



## CLINICAL PRACTICE STANDARD — Aeromedical Operation AO.CLI.03 – Hypertonic Saline

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<b>Clinical Practice Standard</b>	HELI.CLI.03 – Hypertonic Saline				
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<b>Summary</b>	The purpose of this procedure is to guide the use of hypertonic saline in clinical practice.				
<b>Applies to</b>	NSW Ambulance aeromedical medical staff.				
<b>Review Date</b>	April 2025				
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<b>Related Documents</b>	Nil Nil				
<b>Related Legislation</b>					



## CLINICAL PRACTICE STANDARD – Aeromedical Operations AO.CLI.03 – Hypertonic Saline

### 1. Introduction

Hypertonic saline (HTS) is used for the mitigation of raised intracranial pressure (ICP) following trauma or intracranial bleeding. In this regard it has at least equivalent efficacy as mannitol<sup>1</sup> although evidence of its effect on mortality and other secondary clinical outcomes remains unclear<sup>2</sup>. Secondary indications for use of HTS include fluid resuscitation in trauma, acute symptomatic hyponatraemia and as an alternative agent in tricyclic antidepressant (TCA) poisoning.

HTS is used within the retrieval service to replace mannitol as it has the following advantages in the pre-hospital environment:

- Does not crystallise in cold ambient environments.
- Better haemodynamic profile for the treatment of raised ICP particularly in the hypovolaemic patient and is less likely to exacerbate hypotension either on initial infusion or with the later diuresis.
- Potential beneficial immunomodulatory, neurochemical, vasoregulatory and microcirculatory effects<sup>3</sup>.
- Smaller volume and less weight (250mL as opposed to 1000mL 10% mannitol).

NSW Ambulance Aeromedical carry 250mL of 7.5% sodium chloride (sodium concentration 1280mmol/L, osmolality 2560mOsm/L). Each 250mL contains:

- Sodium 320mmol
- Chloride 320mmol

All packaging should be clearly labelled with adhesive labels: “Hypertonic Saline”.

### 2. Purpose

The purpose of this procedure is to guide the use of HTS in clinical practice.

### 3. Procedure

#### 3.1 Indications for Use

##### 3.1.1 Primary Indication

- Raised intracranial pressure to temporarily decrease ICP prior to neurosurgical intervention.
- Raised intracranial pressure with evidence of herniation may be indicated by a dilated pupil or pupils without direct or consensual light reflex (uncal herniation) or by excessive hypertensive response with bradycardia in



appropriate clinical context, indicating Cushing's reflex due to infra-tentorial herniation.

Adult (>50kg) = 250mL  
Child = 5mL/kg (max 250mL)

## 3.1.2 Secondary Indications

**3.1.2.1. Resuscitation in Trauma:** Every effort should be made to control haemorrhage prior to fluid administration in trauma. Hypertonic saline may be used as a resuscitation fluid as an adjunct to isotonic fluids, with blood products or in isolation. It should be noted that compared with isotonic fluids hypertonic saline has not been shown to reduce mortality or important secondary outcomes.

**3.1.2.2. Acute Symptomatic Hyponatraemia:** Acute hyponatraemia may occur following strenuous physical exercise e.g. endurance events or dance parties. It may be suspected clinically in patients presenting with headache, vomiting, altered mental status, seizure or coma<sup>4</sup>. Where possible confirm serum sodium level on point of care testing prior to administration. HTS may be indicated in the presence of hyponatraemia-induced coma or seizures but should be given judiciously, eg. 50ml over 10 minutes in an adult, to remove the immediate life threat. Any further administration should be guided by serum sodium measurements where possible

Adult (>50kg) = 50mL over 10 minutes  
Child = 1mL/kg (max 50mL) over 10 minutes

**3.1.2.3. TCA Poisoning:** Sodium channel blockade in TCA poisoning is indicated by widening of the QRS complex (>100mS) and a prominent R wave in aVR (R/S ratio > 0.7). Traditional therapy with sodium bicarbonate delivers a sodium load, increases the serum pH and alters drug-protein binding. HTS has been successfully used as an alternate therapy in the management of TCA mediated cardiac toxicity<sup>5</sup>.

Adult / Child = 1-2mL/kg  
Consider repeating dose

## 3.2 Contraindications:

- HTS is not recommended for resuscitation of hypovolaemia in the dehydrated patient, such as severe burns or high output states such as diarrhoea, vomiting, and fistulae.
- Patients with known hypernatraemia or established acute renal failure.



### 3.3 Cautions

- Patients with known hyponatraemia have a theoretical risk of Osmotic Demyelination Syndrome if the sodium is corrected too rapidly.
- When given by the intraosseous route, the limb should be carefully monitored to avoid leakage into surrounding tissues, particularly in the shocked patient who may have a higher risk of tissue necrosis and compartment syndrome<sup>6</sup>. Military and civilian experience<sup>7</sup> and animal data<sup>8</sup> currently indicate intraosseous HTS administration to be safe and effective.

### 3.4 Documentation and Handover

Timings and volume administered must be clearly documented in the clinical record and handed over to the accepting physician. Neurological parameters, GCS and pupillary signs must also be noted with times and response.

## 4. Responsible Personnel

Medical Manager, Medical Training Manager, Operations Manager

## 5. References

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### APPENDICES

1. N/A

### REVISION HISTORY

Version (Document #)	Amendment notes
Version 4.1	Minor edits only – no new substantive literature
Version 4.0 Issued June 2019	Adjust Adult Dose >50kg Expand Secondary Indications – TCA OD Update references
Version 3.0 Issued 16 September 2016	Minor amendments, and transition to new format. Approved by Executive Director, Health Emergency & Aeromedical Services.
Version 2.0 Issued 30 January 2015	Approved by Executive Director, Health Emergency & Aeromedical Services