertaken at a late presentation in pregnancy, another scan later in the pregnancy will determine if the rate of growth of the baby looks normal between those two scans. If there are multiple measures that are a period of time apart, this reduces the risk of significant error in the estimated due date (**EDD**). Professor Hyett stated that there was another scan performed later in the pregnancy that showed a normal growth trajectory.[61] The implication is that Sommer's EDD was shown to be more accurate than within a 10 to 14-day window on the basis of subsequent ultrasound scans in pregnancy.

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[51] T668 line 27 – T669 line 4.
[52] CB 67 – 68.
[53] T665 line 22 -
[54] T666 lines 15 – 17.
[55] T667 lines 5 – 8.
[56] T667 lines 13 – 16.
[57] T 89 lines 6 – 8.
[58] T245 lines 9 - 20.
[59] T329 lines 1 – 9.
[60] T663 line 24 – T664 line 1.
[61] T712 line 16 – T713 line 5.

71. Professor Hyett told the Court that the optimal gestation for delivery of a baby was at 41 weeks gestation, on the basis of educational outcomes at the age of seven years.[62] The implication is that it was reasonable to allow Sommer's baby to be born at 41 weeks and 2 days gestation.

72. Dr Tihomir Djordjic said:

(a) it would have been proper to deliver Sommer's baby prior to 6 October 2014 if she had a medical condition that raised concerns for her or the baby's outcome;[63]

(b) on the basis of her blood pressure readings, her clinical signs and symptoms and her blood test results, Sommer did not have pre-eclampsia; [64]

(c) in a woman with an uncomplicated pregnancy, induction of labour is to be offered at 40 weeks and 10 days; [65]

(d) when taking into consideration the uncertainty in the gestation of Sommer's pregnancy, she required delivery earlier than 6 October 2014 only if she had a diagnosed medical disorder; [66] and

(e) a woman with Sommer's symptoms is offered close surveillance and earlier induction of labour only on the basis of a clear diagnosis. [67]

73. The Panel considered whether, on 1 October 2014, the Hospital should have admitted Sommer on Dr Mackenzie's referral and advice that the baby needed to be delivered or whether it was reasonable for the Hospital staff to examine and monitor Sommer and make an independent decision to discharge her on that day.

74. Obstetricians Professor Hyett and Dr White considered that Sommer was assessed reasonably thoroughly at the Hospital on 1 October 2014. They stated that it was reasonable and acceptable that she was discharged with a plan to be reviewed two days later and that a date had, at that stage, been set for induction of labour.[68] The Obstetricians stated that, while it would have been reasonable to have planned induction earlier than 6 October 2014, it was also reasonable to delay induction until 6 October 2014 at 41 weeks and 2 days gestation.[69]

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[62] T715 line 19 – T716 line 2.
[63] T247 lines 3 - 14.
[64] T247 line 15 – T253 line 9.
[65] T253 line 29 – T254 line 5.
[66] T253 lines 10 - 28.
[67] T254 lines 13 - 23.
[68] T669 lines 5 – 20.
[69] T670 lines 9 – 26; T700 line 5 – T701 line 5; T717 line 9 – T718 line 30.

75. Dr Ross stated that, based on his experience and knowledge of obstetricians and their practices, he could see no reason why the Hospital did not deliver Sommer's baby on 1 October 2014.[70]

76. The Panel unanimously advised that up to 6 October 2014, there were no shortcomings in Sommer's management by the Hospital.[71] The Panel unanimously advised that Sommer did not require induction of labour prior to that date.

Was there a need to delivery Sommer's baby prior to 1800 hours on 6 October 2014?

77. Obstetricians Professor Hyett and Dr White considered that Sommer's cervix was probably fully dilated at about 1530 hours on 6 October 2014 and there was no evidence of foetal distress that would warrant immediate intervention for delivery. Dr White and Professor Hyett stated that clearly a plan was being developed as to when delivery should take place. Therefore, there was no requirement for delivery between 1530 hours and 1800 hours.[72]

When did Sommer require treatment with antihypertensive medication on 6 October 2014?

78. On 6 October 2014 at 1755 hours, Sommer's blood pressure was 200/120 mmHg. This was written on a piece of paper towel by Midwife Milroy.[73] Midwife Milroy said that she told Dr Rangaswami of this blood pressure,[74] and she wrote '*1755 blood pressure 200 reported*' on the CTG trace.[75] Dr Rangaswami says that he was not informed of this blood pressure. [76]

79. Dr Rangaswami said:

    (a) he was aware that Sommer had a raised blood pressure of 190/110 following the administration of the epidural anaesthesia.[77] Midwife Milroy says that she told Dr Rangaswami that Sommer's blood pressure was 200 at the time;[78]

    (b) normal practice in managing a blood pressure of 190/110 is to do frequent checks of the blood pressure;[79]

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[70] T669 lines 23 – 28.
[71] T719 lines 14 – 21.
[72] T670 line 27 – T671 line 8.
[73] CB 355; at T181 lines 9 - 11 per Midwife Debra Milroy, who said that she wrote all the blood pressures that she took on the piece of paper at CB 355.
[74] T123 line 29 – T124 line 16.
[75] CB 363.
[76] T489 lines 10 – 20.
[77] T489 lines 10 – 20.
[78] T123 line 29 – T 124 line 16 and contemporaneous note '*1755, blood pressure 200 reported*' on the CTG trace at CB 363.
[79] T489 lines 29 – 31.

(c) when he learned that Sommer's blood pressure was raised, he started taking her blood pressure himself by way of the CTG machine;

(d) Dr Rangaswami said that he treated Sommer's raised blood pressure by administering a second dose of ropivacaine/fentanyl mix into her epidural catheter between approximately 1800 and 1805 hours.[80] However, in his earlier written statement to the Court, Dr Rangaswami said that he gave the epidural anaesthesia in two divided doses because Sommer was obese;[81]

(e) he hoped that the second dose of epidural anaesthesia would treat Sommer's blood pressure;[82]

(f) it was standard management, for a hypertensive pregnant woman with an epidural in place, to treat the hypertension with a further dose of epidural anaesthetic rather than IV antihypertensive medication;[83]

(g) a blood pressure of 190/100 does not require immediate rectification with magnesium sulphate;[84]

(h) '*we should have been a bit more proactive in managing this patient, giving antihypertensives. The first 15 minutes was a consideration that we have given an epidural and so it was trending down, and the last five minutes, or eight minutes, I think there were logistic issues, and one was I wanted an ECG monitoring person there. ...that's my limitation of giving an antihypertensive*';[85]

(i) '*we should have given it, we should have treated the blood pressure*';[86] '*in the last six minutes, when the blood pressure rebounded*';[87]

(j) when Sommer had the generalised tonic-clonic seizure she ought to have been given a benzodiazepine,[88] which he subsequently qualified by stating that if the seizure was prolonged the drugs should have been given.[89] Dr Rangaswami said that he did not give a benzodiazepine because he was at the top end and Dr Djordjic was managing the drugs;[90]

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[80] T490 lines17 – 20; T490 line 21 – T491 line 15; T491 lines 5 – 15; T522 lines 18 – 23.
[81] Exhibit 15 (undated) at CB 155.
[82] T523 lines 3 – 6.
[83] T522 line 24 – T523 line 2.
[84] T563 line 28 – T564 line 8.
[85] T562 lines 1 – 8.
[86] T562 lines 20 – 21.
[87] T589 lines 2 – 6.
[88] T564 line 18 – T565 line 2.
[89] T566 line 20 – T567 line 30.
[90] T565 lines 9 – 12.

(k) Sommer's blood pressure was trending down in the period between 1800 and 1810 hours;

(l) Sommer's blood pressure of 164/85 was unacceptable;[91]

(m) Sommer's depressed conscious state and fluttering eyelid/s were possibly a partial seizure or maternal exhaustion; [92]

(n) he did not see the blood pressures taken by the CTG machine at or after 1812 hours as he was helping to position Sommer for the vaginal examination;[93]

(o) he knew that Sommer's blood pressure had rebounded in the two or three minutes before the seizure;[94]

(p) if he had seen Sommer's blood pressure at and after 1812 hours, treatment with IV antihypertensive medication would have been appropriate;[95] and

(q) Sommer's blood pressure, as taken by the CTG machine, was digitally displayed on the face of the CTG machine.[96]

80. At approximately 1810 hours to 1815 hours, Dr Djordjic was aware that Sommer's blood pressure was 190/110 and that she was not fully conscious.[97] Dr Djordjic decided to expedite delivery with forceps to manage and resolve Sommer's hypertension.[98]

81. The Panel unanimously agreed that the flickering of Sommer's eyelids ought not to have been put down to maternal exhaustion.[99]

82. Professor Hyett and Dr White considered that as Sommer did not have a consistently elevated blood pressure until 1755 hours on 6 October 2014, treatment with antihypertensive medication was not required until that date and time.[100]

83. The Panel unanimously agreed that accepted obstetric and obstetric anaesthetic practice required Sommer to be treated with labetalol to lower her blood pressure and magnesium sulphate for seizure prevention at 1755 hours on 6 October 2014.[101] As this did not occur, the Panel indicated that the medications should have been administered when Sommer's conscious state was decreasing.[102] Between 1810 hours and 1817 hours,

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[91] T531 lines 1 – 3.
[92] T528 line 20 – T529 line 8; T496 lines 17 - 20; T497 lines 15 – 16; T525 lines 11 – 12; T585 lines 22 – 26.
[93] T535 line 7 – T536 line 13.
[94] T589 lines 12 – 25.
[95] T558 line 28 – T559 line 2.
[96] T642 lines 4 – 9 per Dr Rangaswami.
[97] T258 line 29 – T259 line 12; T260 lines 6 - 11 per Dr Djordjic.
[98] T262 line 24 – T263 line 5 per Dr Djordjic.
[99] T690 line 28 – T692 line 11.
[100] T671 lines 9 – 17.
[101] T671 line 30 – T672 line 21; T674 lines 10 – 28; T673 line 23 – T674 line 2.
[102] T681 line 10 – T682 line 4.

both Dr Rangaswami and Dr Djordjic were aware that Sommer was, (or had been), hypertensive and had a depressed conscious state. However, Dr Djordjic stated that he first attended Sommer at 1810 hours[103] and consequently, he did not have sufficient time to: assess Sommer, call for the eclampsia trolley, wait for the eclampsia trolley to arrive, draw up labetalol, administer a bolus of labetalol over two minutes, and wait for the labetalol to reach its maximal effect.[104] However, the Panel informed me that the requirement for labetalol and magnesium sulphate arose due to Sommer's severe hypertension at 1755 hours, regardless of the cause of that hypertension.[105] Additionally, Dr White and Professor Hyett stated that a benzodiazepine could have been used as an anticonvulsant when Sommer had the seizure if magnesium sulphate had not been effective.[106]

Attempted intubation of Sommer during resuscitation

84. During attempts to resuscitate Sommer, Dr Rangaswami used a laryngoscope with an inoperable light, rather than immediately using a backup laryngoscope.[107] Leigh Hitchcock's legal representative submitted that Dr Rangaswami's reasons for so doing were unexplained. Dr Rangaswami said that he did not immediately use the backup laryngoscope because chest compressions needed to continue.[108] Dr Rangaswami was not questioned as to whether he knew, or ought to have known, that the light on the laryngoscope was not working.[109] Similarly, there is no expert evidence to indicate whether Dr Rangaswami ought to have been aware of the issue. The Panel did inform me that a laryngeal mask ought to have been inserted after the first attempt to intubate Sommer had failed.[110]

85. In submissions dated 5 May 2019, Leigh Hitchcock's legal representative submitted that Dr Rangaswami created a note dated 8 October 2014 at a time after 2017.[111] However, this serious allegation was not put to Dr Rangaswami during the Inquest.[112]

[103] Second Statement of Dr Tihomir Djordjic stated 19 June 2019 at [4].
[104] Second Statement of Dr Tihomir Djordjic stated 19 June 2019 at [17] – [19].
[105] T671 line 30 – T672 line 21; T674 lines 10 – 28; T673 line 23 – T674 line 2; T674 lines 10 – 23.
[106] T671 line 30 – T672 line 21 per Dr White; T673 line 1 – T674 line 2 per Dr Ross.
[107] Submissions on behalf of Leigh Hitchcock dated 5 May 2019 at [14(a)(b)].
[108] T623 line 26 – T624 line 2.
[109] T623 line 26 – T674 line 4.
[110] T687 line 31 – T688 line 21.
[111] Submissions on behalf of Leigh Hitchcock dated 5 May 2019 at [14(f)(b)].
[112] T625 line 21 – T627 line 22.

**Sommer's cause of death**

86. The Panel considered that the cause of Sommer's cardiac arrest was multifactorial, including:

(a) hypertension causing general massive cerebral dysfunction and brain stem failure, which controls blood pressure and caused the seizure;

(b) the effect of 50 mg IV labetalol combined with IV magnesium sulphate may have contributed to the cardiac arrest; and

(c) being relatively supine that may have accentuated a drop-in blood pressure. [113]

87. The Panel informed me that the following measures may have increased the likelihood of Sommer's survival:

(a) treating the hypertension at 1755 hours to preventing her seizure;

(b) administering IV labetalol in 20 mg aliquots;

(c) wedge or tilt position, although Dr McGain also stated that a tilt would not have improved her chances of survival;[114]

(d) early caesarean section; and

(e) early intubation with a laryngeal mask.[115]

88. Dr Ross stated that Sommer never had an actual or clear return of cardiac electrical activity according to the rhythm strips (ECGs) from the time of resuscitation. He stated that it is possible the terminal event was her seizure and Sommer's condition may have been irrevocably fatal,[116] which would arguably render resuscitation irrelevant.

89. The Panel unanimously agreed that treating Sommer's hypertension between 1755 hours and 1817 hours on 6 October 2014 would have likely prevented her generalised seizure.[117] The Panel informed me that preventing the seizure would likely have prevented her death.[118]

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[113] T677 line 20 – T678 line 16.
[114] T696 lines 7 – 17.
[115] T687 line 31 – T688 line 21.
[116] T688 line 22 – T689 line 7.
[117] T680 line 11 – 28.
[118] T680 line 29 – T681 line 9.

## COMMENTS

Pursuant to section 67(3) of the Coroners Act 2008, I make the following comments connected with the death:

90. At the conclusion of the Inquest, Interested Parties spoke to written outlines of submissions which had been provided to the Court. The submissions primarily addressed the points raised and tested during oral evidence. However, some submissions addressed points which were outside the scope of the Inquest and/or not raised during oral evidence. I have not been requested to consider whether it would be appropriate to pursue any of these points. I determine not to pursue them in light of the current status of this matter and the fact that I do not believe the coronial investigation into Sommer's death would be materially advanced by so doing.

91. In making determinations of fact, I am bound to consider the balance of probabilities; this standard of proof requires reasonable satisfaction as to a fact's existence, as delineated in *Briginshaw v Briginshaw*:[119] I must '*feel an actual persuasion of* (a fact's) *occurrence or existence before it can be found. It cannot be found as a result of a mere mechanical comparison of probabilities independently of any belief in its reality.*'[120] Further, the classic formulation of reasonable satisfaction in the context of the "Briginshaw Standard" must not be '*attained or established independently of the nature and consequence of the fact or facts to be proved.*'[121] Leigh Hitchcock's legal representative cited this pre-eminent case in submissions and contended that I ought to moderate my level of reasonable satisfaction in light of the gravity of the consequences which must flow from '*this Court failing to make appropriate findings and recommendations*'.[122] However, Leigh Hitchcock's legal representative did concede that the '*conventional argument*'[123] on this point would be to consider an adverse outcome to '*the professional standing of the hospital and medical staff.*'[124]

92. The "conventional argument" correctly construes the case law. I must consider the '*seriousness of an allegation made...or the gravity of consequences flowing from a particular finding*'[125] to whom it is directed. The interpretation contended by Leigh Hitchcock's representatives would require me to attempt to weigh the gravity of

[119] (1938) 60 CLR 336.
[120] *Briginshaw v Briginshaw* (1938) 60 CLR 336 p 361-2.
[121] *Briginshaw v Briginshaw* (1938) 60 CLR 336 p 361-2.
[122] Submissions on behalf of Leigh Hitchcock dated 5 May 2019 at [23].
[123] Submissions on behalf of Leigh Hitchcock dated 5 May 2019 at [21].
[124] Submissions on behalf of Leigh Hitchcock dated 5 May 2019 at [21].
[125] *Briginshaw v Briginshaw* (1938) 60 CLR 336 p 361-2.

consequences flowing from a particular finding for, *inter alia*, the Hospital against the gravity of consequences for the broader public flowing from failing to make findings. The latter consideration is a misstatement of the law as set out by Justice Dixon in *Briginshaw*. Further, it is my view that making findings in the carefully considered manner delineated by his Honour is the path to honouring the public's best interest. In so doing, I may accurately determine facts and circumstances, in so far as it is possible, make appropriate comments and potentially, recommendations. It is in this manner that I may diligently uphold the Court's role to contribute to a reduction of like deaths and promote public health and safety, without any need to qualify the *Briginshaw* standard of proof.

**Pre-Eclampsia**

93. It was submitted on behalf of both Leigh Hitchcock and Leisa Scammell that Dr Ross' evidence in relation to Sommer suffering pre-eclampsia should be preferred above other expert evidence heard during the Inquest.

94. Leigh Hitchcock's legal representatives submitted that there were increasing and abundant signs of pre-eclampsia throughout Sommer's pregnancy. The submissions relied on Dr Ross' opinions with respect to these signs including, *inter alia,* a weight gain of approximately 35 kilograms.[126] Dr Ross stated that Sommer's weight gain in pregnancy was suspicious for pre-eclampsia.[127] Sommer's weight gain estimate was premised on Leisa Scammell's evidence that her daughter's pre-pregnancy weight was 84 kilograms.[128] However, I note that Sommer's weight was recorded at 106 kilograms on 15 July 2014, when she was approximately 29 weeks pregnant.[129] At post mortem examination, Sommer's body weighed 113 kilograms. The evidence thus indicates that a substantial portion of Sommer's weight gain took place in approximately the first half of her pregnancy.

95. It was verbally submitted on behalf of Leisa Scammell that a caesarean section was booked for Sommer consequent upon pre-eclampsia.[130] There is no evidence to support that contention and I do not accept it.

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[126] Submissions on behalf of Leigh Hitchcock dated 8 May 2019 at [3(b)(b)].
[127] T734 lines 7 – 13.
[128] T16 line 29 – T17 line 6.
[129] CB 286.
[130] T788 lines 1 – 15.

96. It was submitted on behalf of Leigh Hitchcock that, when Sommer was refusing to allow anyone to touch her prior to the insertion of the epidural catheter, this ought to have been recognised as a sign of cerebral irritation, as this was a sign of cerebral irritation according to Dr Ross.[131] The statement and transcript cited in support of this contention relate to Dr Rangaswami stating that Sommer would not allow the midwife to take her blood pressure. During the Inquest, Dr Ross stated that general massive cerebral dysfunction was a cause of Sommer's seizure and cardiac arrest.[132] In his written statement, Dr Ross said that Sommer's apparent confused state and lack of co-operation around the time of insertion of the epidural progressed until the sudden seizure.[133] However, I have not been shown any expert medical opinion in support of the contention that Dr Rangaswami or Midwife Milroy ought to have recognised, at the time, that Sommer's refusal to allow people to touch her indicated developing cerebral irritation.

97. Leigh Hitchcock's legal representatives also submitted that I ought to give credence to evidence that the '*tenor of the (Root Cause Analysis) and indeed nine of the 10 recommendations were premised on the conclusion that Sommer did in fact have pre-eclampsia which was not identified in the antenatal period.*'[134] This contention was adopted by Mr Michael Seelig during verbal submissions on behalf of Leisa Scammell.[135] The Root Cause Analysis does identify that Goulburn Valley Health has made a number of preventative changes, particularly to the management of pre-eclampsia at that health service. However, I note verbal submissions made on behalf of the Hospital that a Root Cause Analysis is undertaken by clinicians and that it is not a forensic analysis in the traditional sense. The Hospital did not have available to it the evidence that is available to the Court,[136] whereas the *viva voce* evidence and expert opinion in this matter has focussed on the Court's capacity to make a Finding as to Sommer's cause of death, in the context of all of the available evidence. As such, I consider it more appropriate to carefully consider and weigh the evidence garnered at Inquest and the expert medical advice, neither of which indicated that the Root Cause Analysis was a persuasive diagnostic tool in this case.

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[131] Submissions on behalf of Leigh Hitchcock dated 8 May 2019 at [12(a)].
[132] T677 lines 24 – 30; T691 lines 3 – 17.
[133] Exhibit 14 at CB 73.
[134] Outline of Submissions on behalf of Leigh Hitchcock at [3(d)].
[135] T778 line 27 – T779 line 21.
[136] T806 lines 1 – 18.

98. It has been submitted to me that Dr Ross' evidence ought to be preferred in relation to diagnosing preeclampsia due to his expertise, experience and considered reports. On behalf of Leigh Hitchcock, it was submitted that Obstetricians Dr White and Professor Hyett's opinion that pre-eclampsia could not be diagnosed failed to provide an explanation for: Sommer's symptomatology in the antenatal period, why she became hypertensive, why she became encephalopathic, why she fitted and why she died.[137] On behalf of Leigh Hitchcock, his legal representative criticised the Obstetric Experts' '*rigid fixation with the criterion of an absolute rise in blood pressure*'.[138] Finally, the legal representative asserted that the Panel '*split along political lines with the concession by Dr Ross that he does not see antenatal patients...to respect professional boundaries and niceties.*'[139]

99. The Panel determined that Sommer was encephalopathic, had a seizure and died because of her acute, severe hypertension. The Panel stated that the reasons for the onset of hypertension in late pregnancy are not relevant to the management of a labouring woman who is acutely, severely hypertensive.[140] It is not within the scope of this Inquest to determine the reasons why some pregnant women, who do not have pre-eclampsia, have blurred vision, increasing peripheral oedema and epigastric and right upper quadrant pain. I am not required to make a Finding as to the causes of these signs and symptoms in Sommer in order to make a Finding regarding the cause of her death.

100. Obstetricians manage antenatal women, whereas Obstetric Anaesthetists manage anaesthesia and analgesia for peripartum women. Consequently, the Obstetricians are the relevant medical specialists on the question of pre-eclampsia. The contention that Dr Ross gave evidence to be polite, as opposed to providing evidence in accordance with the code of conduct for expert witnesses of this Court, was not put to him. Accordingly, I do not accept that submission. Equally, I cannot accept that the Panel Obstetricians' adherence to the formal guidelines for diagnosing pre-eclampsia is illogical or obstructive to diagnosis. The Panel Obstetricians rely on the formal criteria for a diagnosis of pre-eclampsia, including all of the observations made of Sommer and the investigations undertaken. The Panel Obstetric Anaesthetists rely on isolated blood pressure readings and the symptoms of peripheral oedema, headache and blurred vision.

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[137] Submissions on behalf of Leigh Hitchcock dated 5 May 2019 at [18].
[138] Submissions on behalf of Leigh Hitchcock dated 5 May 2019 at [19].
[139] Outline Submissions on behalf of Leigh Hitchcock dated 5 May 2019 at [20].
[140] T674 lines 11 – 23.

However, the Panel Obstetricians informed me that these are not specific symptoms for pre-eclampsia in a pregnant woman.

101. I accept the conclusions of Obstetricians Professor Hyett and Dr White, that:

a. Sommer did not meet the criteria for a diagnosis of pre-eclampsia;

b. Sommer did not have an eclamptic seizure as she did not meet the criteria for pre-eclampsia;

c. up to 6 October 2014 there were no shortcomings in Sommer's management by the Hospital. Sommer did not require induction of labour prior to 6 October 2014;

d. there was no requirement for delivery of Sommer's baby between 1530 hours and 1800 hours on 6 October 2014, and

e. as Sommer did not have a consistently elevated blood pressure until 1755 hours on 6 October 2014, treatment with antihypertensive medication was not required until that date and time.

102. I also note that the Panel considered the Hospital's management appropriate for a pre-eclamptic pregnant woman up until 1755 hours on the date of her death.

**Hypertensive Monitoring**

103. I accept that the times indicated by the CTG machine recordings were accurate, as this was checked by each midwife at the commencement of their shift.

104. It is difficult to reconcile the opposing evidence of Midwife Milroy and Dr Rangaswami in relation to when Dr Rangaswami became aware of Sommer's increased blood pressure. Midwife Milroy's notes were recorded somewhat unconventionally but they were conducive to the circumstances. Midwife Milroy stated that she told Dr Rangaswami of this blood pressure and she wrote '*1755 blood pressure 200 reported*' on the CTG trace. However, Dr Rangaswami said that he was not informed of this blood pressure reading. In his *viva voce* evidence, Dr Rangaswami said that a blood pressure reading of 165/84 mmHg was taken before 1810 hours. At 1810 hours, Sommer's blood pressure was recorded by Midwife Milroy as 185/90 mmHg and Sommer was noted to be drowsy. Dr Rangaswami told the hearing that, after 1810 hours, he knew that Sommer's blood pressure was 190/110.

105. Midwife Milroy's notes are contemporaneous to Sommer's death and I accept them as a record of the events.

106. At 1755 hours on 6 October 2014, accepted obstetric anaesthetic practice required Dr Rangaswami to treat Sommer with IV labetalol to lower her blood pressure and magnesium sulphate for seizure prevention. In the circumstance where magnesium sulphate and labetalol were not started at 1755 hours, these medications should have been administered at the time that Sommer had a dropping conscious state.[141] At 1810 hours, Sommer's drowsiness and the flickering of her eyelids ought not to have be put down to maternal exhaustion. Each of Dr Rangaswami and Dr Djordjic were required to administer magnesium sulphate and labetalol to Sommer between approximately 1810 hours and 1817 hours as they each knew that Sommer was or had been hypertensive and had a depressed conscious state.

107. I am informed by the Panel that the cause of Sommer's generalised tonic-clonic seizure was hypertensive encephalopathy; severe hypertension effected the blood flow to her brain, leading to the seizure. Had Sommer's hypertension been treated between 1755 hours and 1815 hours, Sommer's generalised seizure would have, more likely than not, been prevented. Consequently, her death would have been prevented.

108. During the course of the Inquest, it was identified that Sommer may have had posterior reversible leukoencephalopathy, being a hypertensive encephalopathy, as she had clinical findings and symptoms consistent with PRES. However, this diagnosis cannot be proven in the absence of an MRI scan.

**Hypertensive Management**

109. The Panel informed me that Dr Djordjic's and Dr Rangaswami's failure to provide labetalol and magnesium sulphate to Sommer between approximately 1810 hours and the onset of the seizure at 1817 hours was below the acceptable standard of care. It was submitted on behalf of Dr Rangaswami that:

> *...the evidence of the anaesthetic experts is premised either on the assumption that Sommer had pre-eclampsia and accordingly magnesium sulphate was required in order to prevent an eclamptic seizure or cannot be extracted from the use and benefit of hindsight.*[142]

[141] T681 line 10 – T682 line 4.
[142] Submissions on behalf of Dr Rangaswami dated 7 May 2019 at [21]; Verbal submissions on behalf of Dr Rangaswami by Ms Ellis at T802 line 8 – T803 line 15.

110. I do not accept that the Panel's opinion on this point is nullified by reason of hindsight bias. However, I accept the verbal submissions of the Hospital's legal representatives that treatment by way of labetalol and magnesium sulphate could or should have been given, but that this has to be seen in the context of the situation, prospectively and not retrospectively.[143] Further, Dr Ross suggested that it is possible the terminal event was Sommer's seizure and therefore her condition may have been irrevocably fatal, despite subsequent intervention.[144]

**Foetal Bradycardia**

111. The Panel unanimously agreed that the foetal bradycardia of approximately 90/min seen on the CTG machine printout at approximately 1817 hours[145] was related to Sommer having a generalised tonic-clonic seizure.[146] The submission that this episode of recorded foetal bradycardia was due to loss of contact, maternal pulse rate or artefact was not put to the Panel during the Inquest, and I do not accept these contentions. The Panel unanimously agreed that the foetal bradycardia recorded at approximately 1823 hours[147] was, more likely than not, related to Sommer having a cardiac arrest.[148]

**Resuscitation**

112. The Panel informed me that it cannot be determined whether Sommer would have survived had she been managed differently from 1823 hours. As such, the medical management of Sommer's resuscitation cannot be held to have contributed to her death. However, the evidence has indicated that some aspects the management of Sommer's resuscitation fell below the required standard of care.

113. Dr Rangaswami made two unsuccessful attempts to intubate Sommer and did not attempt to insert a laryngeal mask. The Panel stated that Dr Rangaswami's failure to insert a laryngeal mask for Sommer after the first failed intubation attempt, was unreasonable. However, the evidence is that Sommer was successfully ventilated with a bag and mask during the resuscitation.[149] Consequently, there is not a causative link

[143] T804 lines 5 – 12; T813 lines 11 – 24.
[144] T688 line 22 – T689 line 7.
[145] Exhibit 7.
[146] T675 lines 11 – 18.
[147] Exhibit 7.
[148] T675 lines19 - 25.
[149] T445 line 29 – T446 line 2 and T452 lines 25 – 28 and T453 line 31 – T454 line2 per Dr Chew.

between Sommer's death and Dr Rangaswami's decision not to use a laryngeal mask during resuscitation.

114. It was submitted on behalf of Dr Rangaswami that the Court should prefer the evidence given by those present at the time of Sommer's arrest in order to determine the timing of events. [150] At the Inquest, Dr Rangaswami and Midwife Milroy stated that there was no delay in starting chest compressions after the discovery that Sommer was in cardiac arrest. On behalf of Dr Rangaswami, legal representatives submitted that contemporaneous written records which nominate the time of events were largely artificial, as they were made during a crisis. I do not accept this contention.

115. The CTG trace recorded the commencement of the cardiac arrest at 1823 hours; this evidence remains unchallenged. I accept the contemporaneously written records of events as accurate. I accept the contemporaneous record made by Midwife Herman, acting as scribe during the resuscitation, that hospital staff '*Commenced CPR*' at 1826 hours. [151] This evidence is supported by Dr Colleen Chew who stated that she arrived at 1824 – 1825 hours,[152] at which time Sommer was not receiving chest compressions[153] and was cyanosed.[154] Therefore, there was a delay of three minutes between the occurrence of the cardiac arrest and the start of chest compressions. The Panel Obstetric Anaesthetists stated that there was a three-minute delay between Sommer being known to be in cardiac arrest and chest compressions starting[155] and that this fell below the accepted standard of care.[156]

116. Administration of 50 mg of IV labetalol to Sommer after the onset of the cardiac arrest was in accordance with The Society of Obstetric Medicine in Australia and New Zealand (SOMANZ) Hypertension Pregnancy Guideline that was likely to be in force at the time of Sommer's death. The SOMANZ Hypertension Pregnancy Guideline (April 2014)[157] for the Management of Hypertensive Disorders of Pregnancy 2014[158] at page 15 prescribes the dose of IV labetalol to be given for severe hypertension as 20 mg to 80 mg.

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[150] Submissions on behalf of Dr Rangaswami dated 7 May 2019 at [32].
[151] CB 312; T232 lines 16 – 19 per Leselle Herman.
[152] T412 lines 10 – 13.
[153] T408 lines 28 – 31.
[154] T408 lines 8 – 9.
[155] CB 312; T681 lines 5 – 28.
[156] T682 line 29 – T683 line 1.
[157] Exhibit 14.
[158] Exhibit 14.

117. Obstetric anaesthetists Dr Ross and Dr McGain considered that it was inappropriate practice to administer 50 mg of IV labetalol to Sommer after she started having the tonic-clonic seizure, and that the dose ought to have been 20 mg of IV labetalol.[159] While a dose of 50 mg was said to be likely to produce an unpredictable and precipitous drop in the blood pressure,[160] there is no evidence to support a finding that IV 50 mg of labetalol was a cause of Sommer's death. No criticism is made of Dr Djordjic for administering 50 mg of labetalol to Sommer as it was proper for Dr Djordjic to administer the recommended dose. However, a copy of my Findings will be provided to SOMANZ as the appropriate authority to consider whether the recommended dose of IV labetalol for treatment of severe hypertension in pregnancy ought to be given in aliquots of 20 mg only.

**Other Matters Extraneous to the Cause of Sommer's Death**

118. The Panel was unable to determine if a wedge was in place for Sommer and considered that, even if a wedge was in place, there was no evidence of an effective mechanical tilt in place for Sommer and was unable to say that the presence of a wedge would have changed the outcome.[161]

119. The medical records show that Sommer consulted directly with an obstetric consultant at the Hospital once prior to 6 October 2014: on 25 August 2014. Sommer was in the red pathway for obstetric patients at the Hospital, meaning that she had a high-risk pregnancy.[162] The medical record shows that Sommer's care was appropriately escalated from midwife to Head Medical Officer and/or Obstetric Registrar whenever Sommer attended the Hospital. The Panel determined that there were no shortcomings in Sommer's management by the Hospital until the date of her death.[163]

120. Dr White and Professor Hyett were not critical of Hospital staff for neglecting to measure Sommer's urate level on 6 October 2014. The expert witnesses considered that it was not necessary to measure Sommer's serum urate as it is no longer regarded as particularly useful in the management of possible hypertensive disorders of pregnancy.[164]

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[159] T676 line 26 – T677 line 26.
[160] T676 line 27 – T677 line 19.
[161] T685 line 10 – T687 line 3.
[162] CB 264; T282 line 30 – T283 line 7 per Dr Djordjic; T327 lines 4 - 21 per Dr Ijaz.
[163] T719 lines 14 – 21.
[164] T670 lines 5 – 8.

121. The Panel considered the eight-minute period between Sommer's cardiac arrest and delivery of the baby was reasonable in all the circumstances.[165]

122. I do not intend to make any adverse findings regarding the management of Sommer by: Midwife Leselle Herman, Midwife Debra Milroy, Dr Nazia Ijaz, Dr Colleen Chew or Dr Ruary Mackenzie.

**Preventative and Restorative Measures**

123. I make no specific recommendations in relation to Goulbourn Valley Health that arise from the circumstances of Sommer's death. The Hospital completed a contemporaneous review and subsequently implement changes in response to Sommer's death. The Hospital review was premised on the concept that Sommer died of preeclampsia, a finding that I do not make. However, I am satisfied that the Hospital, under the auspices of Goulbourn Valley Health, has identified and made appropriate changes with the aim of promoting health and safety and preventing like deaths.

**Family Participation**

124. There has been a significant delay between Sommer's death and the finalisation of the coronial process. Additionally, there was an extended period where the Court failed to communicate with her family, despite significant and ongoing investigation which included seeking multiple independent expert opinions. These failings could have only increased the distress of her family and in no way reflects the principles of therapeutic jurisprudence expounded by this Court. I apologise unreservedly to Sommer's family and loved ones. Furthermore, I thank them for their willingness to participate in the coronial process and assist the Court during the period that I have had carriage of this matter.

125. Sommer's death was unexpected and tragic, and the tragedy is compounded by her very young age. I offer my sincere condolences to her family and friends.

[165] T684 line 19 – 685 line 9

## FINDINGS

1. I find that the identity of the deceased person was Sommer Bethany Warren who was born on 12 March 1996.

2. I find that Sommer Bethany Warren died in labour on 6 October 2014 at the Shepparton Hospital of Goulburn Valley Health in Shepparton in the State of Victoria.

3. I find that Sommer Bethany Warren had sudden onset severe hypertension during the second stage of her labour on 6 October 2014.

4. I find that Sommer Bethany Warren's severe hypertension was identified and reported to Dr Rangaswami at 1755 hours 6 October 2014.

5. I further find that the severe hypertension was not treated with intravenous labetalol and magnesium sulphate between 1755 hours and 1817 hours on 6 October 2014.

6. I find that accepted medical practice required Sommer Bethany Warren to be treated with intravenous labetalol and magnesium sulphate at 1755 hours on 6 October 2014.

7. I find that Sommer Bethany Warren developed hypertensive encephalopathy which resulted in a generalised tonic-clonic seizure at 1817 hours on 6 October 2014.

8. I find that Sommer Bethany Warren's hypertensive encephalopathy resulted in cardiorespiratory arrest at 1823 hours on 6 October 2014.

9. I find that the cause of Sommer Bethany Warren's death is a generalised tonic clonic seizure and cardiac arrest arising from severe hypertensive encephalopathy in labour.

10. I find that the failure to administer Sommer Bethany Warren intravenous labetalol and magnesium sulphate at 1755 hours on 5 October 2014 represents a missed opportunity to prevent her death.

Pursuant to section 49(2) *Coroners Act 2008,* I direct that the Principal Registrar notify the Registrar of Births, Deaths and Marriages (**BDM**) of the prescribed particulars of my Findings following my investigation and accordingly that the Registrar of BDM amend the currently registered cause of death to reflect my Findings into the cause of death of Sommer Bethany Warren.

To enable compliance with section 73(1) of the *Coroners Act 2008* (Vic), I direct that the Findings will be published on the internet.

I direct that a copy of this Finding be provided to the following:

Ms Leisa Scammell by her legal representative at Sofia Lawyers.

Mr Leigh Hitchcock by his legal representative at JG Thompson.

Dr Ruary Mackenzie by his legal representative at Avant Law.

Dr Naz Ijaz by her legal representative at K&L Gates.

Dr Jayakumar Rangaswami by his legal representative at Kennedys Law.

Dr Colleen Chew by her legal representative at Ball + Partners.

Goulburn Valley Health by its legal representative Minter Ellison.

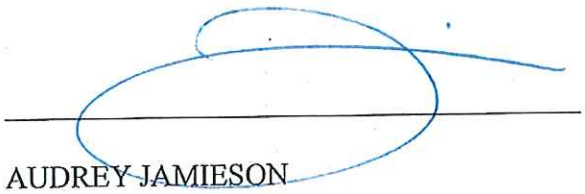
The Royal Australian and New Zealand College of Anaesthetists.

The Royal Australasian and New Zealand College of Obstetricians and Gynaecologists.

The Society of Obstetric Medicine in Australia and New Zealand

Australian Health Practitioner Regulation Agency.

Signature:




AUDREY JAMIESON

CORONER

**Date: 18 March 2020**