Sodium chloride 3% Intravenous INFUSION for Adults (hypertonic saline 3%)

Who can administer

Administration RESTRICTED - see Appendix 1

Important information

- When interpreting sodium levels, ensure that the sodium concentration has been measured using the same technique as used for the previous measurement (e.g. either serum sodium OR arterial blood gas sodium)[ref 1]
- See Severe/Symptomatic Hypotonic Hyponatraemia guidelines [ref 2] for targets and limits for sodium correction in hyponatraemia management- see respective section (acute or chronic)
- For practical purposes in GUH, the maximum concentration that may be administered via peripheral line is 3%
- Sodium chloride 30% ampoule and the 3% infusion (500ml) must be stored in the CONTROLLED DRUGS press
- Kept as stock in ICU

Available preparations

Sodium chloride 0.9% (150mmol sodium/litre) -available in many different volumes

Sodium chloride 3% 500ml infusion bagÂ (note only a proportion of the bag will be required- discard excess)

Sodium chloride 30% 10ml ampoulesÂ

- Sodium chloride **30% concentrate ampoules** contain **5mmol/ml** of sodium
- Dilute ampoules further prior to use
- Draw up using a 5 micron needle

Methods of intravenous administration

- **Administer hypertonic solutions (i.e. 3% infusion) using an electronically controlled infusion device**
- See Severe/Symptomatic Hypotonic Hyponatraemia guidelines [ref 2] for rate of administration
- **Preferred option: Use a commercially available 3% infusion bag when available** (Note: only a proportion of the bag will be required- discard excess)
- The 3% infusion bag is stored in the Controlled Drug Cupboard
- If the 3% infusion bag is not available a 3% solution may be prepared - see Further information

Dose in adults

Raised intracranial pressure [ref 3]

- In general, patients at risk of raised intracranial pressure are best managed in Neurosciences centres, and this should always be the primary consideration rather than achieving sodium targets
- In patients at risk of raised intracranial pressure the goal is to keep plasma sodium constant or rising, not falling, and to avoid hyponatremia.
- A serum sodium of 140mmol/L or more should be targeted. If sodium level below target commence Sodium chloride 3% 150ml every six hours until above target.
- Standard maintenance fluid is Sodium chloride 0.9% infusion

2. Acute hyponatraemia

- See Severe/Symptomatic Hypotonic Hyponatraemia guidelines [ref 2]
- Note: Only a proportion of the infusion bag will be required to provide dose. Ensure the remaining volume is discarded (i.e. discard remaining 350ml if appropriate after 150ml dose admin)

3. Chronic hyponatraemia - with/without severe symptoms

- **See** Severe/Symptomatic Hypotonic Hyponatraemia guidelines [ref 2]
- Note: Only a proportion of the infusion bag will be required to provide dose. Ensure the remaining volume is discarded (i.e. discard remaining 350ml if appropriate after 150ml dose admin)

Monitoring

IMPORTANT

- When interpreting sodium levels, ensure that the sodium concentration has been measured using the same technique as used for the previous measurement (e.g. either serum sodium OR ABG sodium) [ref 1]

At assessment:

- Measure ABG/VBG, hourly urine output, serum osmolality, urinary osmolality, urinary sodium and random cortisol
- Document time of presentation, initial sodium at presentation and sodium target for 24 hours
- If urine output >100ml/hour, patient must be monitored closely for overcorrection as per Severe/Symptomatic Hypotonic Hyponatraemia guidelines [ref 2]
- Monitor serum glucose and measured serum sodium should be adjusted if glucose is raised (add 2.4 to measured sodium value for every glucose value above a baseline of 5.5mmol/L)

Further investigations to consider, depending on clinical scenario:

- Chest x-ray
- Thyroid Function
- CT Brain

During administration of Sodium chloride 3% - see Severe/Symptomatic Hypotonic

Hyponatraemia guidelines [ref 2]

- **Single 150ml infusion administered** - check sodium level four hours later
- **Two (or more) 150ml infusions administered** - check sodium level during second infusion AND then every four hours thereafter

Further information

- The initial symptoms of osmotic demyelination begin to appear 2 to 3 days after hyponatraemia is corrected, include dysarthria, dysphagia and altered mental status
- Additional symptoms often arise over the next 1-2 weeks
- At its most severe, osmotic demyelination can lead to 'locked in' syndrome and death
- Many affected patients improve over weeks to months, some patients have permanent disability [ref 4]

If the 3% infusion bag is not available a 3% solution may be prepared as follows (approximate concentration)

Preparation of Sodium Chloride 3% using 30% ampoules

Concentration required	Infusion Volume Required of 3% solution	Directions for adding 30% sodium chloride to 0.9% (ref 6)
	Usual volume	
3% sodium chloride	**150ml** (75mmol)	**Withdraw 111ml of 0.9% sodium chloride** from a **250ml bag**, and **add 10.8ml of 30% sodium chloride** to the remaining 139 ml
	Non-standard volumes (rarely required)	
3% sodium chloride	**250ml** (125mmol)	**Withdraw 18ml of 0.9% sodium chloride** from a **250ml bag** and **add 18ml of 30% sodium chloride** to the remaining 232 ml
3% sodium chloride	**100ml** (50mmol)	**Withdraw 7.2ml of 0.9% sodium chloride** from a **100ml bag** and **add 7.2ml 30% sodium chloride** to the remaining 93 ml of 0.9% sodium chloride

Storage

- Store below 25^{0}C
- **Controlled drug press** for 30% sodium chloride and 3% sodium chloride preparations

References

1: Clinical practice guideline on the diagnosis and treatment of hyponatraemia Spasovski et al Intensive Care Medicine 2014. 40: 320-331
2: Severe/Symptomatic Hypotonic Hyponatraemia- Sodium <125 - Critical Care Evaluation and Management Guideline, Jan 2024

3: Expert opinion, email on file, 6th February 2024
4: Central Pontine Myelinolysis: National Institute of Neurological Disorders and Stroke, accessed on line 29 April 2019

Therapeutic classification

Parenteral fluids for treatment of electrolyte imbalance