IN THE CORONERS COURT
OF VICTORIA
AT MELBOURNE

COR 2022 003670

FINDING INTO DEATH WITHOUT INQUEST

Form 38 Rule 63(2)

*Section 67 of the **Coroners Act 2008***

Findings of:	Coroner Katherine Lorenz
Deceased:	Matilda Ruby Armstrong
Date of birth:	8 June 2021
Date of death:	4 July 2022
Cause of death:	1(a) viral respiratory tract infection (*Parainfluenza* and *Respiratory Syncytial Virus*) complicated by *Streptococcus pyogenes* chest sepsis 2 recent COVID-19 infection
Place of death:	University Hospital Geelong Bellarine Street, Geelong, Victoria, 3220
Keywords:	Paediatric death, death in hospital, sepsis, delay, patient and carer escalation

INTRODUCTION

1. Matilda Ruby Armstrong was a previously well 12-month-old girl who died in the Emergency Department (**ED**) of University Hospital Geelong (**UHG**) on 4 July 2022, following her second presentation in two days for a febrile respiratory illness, poor oral intake, and lethargy.

2. Matilda deteriorated in the paediatric waiting room and could not be revived. Her cause of death on postmortem examination was viral respiratory tract infection (*Parainfluenza* and *Respiratory Syncytial Virus*) complicated by *Streptococcus pyogenes* chest sepsis.

THE CORONIAL INVESTIGATION

3. Matilda's death was reported to the coroner as it fell within the definition of a reportable death in the *Coroners Act 2008* (**the Act**). Reportable deaths include deaths that are unexpected, unnatural or violent or result from accident or injury.

4. The role of a coroner is to independently investigate reportable deaths to establish, if possible, identity, medical cause of death, and surrounding circumstances. Surrounding circumstances are limited to events which are sufficiently proximate and causally related to the death. The purpose of a coronial investigation is to establish the facts, not to cast blame or determine criminal or civil liability.

5. Under the Act, coroners also have the important functions of helping to prevent deaths and promoting public health and safety and the administration of justice through the making of comments or recommendations in appropriate cases about any matter connected to the death under investigation.

6. This finding draws on the totality of the coronial investigation into the death of Matilda Ruby Armstrong. Whilst I have reviewed all the material, I will only refer to that which is directly relevant to my findings or necessary for narrative clarity. In the coronial jurisdiction, facts must be established on the balance of probabilities.[1]

[1] Subject to the principles enunciated in *Briginshaw v Briginshaw* (1938) 60 CLR 336. The effect of this and similar authorities is that coroners should not make adverse findings against, or comments about, individuals unless the evidence provides a comfortable level of satisfaction as to those matters taking into account the consequences of such findings or comments.

MATTERS IN RELATION TO WHICH A FINDING MUST, IF POSSIBLE, BE MADE

Circumstances in which the death occurred

7. On 30 June 2022, Matilda became unwell with symptoms of COVID-19 infection. A Rapid Antigen Test (**RAT**) in the community confirmed the infection. Matilda was managed at home with paracetamol and ibuprofen as required.

First presentation to University Hospital Geelong Emergency Department

8. On 3 July 2022, Matilda presented to the UHG ED with her parents.

9. The triage summary at 12.45pm outlined that Matilda was on Day 4 of a COVID-19 illness with high fevers, shortness of breath, significantly decreased urine output, a moist and persistent cough, global mottled skin, slow capillary refill time, and a dry mouth.

10. Her observations showed marked tachypnoea (fast breathing rate) with a respiratory rate (**RR**) of 65 breathes per minute (**bpm**), marked tachycardia (fast heart rate) with a heart rate (**HR**) of 188 beats per minute (**bpm**), fever (38.5^{o}C), normal oxygen saturations (**SpO2**, 98%) and a normal conscious state with Glasgow Coma Score (**GCS**)[2] of 15. She was triaged as Category 2, which requires medical review within 10 minutes.

11. Matilda's COVID-19 status was not confirmed at UHG, but was assumed, given she had clinical symptoms of COVID-19 and had returned a positive RAT at home.

12. At 1.06pm, an ED registrar reviewed Matilda in the paediatric waiting area as there were no paediatric ED beds available. The paediatric section of the UHG ED consists of seven staffed beds: 4 Paediatric ED beds and 3 Paediatric Short Stay beds. This assessment continued when Matilda was moved into a paediatric cubicle at 1.31pm.

13. The registrar documented that Matilda had been unwell for 4 days with an upper respiratory tract illness characterised by a runny nose (*"rhinorrhoea ++"*), and a cough which was *"moist sounding, not barking"*.[3] They noted Matilda's fevers had continued despite paracetamol and that she had tested positive for COVID-19 4 days earlier.

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[2] The Glasgow Coma Scale (GCS) is a neurological scoring system used to assess conscious level. The GCS is comprised of three categories; best eye response, best vocal response and best motor response. The GCS is scored out of 15, with a score of 15 indicating a normal level of consciousness.

[3] A barking cough is characteristic of croup, a common upper respiratory infective illness in children.

14. Matilda was noted to have decreased oral intake, occasionally taking milk and water, with a marked decrease in the frequency of wet nappies; 2-3 per day compared with a baseline of 10 per day. Matilda had been improving with paracetamol in the preceding few days and had been playing despite being unwell. However, she had become more lethargic, clingy, and irritable and her mother had noted faster breathing, which prompted the presentation to ED. There was no history of vomiting or diarrhoea.

15. Physical examination at this time showed ongoing tachycardia (HR 180) and fever (39.3^{o}C), with improving tachypnoea (RR 48), normal pulse oximetry (SpO2 98%) and a mildly increased work of breathing with subcostal and intercostal recession. Matilda appeared irritable but reactive and able to settle in her mother's arms.

16. Matilda had copious pale green nasal discharge and had a blanching maculopapular rash over her body.[4] Matilda had a moist tongue and dry lips, with a brisk capillary refill time, a soft fontanelle, and strong femoral pulses. Chest examination revealed normal heart sounds, no murmurs, good air entry throughout the lung fields, and transmitted upper airway noises due to her congested nose. Matilda had no neck stiffness.

17. The registrar's notes suggested that it was not feasible to examine Matilda's ears, throat, and abdomen at that time due to her being unsettled. They planned to complete the examination at a later stage. It is unclear from the medical notes if this occurred.

18. The registrar's impression was that Matilda's signs and symptoms were consistent with COVID-19 infection. Although the history suggested she was dehydrated, she examined well, and though she had mild increased work of breathing, she had no other concerning respiratory features.

19. The registrar prescribed paracetamol and ibuprofen, and a trial of oral fluid rehydration. Matilda's parents were asked to encourage Matilda to drink and to monitor her wet nappies.

20. At around 2.20pm, a nurse assessed Matilda. She remained febrile (39.3^{o}C), tachycardic (HR 185), and tachypnoeic (RR 48), with normal pulse oximetry (SpO2 100%), GCS 15/15, and mild respiratory distress.

21. Nursing examination findings stated Matilda was alert, pale, fatigued, and lethargic, had an occasional cough and a flushed appearance with a blanching rash over her whole body. She

[4] This type of rash is commonly seen with viral infections (cf. a non-blanching rash which is considered a 'red flag').

continued to have reduced oral intake and urine output. Her capillary refill time was normal (< 2 seconds) and her abdomen was soft. Matilda's blood sugar level (**BSL**) was normal (5.7mmol/L) but her blood ketone level was elevated (3.2mmol/L).[5]

22. At 4pm, the nurse noted that Matilda had *"developed raised lumps on hands and trunk"* and she alerted the registrar.

23. At 4.44pm, the nurse reassessed Matilda. Her fever had resolved, and her heart rate (157bpm) and respiratory rate (40bpm) had settled but were still above the normal range for a child of Matilda's age. Matilda was sitting up playing in bed and had an ongoing cough and runny nose. Matilda's capillary refill time was > 2 seconds, and her repeat BSL was normal (5.7mmol/L) with improving ketones (2.9mmol/L). The nurse recorded that Matilda *"appears to have more energy now, ketones improved, parents report patient has had 10mL juice and 20mL water since arrival".*

24. At 5.45pm, the registrar reviewed Matilda and noted her improvement. The registrar documented that Matilda was *"afebrile, HR around 150 at rest. Saturations remain at 100% and tachypnoea settled to around 40"* This heart rate and respiratory rate in a child of Matilda's age are both borderline between normal and elevated.

25. Matilda had taken about 260mL of fluids since arrival and had produced one heavily wet nappy. The registrar noted the new rash: three red dots on her hands, 1mm in diameter, which blanched with pressure and was not clinically concerning.

26. The registrar's impression was that Matilda's presentation continued to be consistent with COVID-19 infection, and that she had tolerated an oral fluid challenge having *"perked up brilliantly"*.

27. Matilda was discharged home with a plan to continue giving paracetamol and ibuprofen and encouraging oral hydration. The registrar discussed with Matilda's parents that they should continue to monitor her intake and output and her respiratory rate and effort.

28. The plan was to follow-up with Matilda's GP in the coming week to ensure resolution of her symptoms, but to return to ED if they were concerned, or if Matilda's breathing or intake was worsening. Matilda's parents were documented as being happy with this plan.

[5] Elevated ketones in this context were likely from not eating while unwell.

29. At 5.49pm, a discharge letter was prepared and sent electronically to Matilda's GP.

Second presentation to University Hospital Geelong Emergency Department

30. On 4 July 2022, Matila and her family represented to the UHG ED, and she was triaged at 8.54pm.

31. The triage commentary noted that she was a representing patient on Day 5 of a COVID-19 illness with worsening cough, decreased oral intake and wet nappies, and increased lethargy. At triage, Matilda was tachypnoeic (RR 56), had a normal heart rate (HR 110), normal temperature (37.1^{o}C), and normal oxygen levels.

32. Matilda was triaged as Category 3, which requires medical review within 30 minutes. Matilda and her mother were shown to wait in the PWA, a separate room off the main waiting area.

33. At approximately 10pm, Matilda began to deteriorate with increasing respiratory distress and turning blue. Matilda's mother pressed the "nurse call" button on the wall of the PWA, and a bystander ran out of the PWA to seek help from staff. Another bystander who was in the PWA also pressed the "staff assist" button.

34. At 10.09pm, two nurses arrived and found Matilda unresponsive. They took Matilda immediately into the ED and alerted other staff that there had been a paediatric arrest.

35. As all paediatric beds were occupied, Matilda was placed on the floor by nursing staff so that cardiopulmonary resuscitation (**CPR**) could be performed.

36. An ED Consultant immediately attended to Matilda, picked her up, and continued to provide chest compressions while walking to the Resuscitation Bay where a cubicle was being cleared. This period of relocation took approximately 35 seconds and chest compressions continued throughout. Matilda was placed in a resuscitation cot.

37. The Paediatric Area Nurse commenced airway management with bag-valve-mask ventilation and another nurse continued cardiac compressions. Matilda was attended by several ED staff, including two ED consultants, and the paediatric team, which included a Paediatric Consultant.

38. Within five minutes of arrival in the Resuscitation Bay, an ED Consultant intubated Matilda, and another Consultant obtained bilateral pretibial intraosseous (**IO**) access.

39. Staff sought advice from the Paediatric Infant Perinatal Emergency Retrieval (**PIPER**) service via telephone about 5 minutes into Matilda's resuscitation. There was no return of spontaneous circulation despite appropriate and extensive resuscitation for approximately 70 minutes. All team members agreed to cease resuscitation, and Matilda was declared deceased at 11.18pm.

Identity of the deceased

40. On 5 July 2022, Matilda Ruby Armstrong, born 8 June 2021, was visually identified by her mother, who completed a statement of identification.

41. Identity is not in dispute and requires no further investigation.

Medical cause of death

42. Forensic Pathologist Dr Heinrich Bouwer from the Victorian Institute of Forensic Medicine (**VIFM**) conducted an autopsy on 7 July 2022 and provided a written report of the findings.

43. The autopsy showed evidence of severe chest infection. There was no histological evidence of findings which may be seen with severe COVID-19 pneumonia. There was no evidence of myocarditis (inflammation of the heart muscle).

44. Although a COVID-19 test was negative at postmortem, Dr Bouwer commented that Matilda tested positive some days earlier and that this is a known risk factor for secondary bacterial pneumonia.

45. Postmortem bacteriology detected *Streptococcus pyogenes* in lung swabs, and multiple viruses in a nasal swab. These were *Parainfluenza*, *Respiratory Syncytial Virus* (**RSV**), and *Cytomegalovirus*.

46. There was no postmortem evidence of injuries contributing to death.

47. Toxicological analysis of postmortem samples did not identify the presence of any alcohol or any other commons drugs or poisons.

48. Dr Bouwer provided an opinion that the medical cause of death was from natural causes and was formulated as:

> 1(a) viral respiratory tract infection (parainfluenza and respiratory syncytial virus) complicated by streptococcus pyogenes chest sepsis
> 2 recent COVID-19 infection.

49. I accept Dr Bouwer's opinion.

BARWON HEALTH INVESTIGATION

50. Barwon Health reported Matilda's case to Safer Care Victoria (**SCV**) as a Sentinel Event. This prompted a Root Cause Analysis (**RCA**) led by Barwon Health, the health service responsible for UHG, with an external independent expert from the Royal Children's Hospital (**RCH**).

51. According to Barwon Health, the four learnings from the RCA were:

    i. Matilda presented with an unidentified disease process that was both severe and rapid in its rate of progression. This contributed to the challenge in recognition or interpretation by clinicians in the current work environment.

    ii. Matilda's mother was not made aware of the available avenues of escalation for carers and patients in the waiting room, including the use of the Patient and Carer Escalation (**PACE**) procedure.

    iii. The Paediatric Waiting Room is geographically isolated, with poor thoroughfare and does not support opportunistic identification of patient deterioration. Due to location of the PWA, there was a lack of opportunity for the carer to signal a passing staff member to escalate any concerns.

    iv. Clinician oversight of the PWA is unclear and not the direct responsibility of any identified clinician who is adequately resourced to do that task. A process of reassessment for re-triage does not exist for patients who have breached their triage timeframes.

52. As a result, the RCA contained recommendations to address these issues. These can be broadly summarised as:

    a) Review the ED waiting environment and layout

    b) Review and co-design with consumers that patient and carer escalation process in the ED waiting room

    c) Develop a model of care that has clear delegation of responsibility for clinician oversight of the waiting room

    d) Ensure that this model of care has active oversight of patients who have breached their triage category waiting time

ED waiting environment

53. This recommendation was completed on 30 April 2023 by increasing visibility between the ED and PWA. This was done by removing the tinting from windows and removing office equipment away from the window area.

Patient and Carer Escalation

54. This recommendation was completed on 20 June 2023. Barwon Health has integrated the use of the "Escalation of Care – Emergency Department" revised procedure. This aligns all escalation procedures for deteriorating patients. There are tailored posters in the general waiting area and in cubicles which reflect these processes in an easily accessible way for patients and carers.

Clinical oversight of waiting areas

55. UHG are in the process of constructing a dedicated Paediatric ED which will be separate from the current mixed ED. The original mixed ED will become an Adult ED. The clinical oversight for the new Paediatric ED is on hold until the project is completed in late 2024. An interim model of care has been developed while the mixed ED is still operating.

56. A dedicated team has been delegated responsibility for paediatric care in the ED. The Team Leader has medical oversight and responsibility for care for patients in the PWA and Fast Track area.

Triage category waiting time breaches

57. UHG have increased the number of nurses in the ED and their responsibilities now explicitly include initiation and reassessment of care for patients in the waiting room, including those who have breached their triage category waiting times.

ISSUES

58. The clinical care provided to Matilda was appropriate and in line with expected standards. At her first presentation, there were no factors that clearly supported a diagnosis of a serious bacterial infection over the provisional diagnosis of a viral illness.

59. Further, Matilda improved with supportive treatment and was discharged with a sensible plan for follow-up in discussion with Matilda's parents. Matilda's parents followed that plan and returned to the ED.

60. The main issue at representation was a lack of timely assessment and continued reassessment while waiting for medical review. A lack of clear parental escalation processes also contributed as outlined by the Barwon Health RCA. These are explored in turn below.

61. Finally, the clinical care provided following Matilda's arrest was comprehensive to in keeping with national guidelines. Matilda received continuous and effective resuscitation by a team skilled in paediatric resuscitation, including two ED consultants and a consultant paediatrician.

Timely assessment and continued reassessment

62. Both Matilda's initial and subsequent presentations to UHG ED featured delays in time to assessment and treatment. This was not identified as a potential preventable factor in the RCA by Barwon Health.

63. However, given the multiple infective pathogens that contributed to Matilda's death (only one, *Streptococcus pyogenes*, being treatable with antibiotics), it is not possible to say whether Matilda's death was preventable had these delays not occurred. Nonetheless, I consider that timely assessment and treatment within expected triage timeframes would have been Matilda's best chance of survival.

64. Patients not being seen within their triage category tune is not an uncommon scenario across EDs across Victoria. On the night of Matilda's death, 10 of the 13 patients under 18 years of age in UHG ED were not seen within the recommended time.

65. A key factor in achieving timely review is adequate staffing. I note that since the time of Matilda's death, additional nursing staff are allocated to the UHG ED. This includes dedicated nursing staff assigned to assist with triage, monitoring, and reassessment of patients in the waiting room.

66. At the time of Matilda's death, the UHG ED medical staffing fell just short of the Australian College of Emergency Medicine (**ACEM**) guidelines. Barwon Health stated that UHG ED has struggled to recruit staff to their ED, much like other regional hospitals in Victoria.

Parental Escalation

67. A lack of clear parental escalation processes has been a factor in several paediatric cases reviewed by this Court. Safer Care Victoria have also reported an increase in paediatric Sentinel Events. This has led to the creation of Safer Care for Kids to implement three broad recommendations.[6]

68. One of these recommendations is to deliver a state-wide patient escalation process which aims to empower patients and carers to voice unresolved concerns and receive timely responses from their health service.

69. Overall, I am satisfied that the issues and recommendations identified by Barwon Health and the progression of state-wide escalation pathways have obviated the need for coronial recommendations.

FINDINGS AND CONCLUSION

70. Pursuant to section 67(1) of the Act I make the following findings:

    a) the identity of the deceased was Matilda Ruby Armstrong, born 8 June 2021;

    b) the death occurred on 4 July 2022 at University Hospital Geelong Bellerine Street, Geelong, Victoria, 3220, from *viral respiratory tract infection (*Parainfluenza *and* Respiratory Syncytial Virus*) complicated* Streptococcus pyogenes *chest sepsis* in the setting of *recent COVID-19 infection.*

    c) the death occurred in the circumstances described above.

I convey my sincere condolences to Matilda's family for their loss.

Pursuant to section 73(1A) of the Act, I order that this finding be published on the Coroners Court of Victoria website in accordance with the rules.

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

Adrianne & Bradley Armstrong, Senior Next of Kin
Barwon Health
Safer Care Victoria
CCOPMM

[6] See Safer Care for Kids website at <https://www.safercare.vic.gov.au/safer-care-for-kids>

Signature:

Coroner Katherine Lorenz

Date: 19 August 2024

NOTE: Under section 83 of the ***Coroners Act 2008*** ('the Act'), a person with sufficient interest in an investigation may appeal to the Trial Division of the Supreme Court against the findings of a coroner in respect of a death after an investigation. An appeal must be made within 6 months after the day on which the determination is made, unless the Supreme Court grants leave to appeal out of time under section 86 of the Act.