STATE CORONER'S COURT
OF NEW SOUTH WALES

Inquest:	Inquest into the death of Aidan Mara
Hearing dates:	**4-6 June 2018**
Date of findings:	**29 June 2018**
Place of findings:	State Coroners Court, Glebe
Findings of:	Deputy State Coroner O'Sullivan
Catchwords:	CORONIAL LAW – cause and manner of death, death of a child, influenza A (Type H3N2) Hyponatraemia Syndrome of Inappropriate Antidiuretic Hormone (SIADH)
File number:	
Representation:	(1) Counsel Assisting the Coroner Dr Peggy Dwyer, instructed by Janet de Castro Lopo of the Office of General Counsel, Department of Justice (2) Counsel for the South Eastern Sydney Local Health District. Lyn Boyd, instructed by the Crown Solicitor's Office, NSW (3) Registered Nurses Kerrie-Anne Eggins and Hazel Paolo Patricia Robertson, NSW Nurses and Midwives Association

Findings:	**Identity of deceased:** Aidan Mara **Date of death:** 29 July 2014 **Place of death:** Sutherland Hospital, New South Wales **Cause of death:** The medical cause of death was Influenza A infection (Type H3N2) **Manner of death:** Cardiovascular collapse as a result of a combination of hypovolaemia (lack of volume in the vascular space), hypotension (low blood pressure) and hypoxemia (low oxygen) in the setting of a warm shower (with possible vasodilation) and period without supplemental oxygen.

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Introduction

1. This inquest concerns the tragic death of a cherished three year old boy, Aidan Mara, who died on 29 July 2014 at Sutherland Hospital, two days after he had been admitted suffering from the symptoms of lower lobe pneumonia.

2. Aidan was born on 2 July 2011 and he would have been nearly seven years old by the time of the inquest.

3. Aidan is survived by his parents, Gillian and Lucas Mara, an older and younger brother and extended family. His death is an enormous loss to his close and loving family and their friends. Aidan's parents have been extremely gracious during the course of these proceedings, to the Hospital staff and the Court. I extend my condolences to them, and thank them for their contribution to the inquest.

4. I was particularly struck by these words from the statement Lucas Mara made on behalf of his family:

> "In many ways we see it as our responsibility to ensure Aidan's loss was not in vain. We hope that there are lessons to be learned not just about avoiding tragedies in the future but also about love in general and the importance of humanity and the sense of community."

5. It was in that spirit that the family conducted themselves in this inquest, and I hope that they can take some comfort from the evidence that lessons do indeed appear to have been learnt.

The role of the coroner

6. The role of a Coroner, as set out in s. 81 of the *Coroners Act 2009* ("the Act"), is to make findings as to the:

    a) identity of the deceased;
    b) date and place of the person's death;
    c) physical or medical cause of death; and
    d) manner of death, that is, the circumstances surrounding the death.

7. Pursuant to s. 82 of the Act, a Coroner has the power to make recommendations, including concerning any public health or safety issue arising out of the death in question.

Background

8. Aidan was a beautiful healthy and happy little boy. I heard very moving evidence from Aidan's father, Lucas Mara, about what a clever and vibrant child he was.

9. Lucas Mara told the Court that Aidan's most endearing feature was his smile, and although he was a beautiful looking and energetic boy, what he and his wife were

most proud of in their son was his loving personality. He was a child who was always thinking of others, particularly his big brother.

10. Until shortly before his hospitalisation, Aidan was a healthy child. He attended pre-school and was fully immunised. He experienced the coughs or colds that all children have but had never had a major illness.

The evidence

11. The Court has heard oral evidence and has received extensive documentary evidence comprising two volumes of materials, including hospital and GP records, and the statements of the treating medical and nursing teams.

Circumstances leading up to Aidan's hospitalisation

12. On 21 June 2014, Lucas and Gill and their two children left for Fiji for a family holiday, returning on 3 July. Aidan's older brother had had a chest infection around mid-June but had recovered before the family left on holidays. Lucas suffered a bout of bronchitis while in Fiji but had recovered by the time the family returned.

13. Around 11 July 2014, the week after the family returned from holiday, Aidan developed a mild dry cough, but he was still in good spirits for his belated 3rd birthday party held on 12th July, and spent at home with family and friends. Aidan was reportedly very active that day and was excited and running around.

14. By Sunday 13 July 2014, Aidan's cough had worsened and Gillian Mara took him to the Kirrawee Medical Centre where he saw Dr Shah Jalal. Dr Shah's notes record:

    - Few days moist cough, temp 36.6
    - Oral normal
    - Ears normal
    - Chest creps
    - Plan Panadol, oral AB

15. Aidan was prescribed Amoxicillin for a chest infection. In a statement from Dr Jalal, he provided the opinion that Aidan was suffering from Upper Respiratory Tract Infection on that date.

16. Aidan ended up only completing half the course of antibiotics, because he had loose stools. His cough had subsided and he appeared to recover well.

17. On Monday 21 July 2014, Aidan started to feel ill again and had a dry rattling cough. His father Lucas took him to the Yarrawarrah Medical Centre where Aidan saw General Practitioner, Dr Mona Singh. Dr Singh took a history, which included the recent viral upper respiratory infection over the prior two to three weeks. In her statement she writes that Aidan was alert and active and did not have a fever on examination. His capillary refill was normal, there were no signs of meningitis

and he was not dehydrated. On examination of his ears, the right tympanic membrane seemed slightly inflamed. Her diagnosis at the time was a viral Upper Respiratory Tract Infection (URTI). The notes taken by Dr Singh, which are consistent with her statement, include the words “no red flags”. She did not prescribe antibiotics but advised paracetamol and ibuprofen as per the guidelines and encouraged fluid intake.

18. On the evening of Wednesday 23 July, Aidan had a fever and his parents treated him with children’s Panadol and Nurofen, as per the dosage on the medicine bottles.

19. On Thursday 24 July, Aidan appeared to be getting much better. His temperature was down and he attended an outing at ‘Ready Steady Go’ in Engadine.

20. Sometime that afternoon Aidan started to get a temperature (around 38.5 to 38.7) and was a bit nauseous, so his parents took him to Kareena Medical Centre in Caringbah. The treating doctor, Dr Jaffe, saw Aidan at 7.45pm. His temperature was 38 degrees and he had no respiratory distress. On examination Dr Jaffe noted that Aidan’s left ear had otitis media, a middle ear infection. According to Lucas Mara, the doctor explained that the nausea was due to Aidan’s ear infection, which can cause bacteria in the bloodstream. Dr Martin Jaffe has provided a statement in which he states that at the time he saw Aidan, he did not suspect Influenza A or pneumonia. He attributed the fever to the ear infection and prescribed the antibiotic Amoxicillin to treat it.

21. On Friday 25 July, Aidan was not well and slept most of the day. He vomited during the night, which his parents attributed to the ear infection.

22. On Saturday 26 July, Aidan’s condition didn’t improve much, save for the fact that he started to drink more water in the afternoon, having previously been off his food and drink.

23. On the morning of Sunday 27 July, Gillian and Lucas Mara were concerned that his condition was getting worse and they took Aidan to Kareena Private Hospital. After waiting in the ‘emergency’ area for about an hour, they saw a doctor who advised them that Aidan should be driven immediately to Sutherland Hospital Emergency Department (ED), which his parents then did. In the meantime, a doctor from Kareena called Sutherland Hospital to notify them of Aidan’s arrival and that he was unwell and hypoxic (oxygen deficient). That doctor spoke with Dr Andrea Bell, the Emergency Medicine specialist on duty at Sutherland Hospital, who assembled a team including herself, Dr James Andrews, a Paediatric Registrar and nursing staff to be waiting for him in the ‘Resus’ (Resuscitation) bay.

Arrival at Sutherland Hospital –Day 1- Sunday 27 July

24. On arrival, Aidan was triage Category 1 (the most urgent category) and was immediately assessed by Dr Bell and her team. Dr Bell and Dr Andrews provided statements in which they recalled that on initial assessment Aidan appeared to be

very unwell. He was lethargic, pale and poorly responsive to medical and nursing interventions being performed. His heart rate, respiratory rate and temperature were elevated. He had reduced air entry at the left base and his oxygen saturations were low. There was evidence of dehydration with dry mucous membranes, prolonged capillary refill and decreased skin turgor.

25. A cannula was inserted and urine and blood samples were taken. Aidan was connected to monitoring and given an oxygen mask.

26. Dr Andrea Bell provided the Court with a statement outlining that her clinical findings were consistent with sepsis likely secondary to left lower lobe pneumonia. Because Aidan appeared dehydrated and shocked, Dr Bell initiated treatment with fluid resuscitation with 10mls/kg normal saline boluses. As there was no initial improvement following the first 10mls/kg fluid bolus, a second 10 mls/kg normal saline bolus was administered. Following the second fluid bolus some improvement in Aidan's peripheral perfusion was noted. As Aidan clinically had not improved, she administered a further two 10ml/kg normal saline boluses over the next 20 minutes, whilst instituting intravenous antibiotic therapy for sepsis for "unknown source? Pneumonia".

27. Aidan showed some improvement in heart rate, peripheral perfusion and alertness. A mobile chest X-ray was performed demonstrating the likely L lower lobe pneumonia. The antibiotics Cefotaxime, Gentamicin and Benzl-Penicillin were administered to treat severe sepsis/bacteraemia likely cause by pneumonia.

28. Dr Bell contacted the on duty Paediatric Registrar, Dr Sanjay Singh, for urgent clinical review, and she arrived promptly. Dr Bell then discussed with Dr Singh the presentation, clinical course and management of Aidan whilst in the Emergency Department.

29. Dr Singh was then involved in discussed with the paediatric consultant on duty, Dr Christine Lau, which Dr Bell was not privy to. At 3.45pm, nearly three hours after presentation, Aidan was judged well enough to be transferred to the paediatric ward. Dr Andrews states that at that time, Aidan was still looking unwell but he was alert and his observations had improved.

30. From the time of Aidan's transfer, Dr Bell and Dr Andrews, who were Emergency Department staff, ceased involvement, and Aidan was in the care of Dr Singh and Dr Lau. The plan agreed with Dr Lau and communicated to the ED staff was to admit Aidan with IV antibiotics (Cefotaxim and Clindamycin) with 2/3 of fluid maintenance. He was to receive ongoing hourly vital sign observations.

31. Dr Singh had only limited involvement and only on the one day. She provided the Court with a statement outlining her role in treatment on 27 July 2014 and indicating that she reviewed Aidan again at 5.35pm and handed over management to Dr Lau, the Paediatric Consultant at 6pm. After that, she was on leave for the next 3 days and had no further involvement.

32. Dr Lau reviewed Aidan at 6.20pm with Dr Sanjay Jamwal, a Paediatric Registrar, Joanne Mumford, a Nurse and Lucas and Gillian Mara. The history was

reviewed, with the help of Aidan's parents. Dr Lau gave evidence about Aidan's presentation on that night. In short, he was alert, easily rousable and responding to voice and pain, but he looked unwell and miserable.

33. Aidan was self-ventilating with a patent airway. He had minimal increased work of breathing but was on a non-rebreather mask at 8-10L flow. His oxygen saturations were 97% and respiratory rate 28 breaths/minute. On auscultation of his chest, he had decreased air entry in the left mid-zone to base posteriorly with bronchial breath sounds audible in his left axilla. On percussion, he had dullness to percussion at the left mid zone to base with stony dullness only posteriorly. Aidan had audible course crackles on the right side with good air entry. During the examination he was repositioned to sit upright to better support his breathing.

34. Aidan looked pale. He had a capillary refill of 2 seconds and his temperature was 36 degrees. His heart rate was 130 bpm and the peripheries were slightly cool to touch but peripherally perfused. His blood pressure was 75/49mmHg. Aidan had dual heart sounds with no audible murmur. His blood glucose level was 12.8mmol/L. There were no symptoms of neck stiffness or rash.

35. Following her review, Dr Lau's impression and diagnosis was that Aidan had "Left lower lobe Pneumonia with associated hyponatraemia". The history of presenting symptoms suggested that Aidan could have had a viral infection with a secondary bacterial infection. Differential diagnosis for hyponatraemia included Syndrome of Inappropriate Antidiuretic Hormone (SIADH), or dehydration or a combination of both.

36. SIADH is a condition where the body holds onto too much water, which dilutes the amount of sodium in the blood and causes levels to be low. As the Court heard, and as I set out further below, distinguishing between the cause of the hyponatreamia is vital to determining the effective treatment plan, because unfortunately, the appropriate treatment for hyponatreamia caused by SIADH (restricting fluid intake) is the opposite to treatment if caused by dehydration (liberalising fluid).

37. Investigations carried out on Sunday 27 July included:

    a. Blood tests including full blood count, electrolytes, C-reactive protein, venous blood gas and blood cultures
    b. Chest X-ray
    c. Mycoplasma serology was requested
    d. Nasopharyngeal aspirate was requested for viral OCR

38. The treatment on Sunday 27 July 2014 included the antibiotics Cefotaxime and Clindamycin, with fluid restriction to 1200 ml per day. Strict fluid balance management was commenced, with insertion of an indwelling catheter and monitoring of fluid intake. Aidan was managed with intravenous fluids (0.9% sodium chloride and 5% glucose) and oral intake as tolerated. He was keen to drink and was encouraged to drink hydrolyte or dilated juice. A small dose of Furosemide (0.5mg/kg dose) was given intravenously with good diuresis. Repeat

venous blood gas/formal sodium level was requested in two hours (since last level at 1745), to be repeated at midnight if stable, and at 6-7am.

39. Dr Lau ordered that Aidan be closely observed overnight. Oxygen was to be weaned if tolerated.

40. Aidan's parents stayed with him in the Hospital overnight.

Day 2- Monday 28 July 2014

41. On Monday 28 July, Aidan was reviewed at the morning round at 9am by Dr Nicolette Holly, the Paediatric Resident Medical Officer, in the presence of two UNSW medical students and Lucas Mara. Aidan had had a stable night with regular medical reviews. His sodium levels had remained stable overnight. He appeared to his father to be slightly improved. He was alert but tired, and he still had puffy eyes. He was speaking a few words and starting to recognise family members when visited by his grandparents and older brother.

42. On examination Aidan's vital signs were HR 129, BP 78/46mmHg, afebrile, RR 40 on 4 L Hudson mask. Aidan was on a Hudson mask to help him breath because he still needed the oxygen assistance and had not tolerated nasal prongs. His chest examination was unchanged, with decreased air entry left lower base, bronchial breath sounds and dullness to percussion at base. There were crackles audible on the right side.

43. Further investigations carried out on Monday including:

    a. Electrolytes and Mycoplasma serology sent at 0700
    b. Repeat full blood count, C-reactive protein, electrolytes, venous blood gas, and albumin collected at 2pm
    c. Nasopharangeal aspirate was sent requesting a respiratory PCR virus panel and rapid influenza test
    d. Urinalysis and urine protein: creatinine ratio
    e. Paired (if possible) serum and urine osmolality (a measure of urine concentration) and urine sodium level

44. The treatment on Monday included continuation of intravenous antibiotics, strict fluid balance management with indwelling catheter and monitoring of fluid intake managed, continuation of intravenous fluids and oral intake as tolerated. There were hourly observations with a plan for a 'once per shift' review by the Paediatric Registrar.

45. At approximately 16:30-17:00, Dr Lau had a phone conversation with Dr Holly, the Paediatric Registrar, to discuss results and the recent review. The repeat blood tests performed at 14:00 showed a sodium level of 130mmol/L. The albumin level had decreased to 221g/L (from 29g/L on presentation). Dr Holly reported that Aidan had dry membranes and lips and his urine output had dropped to 0.85ml/kg/hr and the catheter was patent and draining. Aidan was in positive fluid balance of 259ml.

46. By that stage, the impression Dr Lau had was that the hyponatraemia in conjunction with Aidan's clinical picture was more consistent with intravascular depletion and dehydration. Dr Lau therefore increased the total fluid intake to 1500ml per day, by increasing the intravenous fluid intake with ongoing oral intake. A plan was made to review his status in four hours and to reassess. If he had ongoing low urine output, then clinical review was needed and there was to be further discussion around a possible furosemide stat dose or consideration of an albumin infusion.

47. At 17:40, Dr Lau had a conversation with Dr Parul Chandra, the evening Paediatric Registrar, to discuss further investigations to help delineate the underlying cause of the hyponatraemia, including paired serum and urine osmolality, urinalysis and protein: creatinine ratio and urine sodium levels to look for nephrotic syndrome as an alternative diagnosis. Aidan's renal function was normal. There was discussion of a repeat chest x-ray.

48. At 2015 that night, Dr Lau was contacted by Dr Chandra with an update. Aidan's urine output had increased. His urine osmolality was less convincing of SIADH. Dr Lau ordered that Aidan was to continue on strict fluid balance and close monitoring with increased intravenous fluids from ½ maintenance to 2/3 maintenance and to repeat sodium levels in the morning. Dr Lau discussed the potential for albumin infusion and planned to review him in the morning.

49. Gillian Mara went home that night because she was starting to feel unwell herself and she didn't want to disadvantage Aidan. She was kept up to date by telephone and Lucas Mara stayed overnight.

Day 3- Monday 29 July 2014

50. At 5am, on the morning of Tuesday 29 July, Dr Lau was contacted by Dr Nerida Butcher, the night Paediatric Registrar, who had reviewed Aidan following a PACE Tier 1 call because of his decreased urine output. A Pace Tier 1 is a call for clinical review within 30 minutes. Aidan's urine output had decreased, his face was puffier and he reported being thirsty. Dr Lau discussed the plan to liberalise his fluids and to increase intravenous fluids to maintenance fluids after checking sodium levels to ensure that there was not a rapid rise or drop in sodium level. She requested a further review of the catheter to make sure it was draining and was not blocked or obstructed.

51. In the statement of Lucas Mara, he indicates that Aidan woke up around 6 or 7am and told Mr Mara that he needed to urinate. Since Aidan had a catheter in place, Mr Mara thought that was unusual and he informed the nurses, who expressed their thoughts that it must be blocked. Mr Mara was told by nursing staff that a doctor needed to approve the removal of the catheter and since there was no urgency, that would be done when the doctor had time to attend.

52. At 7am, as she was on her way to the Hospital, Dr Lau called Dr Nerida Butcher. Amongst the discussions they had, Dr Lau advised Dr Butcher to contact the

Paediatric Nephrologist on call at Sydney Children's Hospital to discuss the case and seek advice in relation to management, specifically assistance in distinguishing volume depletion/dehydration versus SIADH, given the low sodium, and to seek her advice on an albumin infusion. The nursing staff were handing over and Dr Lau was informed that Aidan had a small amount of urine produced and collected in his indwelling catheter.

53. At about 7:20am, Registered Nurse (RN) Kerrie Eggins took over the care of Aidan, having been briefed about him at the 7am handover. She gave evidence that she approached Dr Butcher and raised her concerns about Aidan's decreased urine output and puffiness around his face. Along with two other nurses she assessed Aidan at the bedside and checked his catheter and intravenous fluids. She continued hourly observations and hourly urine output measures over the morning. Aidan remained on 1500 ml fluid restriction. He had tolerated 1 x 60ml juice and one yoghurt.

54. At 7:30am, Dr Lau attended on Dr Butcher and discussed the advice from Dr Leah Krishock, the Paediatric Nephrologist on call at Sydney Children's Hospital. Dr Krishock had asked to be contacted again once the formal sodium levels became available, in order to have a more informed discussion about the albumin infusion and fluid management.

55. Aidan's case was discussed at 8am handover and in attendance was Dr Lau, junior medical staff, and Dr Alys Swindlehurst, staff specialist paediatrician. In accordance with good practice of obtaining a second opinion from senior colleagues, Dr Lau sought the opinion of Dr Swindlehurst in relation to Aidan's fluid balance, management and possible diagnosis. Aidan's available blood, urine tests and chest x-ray were reviewed on Powerchart, the electronic medical records. The Sydney Children's Hospital "Water and Electrolyte in PICU Practice Guidelines" available on the intranet were reviewed and referenced as part of the clinical discussion.

56. Dr Swindlehurst agreed that Aidan had pneumonia and with the available pathology results and current clinical picture, the hyponatraemia was more consistent with intravascular depletion and dehydration as opposed to SIADH. That supported Dr Lau's management plan to liberalise fluids. The cause of the low albumin and oedema (swelling) remained unclear and were to be the subject of further discussion with the on call Paediatric Nephrologist.

57. At 10.30am, Aidan was reviewed on the morning medical round by Dr Lau, in the presence of Dr Nicolette Holly (Paediatric Resident Medical Officer) nursing staff, two UNSW medical students and Lucas Mara. Aidan was more alert and was now interested in eating and drinking. However, the puffiness around his eyes was worse. He was not in respiratory distress. His vital signs were: HR 140; RR 30; Oxygen saturations 97% on 2L: on nasal prongs and BP 109/65 mmHg.

58. The impression of Dr Lau was that Aidan had a full bladder and the catheter was impeding urine output. The treatment plan included removing the catheter (with confirmation of 140ml in his bladder on a bladder scan just prior to his catheter removal) and increasing his oral salt intake with salty foods. The potential need to

replace his oral sodium and his albumin in addition to ongoing fluid management was discussed. The plan was to contact Dr Krishock with the formal electrolyte results; repeat weight and give an albumin infusion, unless Dr Krishock provided a different management opinion based on the current clinical picture and available laboratory results.

59. Immediately after the medical review, the team of treating doctors then left the room and nursing staff remained. Registered Nurses Kerrie-Anne Eggins and Hazel Paulo removed the urinary catheter, at which time Aidan passed a large amount of urine and a loose bowel motion, soaking him and causing him to be upset. Lucas Mara recalls that the action required to remove the catheter, to clean Aidan and move him to allow the bed sheets to be changed, expelled a lot of his limited energy and he appeared more visibly tired after these activities.

The decision to remove oxygen and shower Aidan

60. A decision was then made to shower Aidan. The oxygen nasal prongs were disconnected, but the intravenous drip was kept in place on a trolley and taken into the bathroom.

61. The decision to remove oxygen was made by the nurses without any great thought. The responsibility for that lay with Nurse Kerri-Anne Eggins, who was by far the more senior of the nurses, and was the nurse with responsibility for caring for Aidan that day. RN Eggins has been a nurse at Sutherland Hospital for over 20 years, whereas RN Paolo was a recent graduate, and had commenced work at Sutherland Hospital on the Paediatric Ward just two months earlier, in May 2014.

62. There was no consultation with the medical team, and no trialling of Aidan at room air before the oxygen was removed, and he was showered. Aidan was not supervised by nursing staff whilst he was in the shower.

63. Registered Nurse Eggins gave evidence that she formed the view that Aidan would be fine to have the oxygen removed for a few minutes to have a shower, because she had weighed him earlier that morning, which required that he have his oxygen removed for a time, and he had not shown any signs of distress. If it is correct that she was reassured by that, then she was inappropriately reassured. First, the scales were just outside Aidan's room and Aidan was held in his father's arms while being weighed, which would have taken less than a minute. Second, Aidan was not attached to a monitor whilst he was on the scales, so his oxygen saturation levels might have been decreasing, and RN Eggins would not have known about it. Third, in the absence of a record as to how Aidan was off oxygen, I am not satisfied that any close attention was paid. Fourth, Dr Lau and the experts, Dr Jacobe and Dr Dunlop, were adamant that oxygen is part of the treatment, and Aidan should not have had part of his treatment removed without the review and order of a member of the medical team. Dr Lau and Dr Holly were close by and there was nothing to prevent RN Eggins consulting with one of them as to whether oxygen could be safely removed for the purpose of showering.

64. I am not satisfied that in fact, RN Eggins gave any significant thought to Aidan's dependence on oxygen before the prongs were removed. There is a very human explanation for that error, in circumstances where Aidan had just had the contents of the catheter spilt on him and he was distressed. As the evidence suggested, being cleaned often comforts children and it is understandable that a quick decision was made to disconnect him, without sufficient thought going in to the consequences. It is clear, however, that the decision to do so was an error, and the appropriate response should have been to sponge bath Aidan, to minimise the risk. At the very least, if oxygen was to be removed, he should have been trialled at room air, with formal observations recorded.

65. In oral evidence, RN Eggins ultimately admitted that she had made an error. It was submitted on her behalf that she made that error because she made a decision that Aidan could have a bath, on the spur of the moment, and with the best intentions. I accept that. RN Paulo also took responsibility for her part in the decision making.

66. I will shortly return to the new Hospital policy that has been implemented as a result of what happened in Aidan's case, so that it is now clearly set out that nursing staff are not to remove oxygen without first consulting with the medical team.

67. I accept that both nurses were aware that Aidan was very unwell and they were motivated to care for him and assist with his recovery. They perform a very important role in our hospital system and were clearly affected by Aidan's death. I commend them for recognising the mistakes made that morning and for contributing to the inquest.

68. Aidan sat on a chair for most of the shower, with his father holding him up. After standing up briefly at the end of the shower, he collapsed and had to be carried by his father wrapped in a towel back to bed.

69. While Lucas Mara dried Aidan off, the two nurses attempted to reattach the oxygen prongs and the monitoring machine sensors to Aidan.

Failure to get a reading on the monitoring

70. Nurse Eggins gave evidence that her best recollection of the events that she connected the finger monitor to get a reading of oxygen saturations and was unable to get a trace. Thinking the monitor was at fault, she then went to the nurse's station and obtained a second oxygen saturation monitor and was still unable to get a trace. She then asked RN Paolo to assist and she recalls that obtained a reading of 95% oxygen saturation and pulse rate 90.

71. Registered Nurse Paulo had a slightly different memory of what occurred at that point. She gave evidence that RN Eggins informed her she was having difficulty getting a reading on the cardio-respiratory monitor previously hooked up, so she (RN Paulo) went to get another monitor from the nurses station. She recalled getting an Oxygen saturation monitor because that was the most important

monitor and she cannot recall if a cardio-respiratory monitor was available. She got an oxygen saturation rate of 95% and initially no heart rate, then a very faint one.

72. The evidence given by the nurses did not accord with the memory of Lucas Mara as to what took place. At 11.32am, soon after placing Aidan on the bed, Mr Mara received a phone call from his wife Gillian, who was calling to see how Aidan was. Mr Mara did not want to disturb the nurses and he needed to move the car, so he left the room, walked out of the hospital, moved the car and came back inside. That trip took him 10-15 minutes.

73. When Mr Mara returned, his mother in law was in the room and the nurses were beside the bed still checking the monitoring equipment. Aidan appeared to Mr Mara to be sleeping and Mr Mara sat down in a chair. As soon as he did, his mother in law, Nerida, said to him "I can't see Aidan's chest moving". Mr Mara got up and looked at Aidan and could see that he was not breathing. He touched his lips and chest and they were cold, and he could not feel a heartbeat. He asked the nurses to check his son physically, and Nurse Eggins then did so, and immediately called the doctor. The doctor checked Aidan, had a brief discussion with nursing staff and then activated an emergency button.

74. It is entirely understandable that memories differ at these moments of extreme stress, and I accept that each of the witnesses may be providing their genuine recollection of what happened.

The nurses fixation error

75. It is not necessary for me to resolve the evidence as to the exact sequence of events, in order to conclude that the nurses fell into error in focusing too long on the monitoring equipment, without checking the physical signs of whether Aidan was breathing.

76. There is sufficient evidence that the time between Aidan collapsing and the time of calling for medical review was unacceptably long, as a result of the fixation on the monitoring equipment, which the nurses thought must be the cause of the failure the get adequate readings.

77. Lucas Mara spoke to the Officer in Charge of this investigation, Detective Sergeant Peter Daly, the day of Aidan's death and in the days after. On 30 July, just one day after Aidan died, Lucas Mara showed him his phone with the call from Gillian coming in at 11.32am. I accept that Mr Mara was gone from the Hospital for around 10-15 minutes after that time. I am grateful to the Local Health District for providing records to show that the TIER 2 call for Aidan after he was recognised not to be breathing was made at 11.48am, some 14 minutes later.

78. According to Associate Professor Jacobe, it is clear that Aidan was very unwell when he returned from the shower and it is likely that he was actually "shocked"

at this time, as demonstrated by the decreased level of consciousness, poor peripheral perfusion and inability to obtain a reliable oxygen saturation trace.

79. Although pulseless at 11.35am, the first rhythm recorded by the resuscitation/cardiac arrest team when the defibrillator pads were applied (entered by the scribe at 11.48 hours) is asystole. Such a complete lack of cardiac activity does not usually develop abruptly, but rather follows a period (usually 5-10 minutes or more) of gradual slowing of the heart in response to persistent hypoxia/shock. Asystole suggests that the heart is profoundly ischaemic.

80. Associate Professor Stephen Jacobe referred to the nurses focus on the monitoring equipment to the exclusion of Aidan's clinical conditions as a "fixation error" and explains that it is well recognised in the patient safety literature. This phenomenon of a "fixation error" refers to where a person, or even a whole group, gets into a pattern of thinking that there is only one possible explanation for something, or one correct solution for an urgent problem, and is associated with a loss of situational awareness. Thus the nurses were convinced that the monitoring equipment was faulty, rather than questioning whether Aidan was critically ill and using basic manual checks.

81. Both Nurses Eggins and Paolo accepted that they had made a fixation error, and neither recalled having received any training about how to avoid that phenomenon. As a result, I will make a recommendation for formal training in that regard.

Resuscitation efforts

82. When Dr Lau finished examining Aidan that morning, she and Dr Holly consulted with Dr Krishock, who was able to review all of Aidan's results on the computer using Powerchart. She thought that the investigations were suggestive of a pre-renal cause, for example dehydration, as the cause of hyponatraemia, and advised a slow albumin infusion to help improve Aidan's intravascular volume.

83. Almost immediately after hanging up, Drs Lau and Holly were advised by Nurse Kerrie Eggins that Aidan had just come back from the shower unwell with sluggish capillary refill. Dr Lau agreed to come and review Aidan and Nurse Eggins returned to Aidan's room. Soon after Nurse Eggins returned and told Dr Lau that Aidan was non responsive, while another nurse called for a PACE Tier 2 emergency response. Dr Lau and Dr Holly attended immediately and found Aidan unresponsive and not breathing. A cardiac arrest was called, other staff attended and all efforts at resuscitation began. Sadly, in spite of all the best efforts, Aidan could not be revived.

Autopsy report

84. Dr Istvan Szentmariay, Pathologist, concluded that the medical cause of death was Influenza A Infection (Type H3N2).

Expert Evidence

85. The Court heard from two expert witnesses in relation to the care and treatment of Aidan in Hospital. The first, Associate Professor Stephen Jacobe is the Senior Staff Specialist in Paediatric Intensive Care at Westmead Hospital. The second was Dr Scott Dunlop, a consultant Paediatrician with Visiting Medical Officer positions in a number of public hospitals, including St George Public and Private and Sydney Children's Hospital.

86. There was no criticism of the treatment that Aidan was provided by General Practitioners, and the focus was on his condition and treatment whilst in Sutherland Hospital.

The cause of Aidan's sudden collapse and cardiac arrest

87. Associate Professor Jacobe gave evidence that the cause of Aidan's collapse is not immediately apparent, but he was prepared to provide an opinion on what he thought, on balance, was most likely. He considered that the most likely cause was a combination of hypovolaemia (lack of volume in the vascular space), hypotension (low blood pressure) and hypoxaemia (low oxygen) in the setting of a passage of a large loose bowel motion, a warm shower (with possible vasodilation) and period without supplemental oxygen.

88. Dr Scott Dunlop had a similar opinion as to the cause of the collapse, although he did not place any significance on the single bowel movement. In his opinion, the likely cause of the collapse was cardiovascular, not respiratory, but hypoxia may have contributed to the cardiovascular collapse.

The misdiagnosis of SIADH as the cause of the hyponatraemia

89. On review, it was clear that the initial diagnosis of SIADH as the cause of Aidan's hyponatraemia was incorrect.

90. Both experts gave evidence, consistent with Dr Lau, that differentiation between SIADH and dehydration as potential causes for hyponatraemia in a child can be very difficult. Aidan's treating clinicians correctly considered and documented both entities as potential pathologies in this case.

91. However, as noted above, the distinction is extremely important, because the treatments are almost the antithesis of each other. SIADH is treated with fluid restriction, consistent with the initial treatment of Aidan, and dehydration is treated with fluid replacement. Associate Professor Jacobe gave evidence that

SIADH is commonly seen in association with pneumonia, but must be diagnosed with caution, and only after excluding other potential causes of hyponatraemia such as dehydration.

92. Both Associate Professor Jacobe and Dr Scott Dunlop agreed that in hindsight, it would have been prudent to proactively differentiate SIADH from dehydration by measuring the urine/serum osmolalities and fractional excretion of sodium earlier than occurred. By 28 July 2014, Dr Lau was less convinced of SIADH and had begun liberalising fluids, however the fluid liberalisation never extended beyond fluid requirements, with no replacement dehydration.

93. Dr Scott Dunlop provided an expert opinion that there were clues that dehydration was likely. Despite being significantly unwell, Aidan was thirsty, urine output was questionable (although the catheter might have been blocked) and urine was concentrated with an elevated Specific Gravity. The treating clinicians may have been falsely reassured as sodium levels improved and stabilised.

94. A significant unresolved issue was Aidan's hypoalbuminaemia. Dr Dunlop noted that the treating clinicians appropriately investigated for potential sources of protein loss in the urine, but a decision to replace that protein loss with albumin infusion unfortunately coincided with Aidan's collapse and cardiac arrest, and so was never instigated. That has significant relevance to fluid management. Even with appropriate intravenous fluid administration, the effectiveness of rehydration would be likely to have been impaired by hypoalbuminaemia. Albumin acts to bind fluid in the intravascular space, and without it, fluid can leak into the extracellular space, termed "third spacing".

95. Had Aidan been treated for hyponatraemic dehydration and received an albumin infusion, or a different fluid type been utilised, it is possible that he may have survived.

96. Although it was recognised that there were opportunities for learning and improved treatment plans, neither expert was overly critical of the treating team. In fact, they recognised that Dr Lau had provided a thorough treatment plan and instigated regular medical reviews and regular testing.

97. Dr Lau herself approached the inquest in a way that was commendable, explaining the reasoning she adopted and the complexity of Aidan's case, and accepting that, if a similar situation presented, she would initiate tests to proactively differentiate SIADH from dehydration earlier. I accept that Dr Lau is a highly competent paediatrician who was doing her best to care for Aidan and could not have anticipated his sudden collapse.

Changes since Aidan's death

98. As a result of Aidan's tragic death, the South Eastern Sydney Local Health District appears to have been proactive in determining what lessons could be learnt in order to identify system improvement opportunities, so as to minimise

the risk of a similar death in the future. I commend them for that constructive approach and for the assistance the Court was given. I also commend the sensitive and respectful way in which their counsel and solicitor addressed the Mara family and I was aware how much that was appreciated.

99. Dr Justine Harris, Director of Clinical Services at the Sutherland Hospital, outlined the most significant outcomes of the review. Aidan's case was presented at the monthly Paediatric Quality Meeting chaired by the Director of Paediatrics (Dr Christine Lau) and attended by paediatric clinical and nursing staff. Dr Alys Swindlehurst, Paediatric Staff specialist, provided a comprehensive case presentation with respect to Aidan's diagnosis, treatment and management, and outlined her main learning points, which included:

    a) early tertiary opinion for complex cases
    b) discussion with tertiary hospital staff with respect to any patient requiring urinary catheters
    c) a diagnosis of SIADH should not be made in the absence of supporting laboratory investigations and without consultation with the local operating procedure of hyponatraemia. In October 2017, a Clinical Business Rule was published which replaced a draft guideline and interim clinical business rule on hyponatraemia introduced after Aidan's death. That document is "Hyponatraemia in Paediatric Patients- Management at the Sutherland Hospital", TSH CLIN 418 Clinical Business Rule.
    d) Emphasising with junior medical officers that they must consult specialists any time of the day or night
    e) Oxygen or monitoring is not to be discontinued by nurses without discussion with a medical team. The following Clinical business Rules were implemented:

i. "Paediatrics- Respiratory- Weaning of Oxygen in Paediatric Patients- Child and Adolescent Unit, TSH CLIN 333, published September 2015;
ii. Paediatric- Use of 3 Lead ECG Monitor, TSH Child and Adolescent Unit", TSH CLIN331, published September 2015;
iii. "Children's Ward High Acuity Patient (CHAP) at TSH Child and Adolescent Unit", CLIN 332, published September 2015;

100. Furthermore, there were numerous training sessions introduced to address potential deficits in knowledge.

I. From 24 November to 30 December 2014, education sessions were conducted involving paediatric nursing staff on "Daily weight and IVF competency". In particular, the sessions addressed the importance of daily weight measurements for patients receiving intravenous fluids in hyponatraemia.
II. In December 2014, ward based scenarios were conducted by paediatric staff specialists and attended by nursing and medical staff members covering scenarios of fluids/sepsis, cardiac, respiratory, seizures and post-surgical haemorrhage. These scenarios are conducted by the Staff Specialists Paediatricians with the nurse educator. They are multidisciplinary and occur on a monthly basis for all nursing and medical staff on the ward.

III. Between November to December 2014, there was training for paediatric nurses conducted by a Urology Clinical Nurse Consultant, for indwelling urinary catheter care.

101. I received evidence that there are a number of strategies to improve multidisciplinary team work, including:

- multidisciplinary training sessions
- Patient Safety Huddles on the ward daily, led by the Paediatrician and Nurse Unit Manager, and attended by nurses, junior medical officers and allied health; and
- Paediatric Clinical Issues meetings, Patient Safety Meetings and Morbidity and Mortality meetings.

102. It appears that an important improvement occurred with the introduction of a new system known as the Children's Ward High Acuity Patient (CHAP). Significantly unwell children are flagged as CHAPs high acuity after discussion with a senior medical officer. These patients are marked on the electronic patient journey board, take priority at handover and are recognised to require increased nursing care (1:2). These children have formal multidisciplinary team progress reviews three times every day, involving the CHAPS registrar, nurse and patients. I was pleased to hear the submission of Ms Robinson, appearing for Nurses Eggins and Paolo that had that system been in place at the time of Aidan's presentation, it would have elevated his care.

103. By the time of the inquest, I received further information on behalf of the South Eastern Sydney Local Health District that although there are no guidelines or policies specifically covering SIADH with respect to NSW Health and the South Eastern Sydney Local Health District, there are a number of documents which refer to SIADH, fluid therapy and sodium levels, with a focus on awareness of SIADH and risk reduction with appropriate fluids.

104. NSW Health is in discussion with Victoria Health regarding sharing and collaborative development of paediatric clinical guidelines on a range of topics, including hyponatraemia and SIADH. The Ministry of Health considers this strategy to be more effective that a separate NSW Guideline on SIADH. I commend the continued cooperation between the two States and hope that this will continue to result in improved recognition and treatment for this complex condition.

105. As a result of the significant systems review, and the changes introduced, there is no need for comprehensive recommendations in this case.

106. After the conclusion of the inquest, at my request, information was provided on behalf of the Local Health District to address the evidence of nurses as to possible gaps in their training. First, Nurse Paolo gave evidence that she was not trained on the specifics of the monitoring equipment at Sutherland, and it was different to the equipment she had seen during her training. Both nurses gave evidence that they did not receive any training on the concept of "fixation errors" and how to avoid them. I am satisfied that there is now training in place on the

equipment, and I have been provided with records by the SESLHD to suggest that Nurse Paolo and Nurse Eggins did receive training in the equipment in 2014 and 2015. However I think that this case has identified an opportunity for training across the Health District on the phenomenon of "fixation error" and I plan to recommend that it be included amongst the schedule of training that is rolled out.

Conclusion

107. This case is a reminder of the impact of a death in the hospital setting on staff responsible for care. The Court recognises that the medical and nursing staff were deeply saddened by Aidan's death and it can be stressful to give evidence in the inquest environment. I hope they take comfort from how proactive Sutherland Hospital has been to implement systems and training that will help them to provide the best care possible.

108. I thank the Officer in Charge of this investigation, Detective Sergeant Peter Daley, who met the family on the day of Aidan's death, thoroughly investigated and presented an excellent brief. His care and respect for the family of Aidan was obvious.

109. I thank my Counsel Assisting, Dr Peggy Dwyer and her instructing solicitor, Ms Janet de Castro Lopo from the Office of General Counsel, Department of Justice. They put an enormous amount of intelligence, expertise and compassion into the preparation and conduct of this inquest.

110. Finally, I offer my heartfelt condolences to the Mara family. I was deeply moved by their grace and generosity during this inquest. Their love for Aidan is powerful and enduring.

Findings required by s. 81(1)

111. As a result of considering all of the documentary evidence and the oral evidence given at the inquest, I am able to confirm that the death occurred and make the following findings in relation to it.

Identity of deceased:

Aidan Mara

Date of death:

29 July 2014

Place of death:

Sutherland Hospital, New South Wales

Cause of death:

The medical cause of death was Influenza A (Type H3N2)

Manner of death:

Cardiovascular collapse as a result of a combination of hypovolaemia (lack of volume in the vascular space), hypotension (low blood pressure) and hypoxemia (low oxygen) in the setting of a warm shower (with possible vasodilation) and period without supplemental oxygen.

Recommendation

To the South Eastern Sydney Local Health District

I recommend that a component of the training for nursing staff address the phenomenon of “fixation errors”, particularly as it relates to assessment of results of monitoring equipment.

I close this inquest.

Teresa O’Sullivan
Deputy State Coroner
29 June 2018