IN THE CORONERS' COURT OF THE NORTHERN TERRITORY

Rel No: D0087/2023

**CORONERS' FINDINGS**

*Section 34 of the **Coroners Act 1993***

I, Elisabeth Armitage, Coroner, having investigated the death of **Toddler R** and without holding an inquest, find that the identity of the deceased was **Toddler R,** born on **26 November 2019** and that his **death occurred on 14 April 2023, at Ngukurr Community Clinic in the Northern Territory.**

**Cause of death**:

| 1(a) | Disease or condition leading directly to death: | **Disseminated staphylococcalaureus infection** |
|---|---|---|

**Other conditions present but not regarded (or provable) as contributing to death were:**

<u>Summary of main pathological findings and opinion as to cause of death</u>

At autopsy, the body was that of an appropriately developed male child, who appeared well nourished. There was evidence of recent medical intervention. There was a small, red, circular abrasion in the centre of the chest, anteriorly, which could have been due to resuscitation. There were no pathologic swellings of the scalp and no evidence of injury to the skull or brain.

There were numerous circular hyperpigmented lesions on the lower limbs, predominantly on the legs, some with central hyperpigmented scarred areas and some were associated with scabbing. There were occasional vesicles. There was mild swelling of the right hand, posteriorly, and on further inspection, there was oedema of the underlying connective tissues and the muscles, the latter of which appeared red and necrotic. The right pectoralis minor muscle and the inner aspect of the pectoralis major muscle (chest wall muscles), appeared red-brown and possibly necrotic with a small collection of red-brown fluid. There was no evidence of haemorrhage involving the overlying subcutaneous tissue or the skin. Histology revealed pyomyositis and myonecrosis. There were disseminated infective, bacterial deposits in the lungs and the myocardium (heart), with bilateral pleural effusions, pericardiaI effusion and patchy fibrinous pericarditis. There was no evidence of valvular pathology. Histology revealed nodular septic infarcts of the myocardium, however.

Multiple samples were taken for microbiology (heart, pericardial fluid, lung tissues, nasopharyngeal swabs, thigh, right thigh skin lesion swab, blood culture), which revealed disseminated staphylococcal infection. Staphylococcus aureus was detected in the blood culture, both lungs, the right hand muscle, the right pectoralis muscle, and the nasopharyngeal swab.

*"Staphylococcus aureus continues to cause impressive spectrum of community-acquired diseases ranging from skin infections to fatal disseminated disease, especially in malnourished children of tropics and subtropics. Mortality in children with staphylococcal bacteraemia varies from 1.4% to* 30-35%." [1]

*"Bacteraemic spread of infection to skeletal muscle is extremely uncommon. Among fatal cases of staphylococcal septicaemia, abscesses in skeletal muscle are found in less than 1%. Pyomyositis (primary muscle abscess) is a bacterial infection of muscle that* occurs *in the absence of a predisposing site of infection.* S. *aureus is the most common cause. Blood cultures are positive in* 5% *to* 35% *of the cases in most series at the time of presentation; metastatic infections in tissue other than muscle are rare, although the development of venous thrombosis and septic pulmonary emboli has been reported."* [2]

*Haemophilus influenzae* bacterium was also isolated in the lungs and nasopharyngeal swab and *Rhinovirus* and type 2 Human *Parainfluenzae* virus were identified in both lungs, but there was no histologic evidence in keeping with viral pneumonia, nor was there histologic evidence in keeping with primary bacterial pneumonia. However the upper airways were not evaluated, microscopically, therefore viral respiratory tract infection cannot be excluded.

Postmortem biochemistry was non-contributory in the formulation of a cause of death. Only therapeutic medications at non-toxic levels were detected with post-mortem toxicology.

In view of the history, circumstances and postmortem examination findings, death is due to disseminated *Staphylococcal aureus* infection.

References

1. **1.** Arun K. Baranwal and others, A 5-year PICU Experience of Disseminated Staphylococcal Disease, Part 1: Clinical and Microbial Profile, Journal of Tropical Pediatrics, Volume 53, Issue 4, August 2007, Pages 245-251, https://doi.org/10.1093/tropej/fmm022
2. Pasternack MS, Swartz MN. Myositis and Myonecrosis. Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases. 2015:1216-1225.e2. doi: 10.1016/8978-1-4557-4801-3.00096-5. Epub 2014 Oct 31. PMCID: PMC7151864.

**Specimens were taken for toxicological analysis:**

Results: Forensic Science Case Number:

Preserved iliac vein blood Alcohol not detected

Preserved iliac vein blood Paracetamol 24 mg/L

Preserved iliac vein blood Lignocaine detected

Preserved iliac vein blood Rocuronium detected

Preserved iliac vein blood Ibuprofen detected

No other drugs listed in the Scope of Analysis were detected in the preserved iliac vein blood.

**Paracetamol** has analgesic and antipyretic properties

**Lignocaine** is used as an anaesthetic and as an antiarrhythmic drug

**Rocuronium** is a nondepolarizing neuromuscular blocker used as an adjunct to general anaesthesia to facilitate endotracheal intubation and to facilitate mechanical ventilation

**Ibuprofen** is a nonsteroidal anti-inflammatory agent for the temporary relief of pain and inflammation. It may be found in combination with other drugs such as codeine or paracetamol

**Police investigation:**

A coronial investigation by police found no suspicious circumstances surrounding this death.

**Circumstances:**

Toddler R was a three year old Aboriginal child, born in Katherine. He was known to be a happy child and enjoyed fishing and playing the drums.

He attended Sunrise Health Clinic (Ngukurr) for the normal childhood illnesses such as respiratory illness, ear infections and skin infections and was up to date with all immunisations.

On 10 April 2023, he presented at the Health Clinic with his mother complaining of dizziness and a raised temperature. He was provided Panadol and returned home with his mother. A micro cultural swab was taken and sent away for analysis, but unfortunately the results were not reported until 21 April 2023. Over the next few days his family said he complained of having a sore shoulder when being lifted up.

On 13 April 2023, he returned to the clinic with irregular fever, lethargy and cold-like symptoms. He was provided with more analgesia and an injection of penicillin for a skin irritation and pimple on his legs. The nurse considered he might have an upper respiratory tract infection. Later on the same day his mother called the clinic because she was concerned he was not improving. She was advised to bring him back the following day as staff were busy with a potential emergency.

On the morning of 14 April 2023, he was brought into the clinic with on-going fever, a swollen right hand and he was tender to touch on the torso. He had been crying all night. The District Medical Officer was consulted at 11.25am and advised to give analgesic relief with review for possible CareFlight later in the day.

At 1pm he was assessed as being in moderate respiratory distress, contact was made with the RDH Paediatrician and arrangements were made to CareFlight him to RDH. At approximately 2pm he lapsed into unconsciousness. CPR was conducted and CareFlight arrived. He was unable to be revived and he was declared deceased at 5.10pm, 14 April 2023.

<u>What is Sepsis?</u>

Sepsis is a time-critical medical emergency that arises when the body has a dysregulated response to an infection. This results in damage to the body's own tissues and organs, which can lead to septic shock and organ failure. Sepsis can be triggered by infections caused by bacteria, viruses, fungi and parasites. Bacterial infections are the most common triggers.

Early recognition of sepsis is important in all health settings. Majority of sepsis arises in the community, therefore the first point of contact with health care workers in primary care, ambulance services or emergency departments (ED) is a critical setting for the early detection of sepsis. Early recognition in non-acute and pre-hospital settings has been associated to faster treatment and improving outcomes.

The common themes of sepsis related deaths in the NT includes: patients of a young age, fit build, and delayed or missed sepsis recognition, diagnosis and administration of inappropriate antibiotics.

Primary Health Morbidity Mortality Review meeting

A Primary Health Morbidity Mortality Review meeting was held on 16 June 2023. Sunrise Aboriginal Health Organisation attended the meeting. As part of the review the following contributing factors were identified–

*Contributing Factors*

- Delay in recognition of sepsis with subsequent targets for sepsis management delayed or not met.
- Handover documentation – potential to slow recognition of sepsis further.
- Written vs verbal handover – gap in governance.
- Remote location – considerable distance to definitive care.
- Limited after hours capacities.
- Staff limitations – variable experience, time constraints, fatigue considerations.
- Limited investigation resources (pathology).
- No doctor on site to assist with pathology and procedural needs.
- Potential gap from written DMA referral to actual medical retrieval consultant involvement.
- Workload demand which may hamper more frequent follow up – 23 incoming calls, during period of monitoring by DMO service, potentially multiple patients in small clinic with limited staff and equipment.
- Clinical records held across multiple databases, many consultations not published to eHR.
- Absence of visual cues due to tele-consulting work.
- Availability of Sepsis guidelines.

*Actions Implemented by Sunrise Aboriginal Health Organisation:*

- All after hours call out of vulnerable clients (less than 5 years or more than 55 years) will be attended to and reviewed in person.
- All clinician travelling out of communities during work hours will need authorization of Executive team member.
- Successfully lobbied with NT Health to stock Meropenem and Vancomycin in all our communities in our Imprest list.
- All clinicians orientation pack have a session related to recognition of Sepsis.
- Initial education session undertaken by AHP Clinical educator.
- Education sessions undertaken in collaboration with NT Health and “T for Thomas” organization.
- Currently working on implementing “Sepsis Pathway” in CommuniCare software.
- Approved to take part in “SPOCT trial” to aid in the recognition and treatment of Sepsis in remote setting.

Sunrise Aboriginal Health Organisation undertook a review of Toddler R’s treatment and care and conducted an open disclosure information meeting with the family.

Incident Review Report 1 August 2024

A Senior DMO and Sepsis Clinical Lead, reviewed the incident. She noted that there had been a delay greater than 1 hour in escalating his care inconsistent with the CARPA manual.

The DMO submitted a high acuity referral to CareFlight at 13.02pm and this was triaged by CareFlight at 13.26pm. As the child was at that time stable, this delay was not considered to be unreasonable and the child did not meet the criteria for the Early Activation Response Agreement (EAR).

It was noted that the Ngukurr clinic maintains electronic records on the CommuniCare Platform and the DMO works off PCIS and is required to access multiple systems. There is no generic access to CommuniCare across clinics and the time it would take to access individual clinic records would significantly impact the productivity of the DMO and create additional risk. The DMO relies on the clinician on the ground to interrogate the history and relies on the clinician to flag repeated attendances. It is a reminder to be attentive and thorough with history taking. The risk of multiple disparate aging IT platforms is a provisional risk on the risk register. The ideal would be for all clinics to be working off the same platform.

It was noted that DMO workload has grown exponentially in the last three years. 11am is a peak time. In response, since 2018, DMO shifts have increased from 21 per week to 42 per week and a senior DMO is available 24/7 to assist with surge and complex cases.

The Sepsis Lead, has committed to the following:

- A re-launch of the sepsis pathway kits with the development and implementation of a communication plan.
- Development of a framework PPHC Guideline for Recognising and Responding to Acute Deterioration in accordance with Standard 8 of the NSQHS standards.
- Monitoring and feedback to PPHC of the outcomes of Anti-Microbial Stewardship audits.
- Commence sepsis pathway compliance audits which will involve sepsis service items to be established within PCIS. This will enable us to monitor compliance with the sepsis pathway.
- Yearly reporting on sepsis related RCA's, IDCR's and coronial cases as a barometer of our effectiveness in addressing sepsis presentations.
- Establishing a sepsis session in medical orientation for locums and new RMP and DMO staff. The orientation schedule for new GP registrars and RMPs rotating to PPHC from RDH now also includes a session on sepsis.

However, there has not been a commitment that all Northern Territory Aboriginal Health Organisations adopt the Paediatric Sepsis Recognition and Management pathway and so I have made a recommendation to address this.

**Recommendation**

I recommend that the Northern Territory Department of Health encourage all Northern Territory Aboriginal Health Organisations to be aware of the Paediatric Sepsis Recognition and Management Primary Health Care NT Health Guidelines and Sepsis Pathway and for it to be implemented in all health care software systems.

**Decision not to hold an inquest:**

Under section 16(1) of the *Coroners Act 1993* I decided not to hold an inquest because the investigations into the death disclosed the time, place and cause of death, and the relevant circumstances concerning the death. I do not consider that the holding of an inquest would elicit any information additional to that disclosed in the investigation to date, and the circumstances do not require a mandatory inquest because the deceased was not held in custody and his identity is known.