CORONER'S COURT

OF NEW SOUTH WALES

Inquest:	Inquest into the death of Andrew Stubbs
Hearing dates:	15-18 May 2023
Date of findings:	11 August 2023
Place of findings:	Coroner's Court of New South Wales
Findings of:	Magistrate David O'Neil, Deputy State Coroner
Catchwords:	CORONIAL LAW – monitoring of blood lithium levels by General Practitioner – lithium toxicity – decision to commence Intermittent Haemodialysis – complications of dialysis treatment – factors contributing to dialysis disequilibrium syndrome and cerebral oedema
File number:	2020/00253013
Representation:	Mr Jake Harris, Counsel Assisting instructed by Clara Potocki (Crown Solicitor's Office) Dr Peggy Dwyer, instructed by Meridian Lawyers for Dr Alex Golowenko Mr Patrick Rooney, instructed by McCabes Lawyers for South Western Sydney Local Health District, Dr Aravindan Ananthakrishnapuram, and Dr Thilini Kudagamage Mr Stephen Barnes, instructed by Avant Law for Dr Monique Leijten

Findings:

I make the following findings in relation to the death of Andrew Stubbs, pursuant to s 81 of the *Coroners Act 2009* (NSW):

Identity:

The person who died was Andrew Stubbs.

Date of death:

Andrew died on 26 August 2020.

Place of death:

Andrew died at Campbelltown Hospital, Campbelltown NSW.

Cause of death:

Andrew died of Cerebral Oedema, secondary to Dialysis Disequilibrium Syndrome.

Manner of death:

Andrew's death occurred as result of a complication of the dialysis treatment he was undertaking to treat severe lithium toxicity and kidney failure.

Recommendations:

I make the following recommendation pursuant to s 82 of the *Coroners Act 2009* (NSW)

To South Western Sydney Local Health District (SWSLHD):

I recommend that the SWSLHD give consideration to whether the SWSLHD's current Lithium Carbonate Guideline, or a separate guidance document adapted from that guideline, can be provided to General Practitioners when a patient who is prescribed lithium is planned to be discharged from the Community Mental Health Service into the care of a General Practitioner.

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JUDGMENT

Introduction

1 In August 2020 Mr Andrew Stubbs (Andrew) was aged 32.

2 He had a debilitating illness, schizoaffective disorder, which had resulted in his hospitalisation for mental health treatment in 2019. Andrew had been taking lithium for about 3 years, and it was successful in managing his illness.

3 With support from the community mental health team, he returned to independent living, in 2020, in Bowral, near to friends and family. Andrew had a good relationship with his family. Andrew saw his parents frequently after returning to live in Bowral, and they visited his home twice a week, for fish and chips and a Chinese meal. Andrew was unable to work, but his parents described his passions for collecting Muhammad Ali memorabilia, breeding and showing exotic poultry, and supporting the Brisbane Broncos.

4 Andrew died as a result of dialysis disequilibrium syndrome (DDS), on 26 August 2020 as a consequence of treatment for lithium toxicity. Exactly what DDS is and how it led to Andrew's death will be explained in these findings.

Inquest

5 An inquest was held between 15 and 18 May 2023.

6 An inquest is a public examination of the circumstances of death. It provides an opportunity to closely consider what led to the death. It is not the primary purpose of an inquest to blame or punish anyone for the death. The process of holding an inquest does not imply that anyone is guilty of wrongdoing. Despite this there may nevertheless be factual findings which necessitate an adverse comment or criticism to be made.

7 The primary function of an inquest is to identify the circumstances in which the death occurred, and to make the formal findings required under s 81 of the *Coroners Act 2009* (NSW) (the Act); namely:

- the person's identity;
- the date and place of the person's death; and
- the manner and cause of death.

8 Another purpose of an inquest is to consider whether it is necessary or desirable to make recommendations in relation to any matter connected with the death. This involves identifying any lessons that can be learned from the death, and whether anything should or could be done differently in the future, to prevent a death in similar circumstances.

Coronial Investigation

9 Prior to holding an inquest, a detailed coronial investigation was undertaken. Investigating Police compiled an initial brief of evidence, and a number of documents were obtained, including a report by a forensic pathologist as to the cause of death. The court also received extensive documentary material which included witness statements, medical records, policies and procedures, and expert reports from four doctors of different specialties: Dr Kerri Eagle, Forensic Psychiatrist; Dr Kylie McArdle, Intensive Care Specialist; Professor David Gracey, Renal Physician; and Associate Professor Naren Gunja, Forensic Toxicologist. The court heard oral evidence from those involved in the provision of medical care and treatment to Andrew and three of the four court appointed experts who provided reports.

10 The following agencies and individuals were identified as having a sufficient interest in the proceedings and received notification:

1) South Western Sydney Local Health District: Patrick Rooney instructed by McCabes Lawyers

2) Dr Alex Golowenko: Dr Peggy Dwyer instructed by Meridian Lawyers

3) Dr Aravindan Ananthakrishnapuram: Patrick Rooney instructed by McCabes Lawyers

4) Dr Monique Leijten: Stephen Barnes instructed by Avant Law

5) Dr Thilini Kudagamage: Patrick Rooney instructed by McCabes Lawyers

11 All the documents including witness statements and expert reports obtained during the coronial investigation formed part of the five-volume brief of evidence that was tendered at the commencement of the inquest. Material was also received and tendered throughout the inquest. All of that material, and the oral evidence at the inquest, have been considered in making the findings detailed below.

12 Counsel assisting summarised much of the tendered material and oral evidence given at inquest in his comprehensive written closing submissions. I regard his summary of the events as accurate and, rely on that document to set out a chronology and to assist with the factual findings. I have also taken into account the helpful written closing submissions made by each of the interested parties.

Witnesses

13 The following witnesses gave oral evidence in the inquest.

14 Dr Alex Golowenko, who was Andrew's General Practitioner. Dr Golowenko had dealings with Andrew prior to 2020. He took over care of Andrew from the community mental health service upon that service's request during 2020.

15 Dr Lachlan Wiedersehn, who was a second-year advanced trainee in 2020, training to be a renal physician at Campbelltown Hospital. Dr Wiedersehn completed the ward round of patients under the care of the renal team on 25 August 2020 which included Andrew.

16 Dr Hasanul Kabir, who was the senior night registrar in Campbelltown Hospital in the Intensive Care Unit for Andrew's admission from 24 August 2020.

17 Dr Aravindan Ananthakrishnapuram, who was a visiting medical officer to Campbelltown Hospital during August 2020 and the renal consultant on call in the week when Andrew was admitted. After receiving a telephone call from a clinician at Bowral Hospital on 24 August 2020 Dr Ananthakrishnapuram formed that the view that it would be necessary and appropriate for Andrew to be transferred from Bowral Hospital to Campbelltown Hospital for close monitoring in the Intensive Care Unit, correction of electrolyte abnormalities, dialysis for removal of toxic levels of Lithium, and treatment of acute kidney injury.

18 Dr Monique Leijten, who was an intensivist at Campbelltown Hospital during Andrew's admission in August 2020. Andrew was under her care in her capacity as intensive specialist whilst Andrew was in the Intensive Care Unit during his admission.

19 Dr Thilini Kudagamage, who was the junior trainee intensivist at Campbelltown Hospital ICU in August 2020 during Andrew's admission.

20 Three nurses who attended to Andrew during his time at Campbelltown Hospital in August 2020: RN Camille Ganac, RN Kate Facer, and RN Liam Beckinsale.

21 Three of the four court appointed expert witnesses: Dr Kerri Eagle, Forensic Psychiatrist; Dr Kylie McArdle, Intensive Care Specialist; and Professor David Gracey, Renal Physician.

22 Dr Stephen Timothy Spicer, Nephrologist, Head of Renal Services for South Western Sydney Local Health District.

Issues considered in the Inquest

23 A list of issues was prepared and circulated to the interested parties before the inquest commenced. These issues guided the coronial investigation and were considered at inquest. The issues examined included:

1) What was the cause of Andrew's death?

2) What factors contributed to Andrew developing dialysis disequilibrium syndrome and cerebral oedema?

3) Was adequate and appropriate care provided by Dr Alex Golowenko, in particular regarding the following matters:

a) monitoring Andrew's lithium levels;

b) action taken when Andrew presented with tremors on 6 August 2020; and

c) action taken when Andrew presented with dehydration on 20 August 2020.

4) Was adequate and appropriate care provided at Campbelltown Hospital, in particular regarding the following matters:

a) the adequacy of metabolic monitoring;

b) the decision to commence Intermittent Haemodialysis on 25 August 2020, including the location of that treatment; and

c) the action taken when Andrew complained of a headache and vomited on 25 August 2020.

5) The nature of relevant policies and procedures in place at the time of Andrew's death, whether these were followed, and any changes that have been made since.

6) Whether any recommendations are necessary or desirable in relation to any matter connected with the death.

Medical Care for Andrew in the Community by Dr Golowenko

24 Andrew had been taking lithium since 2017, and it was successful in managing his schizoaffective disorder, prior to the events that led to his death.

25 During 2020 Andrew was discharged from the care of the community mental health team into the care of Dr Alex Golowenko (Dr Golowenko), General Practitioner (GP).

26 Dr Golowenko had cared for Andrew previously. He had seen Andrew at a different surgery in 2016, and at another from 2017 to 2019. He felt he had developed a good rapport with Andrew. Andrew sought out Dr Golowenko to be his GP, and he returned repeatedly to him for advice and treatment on a range of issues.

27 Dr Golowenko could not recall if he had prescribed lithium to Andrew previously. He had limited experience in prescribing lithium. He recalled only two or three other patients for whom he had prescribed lithium. He also had limited guidance, although he produced one set of guidelines in evidence. As Dr Golowenko had accepted the responsibility of prescribing lithium it was incumbent upon him to seek support and advice as needed, to prescribe it safely.

28 Andrew was previously on a dose on 1250 mg of lithium per day. He was discharged from Campbelltown Hospital on that dose, with a plan to reduce the dose to 1000 mg

per day. That reduction occurred while Andrew was cared for by the Campbeltown community mental health team.

29 Andrew presented to Dr Golowenko on 29 April 2020. The plan was to transition Andrew from the care of Wingecarribee community mental health team (CMHT) to a GP, who would take over care, including prescribing medication.

30 Andrew told Dr Golowenko that he was on a dose of 500 mg lithium in the morning, and 750 mg lithium at night (1250 mg per day). Dr Golowenko considered Andrew to be a rational historian, who was proactive about his own health. He therefore felt it was reasonable to accept Andrew's account at the time. He recorded the dose in Andrew's medical record.

31 In evidence, Dr Golowenko accepted that, on reflection, he should have confirmed the dose with the community mental health team. Dr Golowenko did not dispense lithium immediately. He wrote a prescription on 28 May 2020, for 1250 mg per day. Pharmacy records confirm that it was dispensed at that dose on three occasions.

32 Documents were sent to Dr Golowenko on four occasions, which stated the correct lithium dose of 1000 mg per day:

1) On 1 May 2020, Michael Lucey from Wingecarribee CMHT sent a fax to Dr Golowenko attaching the discharge summary dated 17 April 2020.

2) On 2 June 2020, Mr Lucey sent Dr Junita Basnett's report to Dr Golowenko.

3) On 30 June 2020, Mr Lucey sent a fax to Dr Golowenko, again attaching Dr Basnett's report and the discharge summary.

4) On 23 July 2020, Mr Lucey sent Dr Golowenko a fax, attaching the medication chart, Dr Basnett's report, and the discharge summary.

33 Dr Golowenko explained in evidence that he generally reviewed such correspondence in between seeing other patients and would also review a patient's documents before seeing them again.

34 Despite receiving the documents which confirmed the correct dose, Dr Golowenko did not alter the prescription. In evidence, he stated it had not "*clicked*" that the dose on these documents was different, and he had overlooked it. He accepted he had not "*double or triple-checked*" the dose and that he should have done so.

35 As a consequence, Andrew was prescribed and took a higher dose of lithium for three months, from 28 May 2020 until his admission to Campbelltown Hospital on 24 August 2020. It is likely that this, in part, was the cause of the elevated levels of lithium in his system at the time of the admission.

36 In about June 2020 Andrew saw the psychiatrist, Dr Basnett. This appointment had been organised by the CMHT. Dr Basnett recommended that Andrew undergo blood

tests. Those tests occurred on 17 June 2020 on the order of Dr Golowenko. Dr Golowenko noted on the order form that the results should be sent to Dr Basnett.

37 When the results of the blood tests were made available to Dr Golowenko, he did not realise the significance of the high lithium and creatine levels. The expert evidence indicated that the lithium result should have been followed up with a further test and that the creatine level may have been an early indicator of renal impairment.

38 Despite Dr Golowenko's notation, Dr Basnett did not receive the results of the blood tests. Dr Golowenko did not follow up Dr Basnett. Rather, he wrongly assumed the results had been received and Dr Basnett had considered them to be ok.

39 Andrew returned to Dr Golowenko on 6 August 2020 and reported his anxiety had flared up. He also complained of a fine bilateral tremor, although Dr Golowenko noted this was something he had observed in Andrew before. Dr Golowenko took observations, which were normal, and prescribed a beta blocker, Inderal (propranolol), for the tremor, which was also intended to assist with the anxiety. The prescribing of Inderal was appropriate.

40 Andrew returned a week later, when Dr Golowenko completed a mental health care plan and referred him to a psychologist. Dr Golowenko observed no signs of lithium toxicity on that occasion.

41 On 15 August 2020, Andrew attended an out-of-hours GP. He saw Dr Grant Lewis, a GP whom he had previously attended. He had sore, cracked lips and a dry mouth. He was given lanolin and advised to push fluids and was referred back to Dr Golowenko for follow-up within 2-3 days if required.

42 Andrew next attended Dr Golowenko the following Thursday, 20 August 2020. He was due for his depot medication. Andrew said he had felt lethargic and unwell since commencing Inderal and he had not been sleeping. He was also dehydrated. Dr Golowenko ceased the Inderal, took observations (which were normal) and prescribed a litre of intravenous (IV) fluids, which was administered by a nurse, after which Andrew reported feeling well.

43 Dr Golowenko asked Andrew to return the following day. Although he was not going to be at the surgery, he expected that another clinician would perform a review prior to providing the depot. Dr Golowenko described this as a form of "*safety netting*" – a way to ensure that Andrew was followed up. However, he accepted he did not have any discussion with the clinician who reviewed Andrew (Dr Fiona Khoo) or look at the notes to confirm what had occurred. His first discussion with Dr Khoo about Andrew occurred after Andrew passed. On reviewing Dr Khoo's notes, retrospectively, he said it was a "*red flag*" that Andrew appeared to still be dehydrated on 21 August 2020. He stated, that had he known this at the time, he would have referred Andrew to the emergency department at that stage.

44 Having been seen by Dr Khoo on Friday, 21 August 2020 Andrew became increasingly unwell over the weekend. He was not eating. On 22 August 2020 he attended his

parents' home. He was dribbling and had vomit or mucus on his clothing. He did not want to go to hospital. He was concerned about being readmitted to the mental health ward. On 23 August 2020, he walked to his parents' home (a distance of about 3 km) in his pyjamas. He looked ill, but he refused to go to hospital. His mother cleaned him up and he returned to his home that evening.

45 On Monday, 24 August 2020, Andrew's mother called him at 9.00 am, but could not reach him. She attended his unit, finding the front door open and Andrew inside. He was covered in runny brown liquid which was also coming from his mouth. She cleaned him up and tried to contact the medical centre and mental health team, without success.

46 At 11.40 am, Andrew's mother took him to Bowral Hospital.

Care and Treatment of Andrew in Hospital

47 Andrew was admitted to Bowral Hospital at 11.44 am on 24 August 2020. While there, he underwent investigations, including a lithium level taken at 12.21 pm. That result was reported at 4.13 pm, showing a toxic/fatal level of lithium, 4.5 mmol/L.

48 The emergency physician, Dr Atheer Zaraga, had a conversation with the renal specialist at Campbelltown Hospital, Dr Aravindan Ananthakrishnapuram (Dr Aravindan). Dr Aravindan accepted care of Andrew. Dr Aravindan also accepted that Andrew would require haemodialysis to remove the lithium.

49 Haemodialysis is a treatment to filter wastes and water from your blood, as kidneys do when they are healthy. Haemodialysis helps control blood pressure and balance important minerals, such as potassium, sodium, and calcium, in your blood.

50 Andrew was transferred to Campbelltown Hospital, arriving at 4.17 pm. By that stage, his lithium level taken at Bowral Hospital had been reported to staff at Campbelltown Hospital. Although Andrew was admitted under Dr Aravindan and the renal team, he was transferred to the Intensive Care Unit (ICU).

51 Following Andrew's arrival in the ICU, Dr Lachlan Wiedersehn (Dr Wiedersehn) had a conversation with Dr Aravindan.

52 Two options were potentially available for Andrew's dialysis. Intermittent Haemodialysis (IHD), which is a form of dialysis, which removes solutes at a fast rate and is considered the preferred treatment for lithium toxicity. It could only be delivered in the dialysis section of the renal unit. The other option was Continuous Venous-Venous Haemodiafiltration (CVVHDF), a form of Continuous Renal Replacement Therapy (CRRT) that could be delivered in the ICU. CCVHDF removes solutes at a slower rate than IHD and can be given over a longer period.

53 When Dr Aravindan and Dr Wiedersehn spoke, they reviewed the pathology results and noted Andrew had impaired kidney function and was dehydrated.

54 Dr Aravindan indicated to Dr Wiedersehn that CVVHDF was to commence overnight in the ICU, and they also discussed an "*acute order*", or prescription for IHD. Dr Aravindan did not see Andrew that afternoon, nor did he see Andrew at any time during 25 August 2020.

55 Dr Wiedersehn recalled that he and Dr Aravindan had a brief discussion about the risk of Dialysis Disequilibrium Syndrome (DDS). The evidence in the inquest established that water and solutes such as sodium, potassium and urea move between the blood and cells all the time with the aim of achieving balance or equilibrium between the two compartments. A gradient exists when one side has a higher concentration of a particular solute than the other. Solutes move from the side with a higher solute concentration to the side with the lower concentration to achieve equilibrium. Water moves from the side of lower solute concentration to the side with higher solute concentration to achieve equilibrium.

56 Dr Kylie McArdle, Intensive Care Specialist (Dr McArdle) said that DDS is a rare and incompletely understood condition. It is a complication of the removal of solutes from the blood during dialysis, with urea being the main solute of concern. Sodium, glucose, and other solutes are also involved. Dr McArdle described the process in her report as follows:

> *"Rapid removal of urea from the blood by haemodialysis results in higher concentrations of urea in brain cells, which establishes a concentration gradient. This can promote rapid movement of water into these cells in an attempt to regain equilibrium, as urea cannot move quickly out of cells. Brain cells become swollen, resulting in cerebral oedema and raised intracranial pressure. If severe this swelling can result in herniation of the brain downwards which further exacerbates swelling due to impairment of blood supply to brain tissues. In worst-case scenarios brain death can result."*

57 In his conversation with Dr Wiedersehn, Dr Aravindan had indicated that the risk of DDS was low, because Andrew was not suffering from chronic renal failure, but an acute kidney injury.

58 In evidence, Dr Aravindan explained his thinking. In cases of chronic injury, the high levels of solutes such as urea have had time to build up in the cells, so that rapid removal of solutes from the blood presents a risk of disequilibrium. However, in cases of acute kidney injury, the solutes had not yet had time to build up in the cells, and so rapid removal presents less risk. He, nonetheless, proposed a slower than usual blood flow rate during IHD, as a precaution.

59 It can be accepted that the risk of DDS is lower in cases of acute kidney injury, however, Dr Aravindan's understanding that the kidney injury was acute may well have been mistaken. Dr McArdle and Dr Eagle each noted that the 17 June 2020 blood test result (Creatine 116) may have represented the commencement of a kidney injury. Dr Aravindan did not have access to this record at the time. He could have sought the GP records or taken a cautious approach by assuming a more chronic injury. However, Dr Aravindan explained that the imperative at the time was to remove the

toxic level of lithium from Andrew's system, given the long-term neurological impact it could have.

60 Ideally, steps would have been taken to obtain Andrew's full, or at least recent, medical history to further investigate when the kidney injury may have commenced. Examination of that record may have at least raised the possibility that the kidney injury was of longer standing than Dr Aravindan understood it to be. It is unclear on the evidence how quickly Andrew's recent record could have been obtained. In this regard it was noted that medical records are not (yet) fully digitalised.

61 Following his discussion with Dr Aravindan, Dr Wiedersehn made a call to book an IHD session. He was initially told there were no slots available on 25 August 2020. He was asked to call the following day. The inquest was told that the Campbelltown Hospital dialysis unit is usually full, with no spare capacity.

62 CVVHDF commenced in the ICU at approximately 10 pm on 24 August 2020. During the evening, Andrew received care in the ICU, under the consultant Dr Schultz. His condition was monitored, including biochemical testing and pathology taken every 6 hours. He was nursed one-to-one. No issue is raised regarding the adequacy of care during that time.

63 On the morning of 25 August 2020, Dr Monique Leijten reviewed Andrew. She noted, among other things, that he was drowsy, had decreased consciousness or Glasgow Coma Scale (GCS) and brisk reflexes, with spontaneous clonus (jerking) in the left leg. She was also informed that Andrew's level of consciousness had been fluctuating. In evidence, she explained that she attributed these symptoms to Andrew's severe, acute lithium toxicity.

64 Dr Leijten noted the biochemical results which were then available, creatinine 353 and urea 36.1. These represented significant reductions from the initial readings taken at Bowral Hospital the previous day (creatinine 607, urea 52.5). Although a swift reduction in these solutes presented a risk for DDS, Dr Leijten explained that a reduction in solutes was expected, given Andrew was undergoing CVVHDF. She did not perceive a risk of disequilibrium during CVVHDF.

65 On 25 August 2020, Dr Aravindan was off-site at a private clinic, which he undertook on alternate Tuesdays. He explained that while at his private clinic Dr Wiedersehn could contact him. He had a brief discussion with Dr Wiedersehn in the morning to confirm the IHD slot. He considered that Dr Wiedersehn was sufficiently skilled and qualified to manage the commencement of IHD, and to raise any issues with him as needed.

66 Dr Wiedersehn reviewed Andrew in person at about 11.43 am. By then he had booked an IHD session and spoken with both Dr Aravindan and Dr Leijten, to confirm the IHD session was available at 4.30 pm. During his review, Andrew was drowsy and unable to provide a history. Following the review, Dr Wiedersehn recorded the acute order for IHD. The ICU team were agreeable to the plan to proceed with IHD.

67 In contrast to Dr Aravindan's expectation, Dr Wiedersehn stated in evidence that he did not expect to have any further involvement with Andrew's care, following his morning review, unless the intensivists team raised a concern.

68 Dr Aravindan accepted, in retrospect, that there ought to have been greater communication between the renal and intensivist teams to confirm that Andrew was stable enough to proceed with IHD.

69 Andrew remained on CVVHDF in the ICU during the afternoon. It was ceased at 4.40 pm. Andrew was transferred next door to the renal unit at about 5.10 pm. He remained under the care of the intensivists, with a renal nurse commencing the IHD at 5.20 pm.

70 In the renal unit, Andrew continued to receive one-on-one nursing from intensive care nurses and the renal nurse conducted the dialysis. Andrew complained of a headache at 5.40 pm, and again at 6.20 pm. In response, the flow rate was reduced, and a review was called for. RN Kate Facer (RN Facer) sought a review from the ICU registrar, Dr Thilini Kudagamage (Dr Kudagamage).

71 Dr Kudagamage was a junior registrar who usually worked in the emergency department. She had limited experience in the ICU, having worked there previously for 3 months, and then again on a part-time basis from August 2020. She had not been present for the detailed ward-round handover but had a separate discussion about Andrew's condition.

72 When she attended to review Andrew, he was sitting up in bed and was "*co-operative*". Although she did not examine him, she was given his observations, which were otherwise normal. She told the nurse she was "*not worried*".

73 The experts agreed that Andrew's headache was a concerning sign and was likely a sign of DDS. Dr Aravindan stated that, if he had been contacted, he would have advised ceasing dialysis. The fact that Dr Kudagamage did not recognise this was a function of her relative inexperience in dialysis rather than any personal failing of hers. It highlights the need to have more senior staff to hand, and to have access to the renal team, to provide guidance where complications arise.

74 Andrew deteriorated at about 7.30 pm. According to nursing notes, he said to staff "*just let me die*". Shortly after, at 7.40 pm, he vomited 10 mls of greenish liquid. A further review was sought. The shift handover was occurring at this time. Both the nursing team and the medical team changed. The oncoming ICU nurse recorded that Andrew had become extremely agitated and was unable to settle. He called for a review, and a registrar charted midazolam, although Andrew settled prior to it being administered.

75 Dr Hasanul Kabir's evidence was to the effect that Andrew was reviewed as part of the handover process, where the oncoming team attend each patient. Andrew was agitated and the team discussed ceasing the IHD early. However, there is no evidence that contact was made with the renal team for advice. Dr Aravindan was of the view

that he should have been contacted both when the initial headaches were reported and when there were discussions about ceasing the IHD. Had Dr Aravindan been contacted, he would have advised ceasing dialysis.

76 Dr McArdle gave evidence that it is considered standard practice to consult a senior renal medical officer if there are concerns or deterioration of a patient undergoing dialysis.

77 Andrew subsequently settled, and remained on dialysis until about 9.30 pm, and was returned to the ICU at 9.50 pm.

78 Tragically, while Andrew was being repositioned, he deteriorated again, some green bile started dripping from his nose and mouth. RN Liam Beckinsale sat Andrew up and applied suction, but he sadly lost consciousness and the Medical Emergency Team (MET) was called.

79 Dr Megan Oliver attended at 10.30 pm and Andrew was intubated.

80 There were then several investigations undertaken, to identify the cause of Andrew's collapse.

81 The initial impression was that Andrew had suffered a withdrawal seizure, due to low levels of his epileptic drug, carbamazepine.

82 At 11.18 pm, a sample was taken for pathology, which showed urea (8.0) and sodium (140).

83 However, a CT scan, and then an angiogram of Andrew's brain at 12.12 am on 26 August 2020 showed diffuse cerebral oedema, consistent with raised intracranial pressure, and herniation of the cerebellar tonsils. T he neurosurgical team at Liverpool Hospital was contacted, but they advised Andrew's injury was unsurvivable. Conservative treatment was commenced.

84 Andrew was also given mannitol, in an attempt to reduce intracranial pressure.

85 A further CT scan with carotid angiogram at 2.13 am confirmed that there was limited arterial flow in the posterior circulation and brainstem.

86 Andrew's parents arrived at Campbelltown Hospital at about 4.30 am. A family conference was held with the treating team. The team explained that it was suspected Andrew had suffered dialysis disequilibrium syndrome, a very uncommon complication of his dialysis.

87 Andrew was extubated at 10.05 am and died shortly afterwards, at 10.10 am.

Post-Mortem examination

88 A limited autopsy [CT scan, external examination and toxicology] was conducted by Dr Dianne Little on 1 September 2020. The results were recorded in an autopsy report dated 23 December 2020. Dr Little recorded the cause of Andrew's death as "*complications of lithium toxicity and its treatment"* with no antecedent causes noted.

89 Dr Little explains that, as at 11.55 pm on 25 August 2020, Andrew's lithium was within the reported therapeutic range, his electrolytes were within the reference ranges, and his renal function was considerably improved.

90 Dr Little provided the following additional commentary:

> *"However, occasionally patients on haemodialysis can develop complications including dialysis disequilibrium syndrome. It is commonest in people having dialysis for the first time and is characterized by neurological symptoms due to cerebral oedema - swelling of the brain. Other risk factors include a very high blood urea level, as was present in this man."*

Discussion of Issues – Findings

91 I now address the issues as set out on the issues list referred to earlier in these findings.

What was the cause of Andrew's death? – Issue 1

92 As referred to above, forensic pathologist Dr Dianne Little initially described the cause of death as "*complications of lithium toxicity and its treatment*".

93 Professor Gracey and Dr McArdle were agreed regarding the cause of death.

94 Professor Gracey expressed it as follows:

> *"cerebral oedema, secondary to dialysis disequilibrium syndrome (DDS) which was seen as a complication of the dialysis therapy, required to manage Mr Stubbs' acute, severe, lithium toxicity, responsible for his acute kidney injury at presentation."*

95 Dr McArdle stated that the cause of death was:

> *"cerebral oedema secondary to Dialysis Disequilibrium Syndrome (DDS) which occurred as a complication of the dialysis treatment required for severe lithium toxicity with acute kidney failure*."

96 Associate Professor Gunja, who provided a report to the inquest, also described a mode of death arising from DDS, causing cerebral oedema.

97 I agree with counsel assisting's submission that there is no significant difference between the opinions of Professor Gracey, Dr McArdle and Associate Professor Gunja.

98 I find that the cause of Andrew's death is cerebral oedema secondary to dialysis disequilibrium syndrome.

What factors contributed to Andrew developing dialysis disequilibrium syndrome and cerebral oedema? – Issue 2

99 I agree with counsel assisting's submission and find that the factors which contributed to Andrew developing DDS, both in the long term and short term, can be summarised as follows:

1) Andrew had been taking a higher-than-normal dose of lithium from 28 May 2020 onwards (described below).

2) As Andrew's serum lithium levels increased, due to a combination of factors, he developed a kidney injury, which reduced his ability to eliminate lithium. Vomiting caused further dehydration, which also increased the lithium level. There is no evidence he took an overdose of lithium.

3) By the time Andrew presented to hospital, he had a toxic/fatal level of lithium in his system. He also had high levels of other solutes, including urea, and a kidney injury. He required urgent dialysis.

4) The initial form of dialysis (CVVHDF) reduced the lithium level, but also resulted in a significant reduction of urea and other solutes, which presented a risk for DDS.

5) Proceeding to the second form of dialysis (IHD) accelerated the speed at which solutes were removed, increasing the risk of DDS.

The care provided by Dr Golowenko – Issue 3

100 Dr Golowenko presented as a GP who had genuine concern for Andrew's care. He expressed regret for the shortfalls in his care. He stated that he has changed his practice; in the future, if he has a patient on lithium, he will refer to a psychiatrist for direction on how often to monitor lithium levels, and how to interpret the results.

101 I find that Dr Golowenko:

a) failed to prescribe the correct dose for lithium, or amend the prescription, despite receiving four documents which stated the correct dose; and

b) failed to repeat the blood test, after receiving a result on 23 June 2020 which showed a level higher than the therapeutic level; and

c) failed again to check the lithium level when Andrew presented with dehydration on 20 August 2020. He should have recognised the risk of lithium toxicity and his failure to repeat the blood tests for lithium level on this occasion was not adequate care for a person on lithium treatment in those circumstances.

The care provided at Campbelltown Hospital – Issue 4

Communication Issues

102 As observed above, Dr Aravindan did not see Andrew at any time despite Andrew being admitted under Dr Aravindan's care. This was due to a combination of the time at which Andrew arrived at Campbelltown Hospital, the transfer of Andrew to the intensive care unit and the fact that the day after Andrew's admission Dr Aravindan was conducting a private clinic.

103 Dr Aravindan's absence from the hospital contributed to a lack of communication between him and Dr Wiedersehn and between the renal team and the intensivists team.

104 Throughout the afternoon of 25 August 2020 Dr Aravindan retained the view that Dr Wiedersehn would be making decisions about Andrew and, in addition that the ICU team would escalate signs of clinical deterioration to him. Dr Wiedersehn thought the intensivists would inform him if there were any issues and the intensivists thought Dr Aravindan would advise them if any issues arose. The lack of communication between the two teams was most regrettable.

105 The lack of communication was critically relevant to the failure to conduct any form of assessment as to whether the IHD should go ahead, given that there had been CVVHDF from 10 pm on 24 August 2020 until 4.40 pm on the 25 August 2020. Following Dr Wiedersehn's review in the morning of 25 August, there was no further review by the intensivists or renal physicians, prior to Andrew commencing IHD at 5.20 pm. There was no further involvement from the senior clinicians, and no discussion between Dr Leijten and Dr Aravindan at any stage.

106 Dr Leijten agreed with the proposition that there ought to have been a further risk assessment, prior to commencing IHD. However, she did not consider her team had relevant expertise, as it was a treatment provided by the renal specialists. This again highlights the unfortunate disconnect between the two treating teams. I accept the view expressed by Dr McArdle that the responsibility to review Andrew and the results of the tests which had been conducted was an ongoing responsibility of both teams.

107 The other aspect in which the lack of communication was critical was in the failure to contact Dr Aravindan when concerns arose during the IHD.

Diagnostic anchoring

108 The evidence established that DDS is a very rare event and that the treating team at Campbelltown Hospital had not experienced an event of the same severity, in one of the busiest dialysis units in the country. Whilst the possibility of DDS occurring was recognised in the very first conversation regarding Andrew between Dr Aravindan and Dr Wiedersehn there is no doubt that the primary focus of the renal and ICU teams was to reduce the levels of lithium. Dr McArdle considered this to be an appropriate focus at the time of Andrew's admission.

109 Much of the approach to Andrew's care turned on the view that Andrew's kidney injury had been recently incurred. Consequently, it was thought that the risk of DDS was low. Simultaneously it was acknowledged that the lithium level was toxically high. Andrew's various symptoms were thought to have been caused by the extremely high lithium level. Over the course of 25 August 2020, Andrew's condition continued to be unstable. The notes record that his level of consciousness continued to fluctuate, and he became agitated at times, and he was at times confused. Dr Leijten noted that these symptoms were taken to be signs of lithium toxicity. However, it is possible that these were early signs of DDS, a consequence of the sudden drop in urea. I accept Dr Aravindan's view that there was a degree of, "*diagnostic anchoring*", whereby Andrew's symptoms which may have been due to either DDS or lithium toxicity were at all times attributed to lithium toxicity.

Delays in lithium level reporting

110 There were delays in reporting the lithium level from the blood sample taken at 5.14 am on 25 August 2020. This sample was taken after Andrew had been receiving CVVHDF for seven hours. The results were not available until 4.11 pm on the afternoon of 25 August.

111 Dr Timothy Spicer explained that the machine used for assessing lithium levels was offline for maintenance during the period of delay.

112 Whether it would have made a difference, had the result been known sooner, is not clear. The lithium level was still above the level at which dialysis was recommended. It could have been used as part of a risk assessment to determine whether it remained appropriate to proceed with IHD. However, Dr Leijten expressed the view in evidence that the lithium level alone would not have altered the treatment course, as the clinical presentation was more significant.

113 Dr McArdle considered that a clinical toxicologist would have assisted the treating team, by advising on the rate of elimination of lithium. One could have been contacted via the NSW Poisons Information Centre. A clinical toxicologist may have provided guidance on whether it remained appropriate to reduce lithium quickly, or whether the rate of elimination under CVVHDF was acceptable.

Whether IHD should have commenced

114 I accept Dr McArdle's evidence that the decision whether to proceed with IHD was nuanced and complex.

115 On any view, Andrew's was a complex presentation with a life-threatening condition.

116 As expressed by Dr McArdle, while dialysis was "*clearly indicated*" at the outset, Andrew's risk profile changed over the course of the daytime on 25 August. In her view, there ought to have been a "*serial risk assessment*", assessing the benefits and risks of proceeding with IHD, and taking into account Andrew's changing clinical presentation, his biochemical markers, and the rate of elimination of lithium.

117 As indicated above, Dr Leijten agreed with the proposition that there ought to have been a further risk assessment, prior to commencing IHD.

118 A risk assessment would have considered the appropriateness of commencing IHD for Andrew, given his clinical presentation, late in the day, when senior staff were not going to be on duty. The timing of the IHD also meant that the therapy would be overseen by the intensivist team, at a time when the renal specialists were no longer on site. It commenced when Dr Wiedersehn was completing his shift. This was an unusual time slot, as the scheduled sessions usually commenced at 7 am and 2 pm.

119 Professor Gracey and Dr McArdle shared the view that, on a retrospective basis, IHD should not have proceeded, and Andrew should have remained on CVVHDF.

Conclusion regarding care at Campbelltown Hospital

120 Whilst no blame could or should be placed on any individual there were a number of missed opportunities in terms of the delivery of care to Andrew.

121 The missed opportunities arose in part because of the following contributing factors.

122 Firstly, Andrew being in ICU whilst under the simultaneous care of the renal team led to some communication issues and a level of disconnection between the two teams.

123 Secondly, the rarity of DDS in combination with the belief that Andrew's kidney injury was acute, led to a focus upon reducing the lithium level at the possible expense of recognising early signs of DDS in circumstances where some symptoms could have been due to either lithium toxicity or DDS.

124 Thirdly, the teams at Campbelltown Hospital had not ever seen a case of DDS as severe as Andrew's ultimately was. This played into the teams' focus on lithium removal and them attributing all Andrew's symptoms to lithium toxicity.

125 Fourthly, all the staff in both units worked under significant pressure dealing with high workloads.

126 In my view, the most significant missed opportunity was the failure to undertake a "*serial risk assessment*" as to whether the IHD should have proceeded.

127 Whilst it is not possible to know what the outcome of such an assessment would have been, one unquestionably should have been undertaken.

128 There were a great many factors to take into account all of which were risk factors and each of which highlights that the teams should have reassessed the appropriateness of IHD proceeding.

129 The relevant factors included: that this was Andrew's first occasion of dialysis; Andrew's urea level was high when first tested; the rapid urea clearance rate; the clinical observations during the afternoon of 25 August 2020; the timing of IHD, being scheduled to commence at 4.30 pm when senior staff, and renal specialist were not on site.

130 During an assessment all relevant factors could have been discussed. The blood test results from the morning were available and, if considered appropriate, a toxicologist could have been consulted.

131 The final missed opportunity was the failure to respond to Andrew's signs of deterioration during IHD, including the failure to contact Dr Aravindan, and to cease dialysis.

The nature of relevant policies and procedures in place at the time of Andrew's death, whether these were followed, and any changes that have been made since – Issue 5

132 The policy in place at the time of Andrew's admission provided limited guidance to staff in relation to the prevention and management of DDS. Notably, the policy stated:

- Mild disequilibrium – manifested by nausea, vomiting, restlessness, and headache (but are usually non-specific): management is symptomatic (i.e., relieve symptoms).

- Severe disequilibrium – manifested by seizures, convulsion, and coma. If a convulsion occurs: cease dialysis; secure cannula sites; ensure airway patency; administer oxygen; maintain patient safety; collect bloods for biochemistry and inform a Renal Medical Officer. Patients may require IV Valium or Clonazepam and/or Dilantin.

133 Under the policy in place at the time, Andrew's symptoms during IHD fell within the "*mild*" category, until the time of his final deterioration. Whilst it cannot be said that the policy was not followed the need for symptomatic management highlights the need for experienced clinicians to be available during Andrew's IHD.

134 Since Andrew's death, South Western Sydney Local Health District has undertaken significant steps to learn from the tragic outcome, and has revised its policy and training. The dialysis unit has also undergone change. These improvements include training for the intensive care team on DDS and a revised policy on managing acute complications in haemodialysis.

135 During the course of the inquest, a further draft policy was produced, entitled Management of Lithium Toxicity. Dr McArdle and Professor Gracey commented on it in evidence. It clearly represents a significant improvement over the existing guidance, and refers explicitly to a number of issues which are relevant to Andrew's case, for example: clinicians are advised to assume that a person has chronic kidney disease unless recent blood tests are available; advice on identifying the risk factors for DDS; the advantages of CRRT over IHD; the need to obtain serum lithium levels every 3 hours; advice on when to cease dialysis; a table setting out symptoms that may relate to lithium toxicity, those which may relate to DDS, and those which may be both.

136 Dr Spicer indicated that the document is in the process of being reviewed by different specialities, and that he expected revisions after that process. He was open to modifying the policy, after hearing the evidence of the experts.

137 In relation to the potential assistance to be derived by contacting a toxicologist, Dr Spicer accepted that a toxicologist's involvement in Andrew's case would have been extremely helpful. Dr Spicer further indicated that a toxicologist at Liverpool Hospital has been consulted about, and would have input into, the revised policy.

The need for recommendations – Issue 6

138 This brings me finally to the question of whether it is necessary or desirable to make any recommendations under s 82 of the Act which confers on a coroner the power to make recommendations that he or she may consider necessary or desirable in relation to any matter connected with the death with which the inquest is concerned.

139 Counsel Assisting put forward the following recommendation arising out of the evidence for the court's consideration:

To: South Western Sydney Local Health District

Consider whether the LHD's Mental Health Service Guideline "Lithium Carbonate Clinical Guideline MH_GL2022_001" should be provided to a GP, where a patient who is prescribed lithium is planned to be discharged into the care of that GP

140 Counsel assisting submitted that the proposed recommendation arises from the evidence that Dr Golowenko had limited access to guidance about lithium prescribing and that the practice of discharging patients into the care of GPs presents an opportunity to ensure that those GPs and the mental health service have a common approach to prescribing lithium. Counsel assisting drew the court's attention to the policy (which is in evidence) that South Western Sydney Local Health District

(SWSLHD) has which provides detailed guidance to its mental health service on prescribing lithium, including monitoring adverse effects and toxicity, however, it does not appear to be publicly available.

141 Counsel for the SWSLHD raised, in submissions, the following with regards to the proposed recommendation:

1) That the *Lithium Carbonate Clinical Guideline* is essentially a guideline for the management of patients who are prescribed lithium as part of inpatient treatment within the SWLHD's Mental Health Services.

2) Significant aspects of the guideline are directed to the specialised monitoring and managing of such patients.

3) SWSLHD's catchment area covers in the vicinity of 12% of the State of NSW. As such, provision of the guideline to General Practitioners within only its own catchment area may create anomalies in information provided outside the area (where different guidelines might be provided or available), and that there may well be alternative guidelines for the management of Lithium in the community already in place that are especially directed towards the needs of General Practitioners.

142 Counsel for the SWSLHD submitted that it is likely to be of no benefit to provide the SWSLHD's guideline to GPs, in the circumstances and accordingly there is little utility in making the proposed recommendation.

143 There is some force in the SWSLHD's submission that the guideline referred to is essentially directed to inpatient treatment.

144 Nevertheless, much of the content in the guideline, such as, the sections dealing with "*adverse effects*", "*lithium serum concentration monitoring*", "*other monitoring requirements for lithium*" and "*lithium toxicity*" are likely to be of great assistance to GPs if appropriately tailored.

145 I see no merit in the balance of the SWSLHD submission. Individual LHDs make their own guidance material regularly, regardless of what is otherwise in place in the community or indeed in other LHDs. I would expect that any guidance documentation would aim to be completely up to date with available knowledge and learning.

146 I agree with counsel assisting's submission that the occasion of transferring care to a GP represents a good opportunity to provide information on a topic, on the evidence, that some GPs may know little about.

Findings section 81 *Coroners Act 2009*

147 Having considered all the evidence, the findings I make under section 81(1) of the *Coroners Act 2009* (NSW) are:

Identity
The person who died was Andrew Stubbs.

Date of death
Andrew died on 26 August 2020.

Place of death
Andrew died at Campbelltown Hospital, Campbelltown NSW.

Cause of death
Andrew died of Cerebral Oedema, secondary to Dialysis Disequilibrium Syndrome.

Manner of death
Andrew's death occurred as result of a complication of the dialysis treatment he was undertaking to treat severe lithium toxicity and kidney failure.

Recommendations pursuant to section 82 *Coroners Act 2009*

148 For the reasons stated above, I am of the view that the evidence supports that a recommendation as outlined below is appropriate to be made in relation to Andrew's death:

To South Western Sydney Local Health District (SWSLHD)

I recommend that the SWSLHD give consideration to whether the SWSLHD's current Lithium Carbonate Guideline, or a separate guidance document adapted from that guideline, can be provided to General Practitioners when a patient who is prescribed lithium is planned to be discharged from the Community Mental Health Service into the care of a General Practitioner.

Conclusion

149 On behalf of the Coroners Court of New South Wales, I offer my sincere and respectful condolences to the family, extended family, friends, and associates of Andrew.

150 I would like to especially acknowledge and thank Andrew's parents, Rhonda and John Stubbs, who attended each day of the inquest, for their participation in the coronial proceedings. I hope that their concerns have been addressed. As parents, there can be no greater loss than the loss of a child and I acknowledge their profound grief and sorrow with Andrew's passing.

151 I also thank the officer in charge of the coronial investigation, Senior Constable Angela Tyson, for her efforts in the process of the investigation and work in compiling the initial police brief of evidence.

152 I acknowledge and express my gratitude to the assisting team, Mr Jake Harris of counsel and Ms Clara Potocki of the Crown Solicitor's Office for their invaluable assistance both before and during the inquest.

153 In addition, I thank the legal representatives for each of the interested parties for their assistance provided throughout the coronial proceedings.

154 I close this inquest.

Magistrate David O'Neil

Deputy State Coroner

Coroner's Court of New South Wales

11 August 2023