CORONERS COURT
OF NEW SOUTH WALES

Inquest:	Into the death of Melissa Stokes
File number:	2016/245963
Hearing dates:	7-9 September 2020
Date of findings:	20 November 2020
Place of findings:	Coroners Court, Lidcombe
Findings of:	Deputy State Coroner E.Truscott
Catchwords:	Coronial Law-unascertained cause of death- pre-surgical anaesthetic assessment- analgesia- post surgical surgery nursing observations
Representation:	**Coronial Advocate Assisting**: Ms C Xanthos **Sydney Local Health District, RN Bogale** Mr P Rooney instructed by Ms O Sclaventis of McCabe Curwoods **Dr Yih Lin Wan** Mr S Barnes instructed by Mr P Tsaousidis of Avant Legal
Findings:	**Identity** Melissa Stokes **Date of Death** 13 August 2016 **Place of Death** Concord Repatriation Hospital, Concord NSW **Cause of death** Fatal Cardiac Arrhythmia **Manner of death** Natural

IN THE CORONERS COURT
LIDCOMBE
NSW

Section 81 Coroners Act 2009

REASONS FOR DECISION

Introduction

1. This is an inquest into the death of Melissa Stokes born on 29th June 1967 in Australia. Melissa had been a young mother and at the time of her death she was living with her partner Greg and one of her adult sons, Gavin Rudd. Since Melissa's death Gavin has married and lives with his wife Hunelith in Sydney. Melissa's older son Keith lives in Tamworth and has two sons. Melissa was the loved daughter of Mary who was unable to attend the inquest but has been kept appraised of the proceedings.

2. Melissa was a highly regarded employee at Bay Audio, a hearing aid specialist, managing numerous stores throughout Sydney. Prior to that time she had worked as a pharmacy assistant in Carlingford and the years preceding that worked as an Assistant in Nursing and then an Enrolled Nurse where she worked with high dependency patients with dementia in aged care. She studied and obtained her qualifications whilst working.

3. Melissa and Greg had planned to move north to live in Port Macquarie. Melissa was a relatively active and healthy person. However, in the preceding 12 months she had been experiencing heavy uterine bleeding marked by increased abdominal swelling and discomfort and blood tests identified iron and haemoglobin deficits.

4. Melissa sought treatment from her GP who subsequently referred her to a specialist in Obstetrics and Gynaecology, Dr Anne Hungerford Pike.

Pre-Operative Assessment

5. Melissa attended Dr Pike on 25 May 2016 and after medical examination Dr Pike advised Melissa that she had a 6cm fundal fibroid which was the likely cause of her symptoms. Management options were explored and Dr Pike recommended an Abdominal Hysterectomy with ovarian conservation. Melissa had pre-existing stress incontinence so the option of inserting a suburethral sling was also discussed.

6. Melissa participated in an Urodynamic Study on 16 June 2016 which confirmed a diagnosis of moderate urodynamic stress incontinence. On 8 July 2016, Melissa returned to Dr Pike where she consented to having an hysterectomy and the placement of a suburethral sling. The surgery was scheduled at Concord Repatriation General Hospital ("the Hospital") on 12 August 2016.

7. On 19 July 2016, Melissa attended a pre-admission clinic at the Hospital and was seen by the senior staff anaesthetist, Dr Jennifer Prowse. In 2003, Melissa had undergone surgery where anaesthetists had experienced difficulty intubating Melissa. A letter from the Blacktown hospital was provided to Dr Prowse for her consideration in the pre-anaesthetic assessment process. The letter set out that in 2003 intubation was achieved after using a McCoy blade and a long bougie into the trachea. The letter recommended that due to the intubation difficulties, that where appropriate, regional anaesthesia be considered for future procedures.

8. In preparation for her appointment with Dr Prowse, Melissa had been provided a "Pre-procedure Health Questionnaire" – a three page, double sided document which set out many questions in relation to her health. On 19 July 2016 Melissa provided the document to the hospital but she had only completed the front page. Dr Prowse said that was not unusual.

9. Dr Prowse completed a "Pre-Anaesthetic Assessment" which included an airway assessment. Dr Prowse conducted a Malampati test whereby she had Melissa sit with her back straight, and with open mouth extend her tongue so that the doctor could visualise access for Melissa's intubation. Dr Prowse agreed that Melissa had a Malampati score of 3 out of 4 which indicated limited visualisation. Dr Prowse noted such on the assessment form. Dr Prowse added that Melissa

had a small jaw but was able to move her top jaw over her bottom jaw. Dr Prowse advised Melissa she may experience some damage to her teeth from the intubation.

10. Dr Prowse's assessment was forwarded to the surgical anaesthetist involved in Melissa's surgery, Dr Yih Le Wan.

The surgery

11. On the morning of 12 August 2016, Gavin, dropped Melissa her off at the Hospital. After completing some paperwork Melissa saw her surgeon Dr Pike and assisting trainee Dr K Vanza. She then saw anaesthetist Dr Wan and her assisting trainee Dr Gupta. At 1:39pm, Melissa's induction commenced; drugs were administered as part of the anaesthesia process and documented on the Anaesthetics record sheet. Dr Gupta performed the intubation without any difficulties.

12. The surgery commenced at 1:51pm and was completed without any complication by 3:46pm. Dr Gupta made some entries on the Anaesthetic Record including up to 2.15 pm. He then left the surgery to attend to other tasks and when he returned Melissa was in the recovery room and he was excused for the day.

Post-Operative Recovery Observations

13. Melissa's recovery room observations were recorded at 15-minute intervals between 3:50pm and 4:50pm. At 4:05pm and 4:20pm, observations documented that Melissa had pain, but by 4:35pm a zero score was recorded. Her final observations were recorded at 4:50pm where Melissa was given a Post-Anaesthesia-Recovery-Score (P.A.R.S) score of 6 enabling her discharged from the recovery ward.

14. Melissa was seen in recovery by her surgeon Dr Pike and just prior to her transfer by Dr Wan. By all accounts Melissa was recovering well; she was described as being alert and orientated with a blood pressure of 130/89; a heart rate of 63; and her temperature was 35.7º. At 5:00pm, Melissa was transferred to the Colorectal Ward known as 1 East Ward.

1 East Ward Nursing Observations: 7 hours from 5:00pm

15. At the time Melissa was transferred to 1 East Ward the afternoon nursing shift rotation was occurring. According to RN Walker Melissa was initially placed in a shared room (bed 36) but at about 6 pm she was moved to a single room (bed 42). RN Walker said this was because it was realised that Melissa had private health insurance. I think she is mistaken about that because the form Melissa filled out that morning stated that she did not have such. RN Bogale said that Melissa was in bed 42 from the start of her transfer. RN Bogale was assigned to Melissa's direct care as one of her 6 patients.

16. In her statement of 31 October 2018 RN Bogale claims that she performed Melissa's four sets of observations recorded on the Standard Adult General Observation Chart (SAGO) at 5, 6, 7 and 8 pm. The SAGO shows that the entry of 5 pm is unsigned and the remaining three entries are signed with the initial "XW".

17. In a later statement dated 26 August 2020 RN Bogale she says that she is not the person with initials "XW". In her evidence she said she does not know who the nurse with those initials is. Likewise, the Hospital has not been able to identify the nurse working on the ward at that time who had initials "XW".

18. Medication records indicate that at 7:09pm, Melissa was administered a dose of 1000 mg oral paracetamol and at 7:12 pm 40 mg Clexane. At 7:41pm, RN Bogale entered a handover record that Melissa's "clinical status" was "stable" but she did not refer to having provided any medication to her, whether Melissa tolerated her evening meal, or whether Melissa complained of pain or nausea.

19. At 8:00pm, RN Bogale was called away to provide urgent assistance with another patient. She recalls that up to that time she held no concerns for Melissa and according to her statement, observations were not due to be checked again until midnight.

20. RN Bogale remained engaged with the other patient until 9:30pm. RN Bogale said that some time after she returned to the ward and before she completed her shift at 10.20 pm she had looked into Melissa's room and saw that she was sleeping.

21. RN Walker who was the team leader of the afternoon shift cared for RN Bogale's patients from about 8:00pm. RN Walker said she performed her ward rounds which included checking in on Melissa at about 8:30pm and at that time Melissa complained of nausea. RN Walker gave her a vomit bag but she said Melissa did not vomit. RN Walker administered the anti-emetic drug Stemetil by IV at 8.50 pm and recorded such on the Medication Administration History Form.

22. In her evidence, RN Walker she said that she remained with Melissa for 10 minutes to ensure the efficacy of the medication but that during that time she did not perform any 9 pm observations because she says she saw that the 8 pm observations had been completed and the next observations were not due until midnight. RN Walker did not make any note on Melissa's handover record though she conducted the verbal handover of patients to the night shift nurses before she left her shift. RN Walker says she next saw Melissa at about 10:00pm as she finished her shift. She said that as she walked past Melissa's room she noted that Melissa seemed to be sleeping.

23. The night shift usually had three nurses commencing at 9:30pm. However, only two had been rostered. RN Anna Christodoulakis contacted the Assistant Director of Nursing (ADN) to request assistance. There were 20 patients on the ward and another was expected to arrive shortly. One patient on the ward was being treated by MET (Medical Emergency Team). It was very busy. The second nurse, RN Marie Thai arrived at 9.20 pm, noted the MET call underway and attended handover but left the ward at 10:10 with the MET patient.

24. Assistant-in-Nursing ("AIN") Xinhe Tian arrived at about 10 pm having been re-allocated to 1 East Ward as a result of the staffing issue. AIN Tian provided a statement but was not available to give evidence in the inquest.

25. AIN Tian says in her statement that she arrived at 10 pm when handover was still occurring and that she had heard about Melissa's surgery and post-operative progress. She said "I recall being told that Melissa had a PCA (Patient Controlled Analgesia) which meant Melissa controlled the amount of pain medication she received. I also recall being told at the handover that Melissa's post-operative observations were satisfactory". AIN Tian's recollection that Melissa had PCA is incorrect as Melissa did not have any PCA.

26. RN Thai says that at handover she was told that Melissa had felt nauseas, for which she had been given medication and that she seemed to have settled after that and she just wanted to have a rest and have a sleep. While RN Thai was off the ward between 10:10 and 10:30 RN Christodoulakis was responsible for all the patients.

27. RN Christodoulakis said she tasked AIN Tian to carry out duties in relation to all the patients by attending to and emptying their drains and catheters. AIN Tian says in her statement "I was directed to answer patients' buzzers. I was not allocated any patients to personally care for myself. Instead, I was asked to assist the nurses by performing specific tasks".

28. AIN Tian says that after she had attended to the buzzers she was tasked with emptying IDC bags which involved recording the output of each bag in the patients' records. She said that the task took about 5 minutes for each patient. She said most but not all patients had an IDC and whilst performing those tasks she also attended patients' buzzers.

29. AIN Tian reports that when she entered Melissa's room to empty the IDC, the light was not turned on, however there was sufficient light coming from the corridor to allow her to change the IDC bag without having to turn on the lights. She does not identify the time at which this was done. She does not refer to Melissa being awake or asleep. She does not refer to having recorded or failed to record the IDC volume in the output chart. She says that after completing the work with IDC bags RN Thai asked her to carry out observations of patients.

30. About 10:20pm, RN Christodoulakis performed a ward round. As RN Thai still had not returned to the ward, she checked on all patients, including Melissa. In her statement, RN Christodoulakis describes Melissa's room as having no lights on. Using her torch, she saw Melissa lying on her right side and facing away from the door. The blanket was covering Melissa and RN Christodoulakis said that she saw the blanket rising and falling; she deduced that Melissa was breathing.

31. About 10:30pm, RN Thai returned to the ward and spoke to RN Christodoulakis who then allocated her 9 patients to care for, one of whom was Melissa. RN Thai

checked on her patients including Melissa who she described as “sleeping peacefully”. She said in evidence that Melissa was not snoring.

32. RN Thai did not check Melissa’s observation chart because she said she had seen it at call-over though had not at that stage been allocated Melissa as her patient. She said that at handover there was nothing mentioned about Melissa being still on fluids.

33. RN Thai said in her evidence that at midnight she saw that both the IV fluids bag and the IDC bag were empty. However, this cannot be correct because the fluid charts indicate that 100 ml per hour flowed from a 1 Litre Hartmann’s. The IV Fluid Order and Administration chart completed prior to Melissa’s transfer to 1 East Ward shows that the bag was commenced at 4.30 pm. Accordingly, at that rate, it would be expected that the bag would have 300 ml remaining at 11.30 pm.

34. RN Thai said in her evidence that because Melissa had had something to eat at dinner (between 5 and 7 pm), the fluids would have been disconnected and ceased. If that was the case then the fluid flow sheet would have recorded that some 200-300 ml had been used. However, the flow sheet records that 700 ml had been used. In her evidence RN Thai said that she had retrospectively completed a fluids flow sheet indicating that from 7 pm to 11 pm 500 ml of IV fluids had been administered to Melissa. She recorded that 600 ml had been emptied from the IDC bag and that 100 ml emesis (vomitus) had been output. She did this at 4.41 am.

35. RN Thai said in her evidence that around 11.30 pm as she and AIN Tian were “crossing paths” AIN Tian told her that she had emptied 600 ml from Melissa’s IDC bag. There was no such reference in RN Thai’s statement about this. I doubt that event occurred. AIN Tian said it was her practice to record the volume and enter it in the patient’s file when she emptied the bag.

36. In her statement AIN Tian did not say what volume the IDC was nor did she suggest she informed RN Thai what it was. AIN Tian did not record the volume of the IDC in Melissa’s records contrary to what she claimed her practice was.

37. The Fluids Flowsheet is not a reliable document but rather one constructed by RN Thai after Melissa's death. I note that shortly after 5 pm RN Bogale had entered both the 6 pm and the 5 pm reading, no doubt on the basis of the flow being set at 100m/hour. No nurse completed the fluid charts in a timely or reliable manner.

38. Just before 11:30pm, a registered nurse from the ICU was sent to assist 1 East Ward. AIN Tian was required to leave 1 East Ward so she could perform meal relief duties at another location at midnight. RN Christodoulakis says that at about 11.40 pm she tasked AIN Tian with completing the observations of patients before she left.

39. AIN Tian said that when she went into Melissa's room to take the observations, the room was dark and that she called out to Melissa but could not wake her. She said it was her usual practice to leave such patients and return to them after she had completed other patients' observations. She made no mention of seeing vomitus on Melissa and though she had said the room was sufficiently lit from the corridor to empty the IDC bag and record the volume (which she did not do). It is not possible to ascertain whether AIN Tian attended Melissa once or twice through the shift.

40. Just before midnight, AIN Tian approached RN Thai and indicated to her that she had not performed observations of Melissa as she was unable to wake her.

41. RN Thai then entered Melissa's room and turned on the lights. Melissa was lying on her left side with her face against the bedrails and vomitus on the bedsheet. RN Thai immediately pressed the Medical Emergency Team (MET) call button.

42. Dr Coon, the medical officer in charge, who was on the ward attending to another patient immediately attended Melissa and commenced chest compressions. Other medical and nursing staff also responded and emergency procedures commenced under the coordination of the ICU Registrar. CPR continued for 41 minutes, however these efforts remained unsuccessful. Dr Coon gave evidence that in her view, Melissa was deceased at the time of the MET call and she described her as very cool to the touch.

43. Dr Coon said she noted that it had been some time since observations had been made asked the nursing staff the time when Melissa was last attended upon (to check the catheter and carry out observations) and no-body could give her an answer). I do note that RN Thai wrote a nursing report at 0150 on 13 August 2016 in which she said that the AIN emptied the catheter bag at about 2330 and at 2354 she was informed by the AIN that she could not rouse Melissa. RN Thai was the scribe for the MET call and according to Dr Coon when she asked the nurses about the time when Melissa was attended (to check the catheter or be observed). She said that no nurse was able to give her a time.

44. Identifying the time at which the AIN attended Melissa to empty her IDC as 11.30 is inconsistent with the AIN saying that she had completed those tasks before continuing to answer patients' buzzers and RN Christodoulakis saying that it was after 11.40 that she tasked the AIN to finish taking observations. It has not been possible to identity precisely when it was that AIN Tian had tried to rouse Melissa to carry out observations and how much time elapsed before she notified RN Thai that she had not performed observations. On the evidence, it could not be said with confidence that it was within the hour of the MET call.

Medical Opinions relating to Cause of Death

45. A post mortem examination was completed by Dr Lorraine du Toit-Prinsloo on 18th August 2016. Her examination included a review of Melissa's history and medical records; a macroscopic and histological examination of the organs; and an analytic toxicology examination of bloods.

46. The histological examination of tissue slides showed the features of minimal ischaemic heart disease. The toxicology report provided results of quantitative tests identified the following substances in Melissa's blood:
    i. 1.1 mg/L Bupivacaine;
    ii. 0.005 mg/L Fentanyl;
    iii. 14 mg/L Paracetamol; and
    iv. 1.7 mg/L Tramadol.

47. Dr du Toit-Prinsloo's report sets out a number of cardiac findings following microscopic examination:

"The T-block (anterior aspect of the left ventricle, left anterior descending coronary artery and right ventricle) shows coronary arteries with atherosclerotic thickening of the intima and eccentric luminal occlusion of approximately 30%. The underlying myocardium displays areas of fibrosis in especially the perivascular regions. Focal lymphocytes are noted on the epicardial surface. There are minimal lymphocytes in the interstitium. The myocytes contain lipofuscin pigment. The section taken from the left ventricle including the left anterior descending coronary artery shows extensive atherosclerosis of the left anterior descending coronary artery with cholesterol slits and calcification. Due to the embedding process, the exact degree of the luminal occlusion cannot be ascertained. The underlying myocardium displays minimal areas of fibrosis. The section taken from the right ventricle and right coronary artery shows minimal atherosclerotic thickening of the intima of the right coronary artery with concentric luminal occlusion of approximately 20-30%. The underlying myocardium displays fatty infiltration in the myocardium. The section taken from the aortic valve shows no abnormalities".

48. Dr du Toit-Prinsloo remarked that histological examination showed features of minimal ischaemic heart disease. Dr du Toit-Prinsloo was unable to establish a medical cause of why Melissa died.

49. Professor Allan Molloy, Consultant Anaesthetist and Pain Management Specialist has provided two reports in 2017 and 2018 respectively. Those documents were provided to Dr du Toit-Prinsloo for comment.

50. Dr Molloy identified that these narcotics were within the prescribed range but described them as a significant dose of drugs for pain control noting that Melissa was opiate naive. In his first statement he queried a reference to Melissa receiving Patient Controlled Analgesic (PCA) but upon further inquiry, the hospital confirmed that Melissa did not have PCA.

51. Dr Molloy noted a well described link between a patient with difficult intubation and obstructive sleep apnoea (OSA). He described that patients with undiagnosed and untreated serious obstructive sleep apnoea have been reported to have fatal or near-fatal post-operative respiratory complications and even unexpected death. In his initial report Dr Molloy pointed out that on

discharge to the ward, there was “no evidence of respiratory depression with a respiratory rate of 16 and good saturations of oxygen”.

52. Dr Molloy noted that the hospital file sent to him did not contain the medication chart to indicate what drugs Melissa had on the ward and that there was no fluid chart to see if her fluid intake was acceptable. He noted that Melissa’s pain score was high at 6/10- 7/10 and it dropped to 3 (at 6, 7 and 8 pm respectively) at which time her oxygen was changed from 6L by mask to 2 L by nasal prongs.

53. Dr Molloy suggested the possibility that Melissa had undiagnosed sleep apnoea and had a respiratory arrest in association with post-operative sedation and narcotic use. He suggested that she should have had more intensive post-operative monitoring in particular with the use of continuous pulse oximetry or a system to detect apnoea. Dr Molloy was critical that routine observations were not performed so that adverse effects of the narcotics leading to her death were not detected.

54. Dr Pike, Melissa’s surgeon provided a statement and suggested Melissa’s death was more likely cardiac related. Dr Wan and Dr Gupta provided statements about the medication administered during Melissa’s admission. This included analgesia and overall Melissa had received 200 mg of Tramadol and 550 mcg of Fentanyl.

55. In his second report Dr Molloy did not favour Dr Pike’s suggestion that Melissa’s death was likely cardiac related pointing out that as far as he was aware Melissa had no prior history of cardiac problems and she was generally fit and well.

56. Dr du Toit-Prinsloo was provided Dr Molloy’s reports and Dr Pike’s statement and provided a supplementary statement dated 30 June 2020 in which she opined that a sudden cardiac death due to an arrhythmia (as proposed by Dr Pike) is a plausible cause of death noting the post mortem findings of minimal ischaemic heart disease, it was possible that Melissa could have had an arrhythmia from a hyper acute ischaemic event.

57. Dr du Toit-Prinsloo suggested that a report be obtained from a toxicologist in light of Dr Molloy’s report and stated that given the uncertainty regarding the potential

effects of the opioid pain medication with possible respiratory depression, she opined that the cause of death is best left as unascertained.

58. A report from Professor Alison Jones, a Specialist Physician and Clinical Toxicologist was then obtained. Professor Jones provided her opinion about the two opioids administered to Melissa for pain control, Tramadol and Fentanyl. Dr Jones agreed that the doses administered to Melissa were within the prescribed limits according to the Australian Medicines Handbook. However, she noted that even within therapeutic concentration levels, opioid adverse effects such as respiratory depression in conjunction with other opioids can occur. In her report Dr Jones opined that Opioid Induced Respiratory Depression (OIRD) with resultant cardiac arrest was the probable explanation for Melissa's death.

59. The Australian Medicines Handbook advises that opioids should be used with extreme caution identifying respiratory depression as the most serious adverse effect. Opioids have two marked effects on breathing - a decrease of both rate and volume of breath. Reduced levels of consciousness can be a response to opioids and the degree of a patient's sedation can indicate a patient experiencing respiratory depression. Dr Jones states that clinically significant OIRD usually results as a decline of these parameters over many hours.

60. Avant Law, instructed by Dr Wan, engaged an expert report from Dr Gronow, a Consultant in Pain Medicine and Neurology. He noted that Melissa was not exhibiting any signs of over-sedation or opioid-induced respiratory decline and that her death was unlikely to be related to any of the analgesia prescribed to her.

61. Accordingly, the level of monitoring and the records of the nursing observations assumed some significance in examining the cause of death. Likewise, whether the pre-anaesthetic assessment observations suggested Melissa had sleep apnoea or indications of cardiac dysfunction was of importance.

The Issues at Inquest

62. Melissa's death occurred unexpectedly following successful and uncomplicated surgery and as the Post Mortem Report did not identify a cause of death the issues in the inquest were as follows:

i. What was the cause of death?

ii. What consideration was given to Ms Stokes' respiratory risk(s) prior to undergoing surgery on 12th August 2016?

iii. What post-operative medical directions were given to the nursing staff to manage Ms Stokes in her post-recovery period after surgery? Were they appropriate to manage and address any potential complications arising from surgery?

iv. Were nursing observations appropriately undertaken when Ms Stokes was transferred into 1 East Ward?

v. Is it necessary or desirable to make recommendations in relation to any matter connected with the Ms Stokes' death, pursuant to s 82 *Coroners Act 2009*?

Witnesses

63. Twelve witnesses gave evidence. The first were the doctors involved in Melissa's anaesthesia. They were Dr Prowse who carried out the pre-anaesthesia assessment and Dr Wan the Staff Specialist and Dr Gupta, the trainee specialist assisting her. Four nurses who were on duty on the ward gave evidence: Registered Nurses Thai, Bogale, Walker and Christodoulakis gave evidence but AIN Tian did not as she is no longer in Australia. There was an AIN with initials "XW" who provided care to Melissa on the shift worked by RN Bogale. The Hospital has not been able to identify who that person is and accordingly a statement was not obtained. Dr Coon who headed the emergency response and Ms Goldsack the Hospital's Acting Clinical Director of Nursing gave evidence. Professor Molloy gave evidence and Professor Jones and Dr Gronows' gave their evidence in conclave.

Pre-Operative Assessment

64. In her evidence, Dr Prowse spoke to her assessment and acknowledged that it was unclear whether Melissa had brought the Pre-Procedure Health questionnaire form with her to the appointment. Dr Prowse indicated that this would not have impacted on the assessment as she would ask questions to establish whether Melissa had any issues with anaesthesia, allergies or any of the other co-morbidities which are set out on the back page of the questionnaire.

65. Dr Prowse confirmed that there were no notes other than what she wrote on the portions of the document which are limited to Melissa's Malampati score and intubation.

66. I accept that Dr Prowse performed an appropriate assessment during which she did not identify any cardiac or respiratory risks that Melissa might have had and in particular sleep apnoea. There was no evidence in the inquest that Melissa in fact had sleep apnoea, undiagnosed or suspected.

Post-Operative Medical Directions

67. Dr Wan gave evidence about the levels of analgesic medication administered to Melissa. Dr Wan confirmed that she had ordered the post-operative recovery orders for pain relief and that when she saw Melissa in the recovery room before being transferred to 1 East Ward, Melissa was alert and orientated and was not exhibiting signs of being over-sedated.

68. Dr Gupta said that he did not write up the post-operative medical directions or prescriptions. Dr Wan said it would be usual for the anaesthesia registrar to do so. The flow chart provided to the inquest captures the prescriptions indicates that Tramadol 150 mg BD (2x a day) and Paracetamol QID (4x a day) but it does not show by whom and when the prescriptions were made. The Medication records suggests that Dr Gupta did actually carry out that task and the likely time that he did so was at about 2.18 pm.

69. The Medication History Record indicates that the current start time of the Paracetamol was 6 pm and Dr Gupta had prescribed it and RN Bogale had administered it at 7.09 pm. The record also indicates a current start time for 12.5 mg Prochlorperazine (Stemetil) as 2.18 pm and that 12 mg was administered by RN Walker at 8:50 pm. There was no issue with any post-operative orders or prescriptions other than clarifying who it was that made them.

Electronic Medical Records (eMR)

70. At the time of Melissa's surgery, the Hospital was implementing an electronic medical records system (eMR). The prescription and administration of

medication was fully implemented as was apparently fluid charts and some nursing notes but the observations and most progress notes remained handwritten.

71. The only Progress/Clinical notes were made shortly after 5 pm when Melissa arrived on 1 East Ward by RN Bogale. Other than a handover record at 7.41 pm that Melissa was stable, there were no up-to-date handover notes made by either RN Bogale or RN Walker for evening shift to night shift handover at 9.30 pm.

72. Only the SAGO chart can be referred to when assessing whether Melissa's deterioration was apparent or noted. Though the statement from RN Thai says that at the evening handover she learned the Melissa had complained of nausea and vomiting around dinner time and was administered Stemetil there is no note appearing in any document to that effect other than the fact of administration of medication contained in the eMR.

73. RN Thai said that she recorded handwritten plans for each of her patients at about 11 pm. The plan for Melissa indicated that "she was post-op, catheter out at 0600, oral Panadol at midnight and 6 am and Tramadol, 150 milligrams. RN Thai said that she would have looked at the post-op orders and the eMR medication chart to write the plan.

74. There is no record of Tramadol being administered to Melissa whilst on 1 East Ward. The last administration of Tramadol was in the recovery room at 4.12 pm. During her evidence, RN Thai said that because the order was "BD" (twice a day) she expected that it would be administered at 8 pm and 8 am but then suggested that she might have intended to dispense it at 6 am given that she would be leaving her shift prior to 8 a.m.

Medication Administration Charts

75. The eMR flow sheet indicated that Melissa was prescribed Clexane 40 mg daily, paracetamol 1 g QID and tramadol SR 100 mg BD and Nexium (PRD). The Medication Administration History indicates that the Clexane was administered to Melissa at 19:12 by RN Bogale, however the Current Start Date was 10 pm (five hours after it was administered) and the prescriber was Dr C Stewart who had been a member of Melissa's surgical team.

76. RN Christodoulakis suggested that the “Current Start Date” could indicate when the medication was due to be administered. However, that does not explain the entry in relation to the Paracetamol or the Stemetil. Ms Goldsack was unable to speak on the eMR.

Nursing Observations

77. RN Bogale was unable to identify the nurse “XW”. She was unable to explain why she had said in her earlier statement that she had conducted those observations when she had not. In her evidence she said that she did not enter her initials when she carried out observations.

78. RN Bogale had handwritten a Progress Note at 17.40 pm. This indicated “patient vital signs attended patient BP (Blood Pressure) 130/89 HB 63 SPO2 99% 6L HM RR 18, Temperature 35.2 patient alert and orientated. Pain score was 2. That notation is consistent with SAGO chart but does not mean that RN Bogale actually carried those observations out. However, I note that pain score observations entered on the SAGO were performed at 6,7,8 which are recorded on the SAGO chart as 6,7,3 respectively by “XW”. One would expect that had XW rather than RN Bogale performed the 5 pm observations that “XW” would have completed a pain score on the SAGO and initialled the entries. Accordingly, I am satisfied that RN Bogale did personally take the single set of observations at 5 pm which she has recorded in her handwritten Progress Note.

79. The observations recorded by “XW” do not indicate any deterioration in Melissa’s vital signs. Melissa’s complaint of pain as a 2 at 5 pm escalated to a 6 at 6 pm and then 7 at 7 pm which was met by RN Bogale administering the Paracetamol. There is no evidence that Melissa was administered Tramadol as prescribed and RN Bogale explained in her evidence that though she made no record of it, Melissa may have decided to take the Paracetamol and if it was sufficient to forgo the Tramadol. It would have been helpful if a progress note had been about this. Likewise, with the administration of Stemetil at 8.50 pm because thought it is consistent with Melissa not tolerating dinner well and feeling nauseas, there is no Progress Note made about that.

80. The observations indicate that Melissa's respiratory rate and oxygen saturation levels were unchanged when on 6L Hudson mask at 7 pm and then on a 2L Nasal Prongs at 8 pm. There is no evidence as to how long the prongs had been in use at the time of those observations. There is no evidence about whether the prongs were in use at the time RN Walker gave Melissa the Stemetil, and there are no observations at 9 pm as to whether Melissa maintained the same respiratory function levels as at 8 pm.

81. On any view, initial observations taken upon a patient's arrival would be taken to have a baseline commencement in the SAGO chart and should not be considered as being "an hour" for the purpose of hourly for four hours. The observations should have continued up to and including 9 pm.

82. The Hospital policy required Melissa to have observations taken each hour for four hours and if she was stable, without deterioration, observations were then required every four hours. The wording of the policy apparently allowed for the interpretation of the policy as meaning just taking 4 sets of observations, which effectively meant that a post-operative patient's observations were taken over just a 3 hour period. That policy was changed in August 2017 so that it is now clear that observations are made every passing hour for the first 4 hours.

83. It would appear that neither complaint of pain or nausea, each requiring medication, is considered a deterioration of health as each is an anticipated and not unusual event for a post-surgical patient. RN Walker said that though she spent 10 minutes with Melissa she did not take Melissa's 9 pm observations as she though observations were not next required until midnight. This was a lost opportunity to record Melissa's health as was the lack of having a relevant and timely Progress Note made for handover to the evening nurses.

84. Melissa had no nurse engage with her after 9 pm. I appreciate the ward was busy and I accept that she was seen in passing but I regret I cannot with confidence say that Melissa was seen to be alive by any nurse after 10.30 pm. RN Walker had given Melissa a vomit bag which was unused as at 9 pm. At some stage, likely after 10.30 pm, Melissa was awake and vomited into the bag and placed that on the table next to her bed. Whether she used or attempted to use her buzzer to call for assistance is unknown and when she vomited a second

time and this time unable to reach for the bag or call for assistance is also unknown.

85. For Melissa's family, to think that she had been unattended in her time of need is extremely distressing. Gavin gave a family statement and spoke with generosity and kindness about nursing staff, his wife is also a nurse, but stated that the family feel that Melissa was failed. The poor record keeping and lack of up dated notes is consistent with little if any provision of attendance to Melissa, no doubt due to the needs of other patients on a very busy and understaffed ward that night.

86. If the cause of Melissa's death was opiate related, observant nursing staff would likely have noted a deterioration in Melissa's health but if the cause of Melissa's death was a fatal cardiac arrhythmia particularly, her death may well been both sudden and silent, particularly if she was alseep which makes for an understanding as to how and why Melissa died without anyone noticing.

The Expert Conclave

87. Dr Molloy was unable to give his evidence in conclave though he did have the benefit of the reports of Professor Jones and Dr Gronow. He was taken to the doses of Tramadol and Fentanyl Melissa received – specifically the last administrations of those drugs, being 200 mg Tramadol at 2 pm, and 20 mcg of Fentanyl at 4.12 pm. Dr Molloy agreed that peak serum would occur 40 minutes hence. When asked about a patient's respiratory levels at that peak serum point Dr Molloy explained that Fentanyl is a lipid soluble drug which is distributed, stored in the body and distributed later.

88. Dr Molloy said that he would have expected Melissa to be alert and awake at 8 pm. He had no issue with the reports that Melissa was asleep from 9.30 pm because his experience is that patients come into hospital quite exhausted from being up early and busy organising things. However, he agreed that sleepiness could be a precursor to respiratory depression. He did not think that Melissa's use of the vomit bag was indicative of her going into a respiratory depression because she was able to protect her airway and place the bag on the table.

89. Dr Molloy agreed that Melissa's pain scores of 6 and 7 (at 6-7 pm) indicate that the Tramadol and Fentanyl had stopped being effective. He did not think the 1 g Paracetamol would have brought that pain score down to 3 within an hour but nor did he think 150 mg Tramadol would do so either and that even both drugs in combination may not as he describing that the doses were not very strong. He also thought it would be very rare for the patient to go into respiratory depression given the doses being discussed.

90. He agreed with Dr Gronow's opinion that it would be unlikely that Melissa would exit sedation at about 5 pm and then re-enter it at 10.30 pm. However, Dr Molloy qualified that by saying "I wouldn't say it wouldn't happen…there are lots of just individual reports of the unexpected things like this".

91. Dr Jones' opinion that Melissa most likely died from Opiate Induced Respiratory Depression (OIRD) was based on a number of factors including the post mortem toxicology findings of Tramadol 1.7 mg/L and Fentanyl <0.005 mg/L, and obstructive sleep apnoea.

92. Professor Jones opined that the post mortem concentration of Tramadol was compatible with the 200 mg administered (at 2 pm) but was disproportionately high given the lapse of time between administration and death. She noted that over the 7 hours following administration Tramadol would have undergone at least one half-life of clearance. She noted that taking into account the maximum effect of potential post mortem redistribution factor of 2.5, she opined that the at death concentration would have been approximately 0.86 mg/L which is within therapeutic range.

93. Professor Jones suggested that if Melissa suffered an adverse effect of Tramadol it could have been compounded by the presence of fentanyl but she noted that the fentanyl at post mortem was within therapeutic range and taking into account possible post mortem redistribution could have been 2.7 times lower at time of death. Professor Jones noted that Melissa also received bupivacaine as local block and the post mortem concentration was within therapeutic concentration and that the paracetamol was below therapeutic range.

94. In her report, Professor Jones noted that patients with pre-existing cardiovascular or respiratory disease had higher associated risk of OIRD and

noted that continuous background infusion of opioids should be avoided and using multimodal analgesia and an opioid sparing strategy will decrease and she noted that such was used in Melissa's case.

95. Professor Jones wrote that cardiac arrhythmias is possible as a result of at least three drugs that may have cardiac effects, but that OIRD with resultant cardiac arrest is a more probable explanation. She noted that though Melissa was noted to have 30% stenosis of the right coronary artery (which supplies the rhythm generating tissues within the heart) Professor Jones opined that such stenosis was unlikely to predispose Melissa to cardiac arrhythmia which can cause death either independent of opioid toxicity or predisposing to arrhythmias from opioid toxicity.

96. Professor Jones noted in her report that the post mortem sample was taken 5 days after death and was not sent for analysis for 31 days and questions how it was stored. In her evidence she conceded that taking into account those circumstances and the potential effects of post mortem redistribution, the post mortem ranges of the sample was unreliable.

97. Accordingly the discussion with Dr Gronow took an acceptable course of examining the doses administered to Melissa and the observed levels of her sedation.

98. Dr Gronow did not accept that OIRD caused Melissa's death. He posited that a sudden cardiac arrhythmia was the likely cause of death. He said that whilst vomiting and sleepiness can be a sign of respiratory distress they are both extremely common events following general anaesthetics and that the medication management of Melissa's nausea indicates against a significant adverse event from the opioids. He pointed out that Melissa's respiratory rate were never noted to be depressed.

99. Dr Gronow wrote that Tramadol causing respiratory arrest is an extremely rare event and would be associated with a very high dose in a patient who has evidence of rental failure or morbid obesity neither of which applied to Melissa.

100. He noted that the tramadol was given over a period of 1 ½ hours intravenously and the last dose of fentanyl was at 4.12 pm, more than 7 hours

before Melissa died. He said there was no evidence of any respiratory depression when the serum levels would have been at their peak, which if there was a degree of sensitivity to the fentanyl, one would expect that within the first 30 minutes of the last dose.

101. Finally, he noted that Melissa was fit to be transferred to the ward from the recovery room, scoring on all levels: adequate respirations, normal temperature range, verbal response to spoken command, head lift with closed mouth for 5 seconds, comfortable in regard to pain.

102. Professor Jones and Dr Gronow agreed that the peak effect of tramadol would have been within an hour of its administration, namely at about 3 pm and the analgesic effects would occur for 3-4 hours after that which is consistent with Melissa's report of severe pain at 7 pm. They agreed that the peak effect of the fentanyl would occur within three minutes with an analgesic effect of 5-20 minutes of administration, no later than 5 pm. Again, Melissa's complaint of severe pain at 7 pm is consistent with the spent effectiveness of analgesia. Dr Gronow pointed out that a report of that level of pain suggests that Melissa was also experiencing a lack of sedative effect.

103. Professor Jones and Dr Gronow agreed that after 7 to 8 hours of its administration the tramadol would have passed its half-life and would be at a sub-therapeutic level.

104. In relation to the effect of the 1g paracetamol at 7.09 p.m, Dr Gronow opined that upon a background of the previously administered analgesics, that amount of paracetamol would have been an effective to reduce the pain within an hour from a reported level 7 to level 3 and he thought that such an effect would continue for 3 to 4 hours. Professor Jones agreed with Dr Gronow and pointed out that subjective pain reports are very complex and some patients report a 40% decline in pain on a placebo dose.

105. Dr Gronow and Professor both agreed that the fact Melissa was on supplemental oxygen by a 6L Hudson Mask changed to 2L nasal prongs would not disguise any respiratory decline. Dr Gronow pointed out that Melissa was awake and talking at 8-9 pm with no evidence of sedation and no reduction of respiratory rate, but it would have been good to have had the respiratory rate numbers at 10 pm.

106. Dr Gronow was comfortable with the probability that a cardiac arrhythmia was the cause of Melissa's death. He commented that surgery and pain produces a stress response where adrenaline is released and that good post-operative pain relief reduce complications of surgery. Professor Jones pointed out that drug effects can exacerbate any risk of arrhythmias, and such was a plausible reason for death, a marginally more plausible cause of death setting aside the post mortem toxicology findings.

107. In return to the issues of this inquest. In relation to cause of death, the Coronial Advocate Assisting Ms Xanthos submits that given the evidence of the experts I would find that Melissa's death was a fatal cardiac arrhythmia. This submission is adopted by both Mr Barnes on behalf of Dr Wan and Mr Rooney on behalf of the Sydney Local Health District. I agree . The evidence is compelling that at the time she died Melissa had subtherapeutic levels of Tramadol and Fentanyl.

108. Melissa was fit to be discharged from the recovery room and though observations were only recorded to 8 pm, she did not exhibit signs of sedation. RN Walker spent about 10 minutes with Melissa and did not observe any signs about which would cause her concern about Melissa's recovery, in terms of sedation. She was not experiencing OIRD and Melissa's nausea settled upon receiving Stemetil. Her nausea and sleepiness are explained by factors other than experiencing OIRD. After the peak serum effect of the Tramadol and Fentanyl Melissa did not receive any further medication that would have caused her to experience OIRD. Even if she had received the Tramadol prescribed to her, the low dose would not have caused such an effect.

109. Dr Prowse competently carried out a pre-anaesthetic assessment and correctly identified that Melissa did not have any particular respiratory risk factors.

110. It is difficult to identify the precise post-operative medical directions given to the nursing staff to manage Melissa other than seeing the prescriptions of medication in the flow chart. The nurses were aware that as a post-surgical patient they were required to take and record hourly observations of Melissa's vital signs for the period of four hours. The nurses were aware that after that period of observation, if Melissa showed signs of deterioration, those

observations should continue at least on the hourly basis but preferably on as needed basis, but otherwise they would proceed to every four hours. Those policy directions, if they were appropriately undertaken were appropriate to manage and address any potential complications arising from surgery. It seems that the policy directions were subject to a different interpretation whereby nursing staff took observations 4 times until the 4 hourly set which meant that only hourly observations for the first 3 hours were being carried out.

111. As of August 2017 that policy has now been clarified. However, in addition to the observations not being taken at 9 pm when they could and should have been, a contemporaneous fluid chart was not kept as it should have been and fluid such as that in the IDC bag was not contemporaneously and reliably recorded. Additionally insufficient entries were made on progress notes so that the fact Melissa was nauseas and did not tolerate dinner was not recorded.

112. The fact that Melissa at some stage awoke and used the vomit bag went unnoticed. It is unknown whether Melissa called the buzzer or not. I do note that Melissa herself used to be a nurse so it may be that she dealt with her vomiting without calling for assistance knowing how busy the staff appeared to be.

113. The identification of a nurse who entered the three sets of observations at 6, 7 and 8 pm has never been ascertained. It goes without saying that a Hospital, like any service provider should be able to identify its staff that is providing care to a patient. It was a lost opportunity to hear from the nurse who had the most contact with Melissa after she was admitted to 1 East Ward.

114. Ms Goldsack gave some evidence in relation to the recording of matters then in place at the Hospital noting in particular the transition to an electronic system. Though the fact of transition does not sufficiently explain the lack of nursing staff recording adequate details about a patient's post-surgical progress now that it can be done electronically at the beside by mobile nursing stations is a significant opportunity for nursing staff to enter a good complement of contemporaneous information about a patient's progress and observations.

115. Ms Goldsack's evidence that recent audits of SAGO charts showed 100% compliance with recording the necessary details is compelling that the Hospital engages in a very high level of both staff engagement and compliance with nursing standards.

116. Given the implementation of those changes there are no matters about which I would make recommendations.

I now enter findings:

Identity Melissa Stokes
Date of Death 13 August 2016
Place of Death Concord Repatriation Hospital, Concord NSW
Cause of death Fatal Cardiac Arrhythmia
Manner of death Natural

I wish to again express my sincere condolences to Melissa's family and friends. The inquest is now closed.

Magistrate E Truscott
Deputy State Coroner
20 November 2020