Irukandji Syndrome Management Guideline

1. Purpose

This guideline is designed to aid in the recognition, immediate management and subsequent disposition of patients presenting to Western Australian Country Health Service (WACHS) Emergency Departments (ED) with suspected Irukandji envenomation syndrome.

2. Guideline

Irukandji syndrome is a common presentation to Northern Australian hospitals. It is due to a sting and envenomation by Carukia barnesi and related jellyfish. These are more common in the wet / monsoonal season but can be seen at other times of year.

ATTENTION

Public health preventative measures

Irukandji stings tend to occur with a cluster of cases and notifying local authorities can prevent further stings.

Once a "likely Irukandji syndrome" has been identified in the ED the most senior clinician should contact West Coast Water Safety on one of the first three numbers below **plus** the shire ranger to advise the geographical location where the sting occurred and allow them to remove people from the water and place warning signs.

For envenomations in Broome, the contact numbers are:

- Cable Beach head lifeguard 0418 909 935
- Cable Beach duty lifeguards 0447 668 300
- West Coast Water Safety Admin 0473 367 572
- Shire ranger via Broome shire switchboard on 9191 3456

2.1 Recognition

The typical scenario: the patient develops symptoms shortly after emerging from the water, often within 10–20 minutes. There are usually no skin changes but occasionally a small local painful erythematous sting site will be visible.

The presence of a large painful sting or weals suggests a non-Irukandji type jellyfish sting. These are painful but do not usually cause systemic features. Box jellyfish stings result in large areas and painful skin changes (welts / blisters / skin pigmentation) but are very rarely seen in northern WA.

Symptoms of **Irukandji syndrome** include:

- severe pain in multiple body regions – chest, back, abdomen and headaches are common
- severe agitation and distress

- the envenomation causes a sympathomimetic picture with tachycardia, hypertension, sweating and nausea.

Altered mental state (low Glasgow Coma Scale) is **not** a feature of Irukandji syndrome. The presence of altered consciousness should raise concern for other diagnosis or intracranial haemorrhage as a rare complication.

2.2 First Aid

Traditionally vinegar has been used at the scene / beach – however recent evidence suggests that this may be unhelpful and potentially increase nematocyst activity. Therefore, vinegar **should not** be applied in the ED.

2.3 Assessment

Following presentation, patients will require observations every 15-30 minutes, depending on severity of the case. This includes blood pressure for paediatric patients. Subsequent frequency of observations can be guided by clinical progress. In severe cases, with concerns of cardiac dysfunction, telemetry should also be utilised. The sting site may be visualised, however sometimes it is not clinically apparent.

2.4 Analgesia

Multimodal analgesia should be initiated as early as possible if the patient can tolerate oral medications. Administer oral paracetamol and ibuprofen if tolerated.

The following WACHS policy documents may be relevant:

- Medication Prescribing and Administration Policy
- Intravenous Opioid Administration Policy.

Opiate analgesia is often required for severe pain in the initial phase:

- Intranasal Fentanyl is useful until intravenous (IV) access can be achieved
- IV Fentanyl or Morphine can be titrated to control severe pain
- consider an IV patient controlled intravenous analgesia (PCIA) if admission is required for ongoing severe pain
- oral oxycodone may be used for ongoing moderate pain.

Intravenous Clonidine is second line and should be considered if analgesia is inadequate after two (2) doses of IV opiate. Recommended dosage is 1 microgram / kg (max 75 mcg) for adults and paediatrics given as a slow IV push initially, repeat after 15–20 minutes if required.

Clonidine side effects include sedation, bradycardia and hypotension, all of which are helpful to treat the agitation, hypertension and tachycardia caused by the Irukandji envenomation.

Magnesium has been used for many years for Irukandji envenomation. Recent evidence does not demonstrate a clear benefit.

Magnesium (Mg) may be considered for ongoing pain and severe sympathetic symptoms as a third line agent if opiates and clonidine have not been successful.

Recommended IV dosage:

- Adult: Magnesium Sulfate 10 mmol infused over 20 minutes
- Paediatrics: Magnesium Sulfate 0.2 mmol / kg (max 10 mmol) infused over 20 minutes.

A subsequent Magnesium Sulfate infusion (0.15 mmol / kg / hr) may be commenced **only** if there is a significant symptomatic improvement following the empirical bolus.

2.5 Hypertension

Hypertension is common; however, most will resolve to an acceptable blood pressure (BP) with effective, early and consistent analgesia.

Initial treatment for hypertension / tachycardia is to use analgesia, clonidine and magnesium (see section 2.4 for Magnesium rationale) to control the pain and agitation.

Persistent hypertension despite analgesia may require further pharmacological intervention. Glyceryl Trinitrate (GTN) as an infusion is the first line: 0.5 micrograms / kg / min and titrate upwards to achieve a BP < 160 mmHg or at upper end of normal for age in children. If BP not controlled after GTN titration or signs of heart failure, then contact intensive care unit (ICU) for further advice. WACHS does not stock phentolamine. For GTN protocol see: NMHS Glyceryl Trinitrate Intravenous Guidelines

In severe cases patients may develop acute pulmonary oedema. The treatment of this is the same as any acute pulmonary oedema, primarily GTN and non-invasive continuous positive airway pressure (CPAP) ventilation.

2.6 Investigations

Patients with mild or easily controlled symptoms do not require any specific investigations. It is useful to collect basic bloods when siting a peripheral IV cannula (PIVC) in case of subsequent deterioration. Refer to WACHS Peripheral IV Cannula (PIVC) Guideline and WACHS Specimen Collection Procedure.

All patients who require admission should have an electrocardiograph (ECG) and if there are concerns for acute pulmonary oedema a **chest x-ray** (**CXR) may be considered**. However, it is reasonable to admit, observe and only order blood pathology if the symptoms progress, persist or there are signs of heart dysfunction.

Troponin testing is controversial:

- Routine troponin testing **should not** be performed for mild to moderate envenomation that does not require admission or parenteral therapy.
- Patients with persistent or recurrent chest pain who require admission may have troponin rises. It is unclear what the significance of this is in young, healthy patients. For admitted patients a baseline then repeat troponin at 6 hours is useful to determine the degree of cardiac injury.
- A single troponin rise in itself does not mandate admission but if they have associated ECG changes or further troponin rise on repeat testing then they should be discussed with cardiology / undergo echocardiography (if available) to look for cardiomyopathy.

Repeat ECGs should be performed if the patient develops subsequent chest pain or suspicion of acute heart failure. Older patients may develop type 2 cardiac ischemia or cardiomyopathy.

Anticoagulation medications

The only recorded deaths (2) from Irukandji were due to severe hypertension in combination with anticoagulation leading to intracranial haemorrhage in older adults. Patients taking anticoagulant medication should have **coagulation studies** and consideration given to acute, temporary, pharmacological reversal if there are no contraindications.

Echocardiography is more specific to detect cardiomyopathy (expect a Takotsubo – pattern). Echocardiography should be urgent if:

- the patient develops hypotension (after ceasing GTN etc)
- a significant troponin rise or
- evidence of pulmonary oedema.

Skin scrapings have been used as part of research into jellyfish envenomation. Irukandji syndrome is a clinical diagnosis. There is no role for using skin scrapings as part of the diagnostic work up or management of acute envenomation. Local stimulation by scraping may potentially increase nematocyst discharge. Therefore, **scrapings are not recommended** outside of a specific research project with appropriate patient consent.

CT Brain may be required to exclude acute intracranial haemorrhage or hypertensive encephalopathy in patients with ongoing neurological symptoms or persistent headaches. It is not typical for envenomation to result in prolonged neurological dysfunction or decreased consciousness – therefore these differentials should be considered if this clinical picture emerges.

2.7 Antivenom

There is **no** specific antivenom available for Irukandji envenomation. Treatment is supportive.

2.8 Disposition

With Irukandji syndrome:

- 40% will go home within 8 hrs
- 45% will need overnight observation
- 15% will need high dependency unit (HDU) / ICU admission.

2.9 Discharge criteria

The average duration of symptoms following Irukandji envenomation is 6 –8 hours. There are some patients in whom a secondary / late recurrence of symptoms may occur.

Mild Envenomation:

- If no opioids have been administered for 6 hrs and the patient has stable observations and pain which is controlled with simple oral analgesia only then they can be discharged.

Moderate Envenomation:

- If some symptoms persist and the patient needs ongoing analgesia, admit to paediatric or general ward.
    - A troponin rise does not mandate HDU admission if the symptoms are controlled, and observations are normal.

Severe Envenomation (seek ICU / paediatric ICU or toxicology medical input early). If any of the following occur, admit to HDU or consider need for transfer to a tertiary centre:

- hypotension requiring inotropic support
- markedly elevated or rapidly climbing troponin
- persistent severe tachycardia
- significant ongoing opioid requirement.

These are the patients who may deteriorate therefore early echocardiography is recommended.

3. Roles and Responsibilities

Medical and nursing staff are responsible for ensuring the following:

- appropriate early assessment and recognition of Irukandji syndrome
- management of any immediate life-threats (rare)
- awareness of this guideline and are trained to respond to an Irukandji syndrome accordingly
- appropriate documentation.

All staff are required to work within policies and guidelines to make sure that WACHS is a safe, equitable and positive place to be.

4. Monitoring and Evaluation

4.1 Monitoring

Quarterly audit of hospital Irukandji presentations by ED Subcommittee including review of compliance with guideline.

4.2 Evaluation

Annual review of clinical effectiveness of the guideline and review of currency of management recommendations with communication with all stakeholders.

5. Compliance

This guideline is aligned to the *Medicines and Poisons Act 2014* .

Guidelines are designed to provide staff with evidence-based recommendations to support appropriate actions in specific settings and circumstances. As such, WACHS guidelines should be followed in the first instance. In the clinical context, where a patient's management should vary from an endorsed WACHS guideline, this variation and the clinical opinion as to reasons for variation must be documented in accordance with the Documentation Clinical Practice Standard.

WACHS staff are reminded that compliance with all policies and procedures is mandatory.

6. References

Fatal envenomation by jellyfish causing Irukandji syndrome. Peter J Fenner and John C Hadok. Medical Journal of Australia vol 177. 7 October 2002

Jellyfish responsible for Irukandji syndrome M. Little, P. Pereira, T. Carrette, J. Seymour QJM: An International Journal of Medicine, Volume 99, Issue 6, June 2006, Pages 425–427

Irukandji syndrome in northern Western Australia: an emerging health problem. C Macrokanis Nicole L Hall, Jacki K Mein, Medical Journal of Australia 06 December 2004
Corkeron MA. Magnesium infusion to treat Irukandji syndrome. Med. J. Aust. 2003; 178: 411.

Isman A, Seymour J, Little M. Use of clonidine in the treatment of Irukandji syndrome: a 4-year retrospective cohort study on safety, efficacy and clinical utility. Emerg. Med. Australas 2022; 34: 504– 8.

Rathbone J, Franklin R, Gibbs C, Williams D. Review article: role of magnesium sulphate in the management of Irukandji syndrome: a systematic review. *Emerg. Med. Australas.* 2017; 29: 9– 17

7. Definitions

Term	Definition
Envenomation	Clinical syndrome of systemic toxicity from venom
Erythematous	Abnormal redness of skin or mucous membranes

8. Document Summary

Coverage	WACHS-wide
Audience	Medical practitioners and nursing staff
Records Management	Clinical: Health Record Management Policy
Related Legislation	*Medicines and Poisons Act 2014* (WA) Medicines and Poisons Regulations 2016 (WA)
Related Mandatory Policies / Frameworks	• MP 139/20 - Medicines Handling Policy • Clinical Governance, Safety and Quality
Related WACHS Policy Documents	• Documentation Clinical Practice Standard • Intravenous Opioid Administration Policy • Medication Prescribing and Administration Policy • Peripheral IV Cannula (PIVC) Guideline • Specimen Collection Procedure
Other Related Documents	• NMHS Glyceryl Trinitrate Intravenous Guidelines
Related Forms	• MR140A Adult Observation and Response Chart (A-ORC) • MR140E Paediatric Acute Recognition and Response Observation Tool (PARROT <3 Months) • MR140F Paediatric Acute Recognition and Response Observation Tool (PARROT 3-12Months) • MR140G Paediatric Acute Recognition and Response Observation Tool (PARROT 1-4 Years) • MR140H Paediatric Acute Recognition and Response Observation Tool (PARROT 5-11 Years) • MR140i Paediatric Acute Recognition and Response Observation Tool (PARROT 12+ Years) • MR170.5 WACHS PCIA-IV Opioid Infusion Prescription and Additional Observation Chart • MR170A WA Hospital Medication Chart – Short Stay • MR170D National Inpatient Medication Chart - Paediatric Short Stay
Related Training Packages	Nil
Aboriginal Health Impact Statement Declaration (ISD)	ISD Record ID: 2656
National Safety and Quality Health Service (NSQHS) Standards	1.07, 1.27. 4.13, 8.04, 8.05, 8.06, 8.08, 8.09. 8.10, 8.11
Aged Care Quality Standards	Nil
National Standards for Mental Health Services	Nil

9. Document Control

Version	Published date	Current from	Summary of changes
1.00	6 November 2023	6 November 2023	New Guideline

10. Approval

Policy Owner	Executive Director Clinical Excellence
Co-approver	Executive Director Nursing and Midwifery
Contact	Kimberley Regional ED Lead
Business Unit	Emergency Department, Broome Hospital
EDRMS #	ED-CO-23-397373

This document can be made available in alternative formats on request.