PRHC Peterborough Regional Health Centre **IV MONOGRAPH**

sodium chloride 3%

OTHER NAMES	**CLASSIFICATION**	pH 5	**HIGH ALERT DRUG**
Hypertonic saline	Electrolyte solution - irritant		Concentrated Electrolyte

INDICATIONS FOR IV USE

HEALTH CANADA APPROVED

- Emergency treatment of profound hyponatremia with severe symptoms, eg seizures, coma[1]

NON HEALTH CANADA APPROVED BUT SUBSTANTIATED IN THE LITERATURE

- Acute neurologic hyponatremia in critically ill patients with neurological and neurosurgical diseases[2]

CONTRAINDICATIONS

- None when used for emergency management of profound hyponatremia
- Hypernatremia[3]

CAUTIONS[4]

- Given risk of overshooting recommended max increases; best to aim for a correction *goal* that falls well short of rates associated with harm (correction *limit*) and to monitor serum sodium and urine volume frequently
- Serum sodium 105 mmol/L or less, hypokalemia, alcoholism, malnutrition, advanced liver disease: patients at higher risk of developing osmotic demyelination syndrome
- Hypokalemia; giving potassium alone may simultaneously correct hyponatremia and hypokalemia; giving additional sodium may lead to an overly rapid sodium correction

PREGNANCY/BREAST FEEDING: Contact pharmacy for most recent information

ADMINISTRATION

MODE	**DIRECT IV**	**INTERMITTENT INFUSION**	**CONTINUOUS INFUSION**
	YES	YES	YES
WHO MAY GIVE	Physician only	All registered nurses	All registered nurses
ADULT	Undiluted; push	Infuse at prescribed rate - see DOSE section	Infuse at prescribed rate - see DOSE section
PEDIATRIC	Undiluted; push	Infuse at prescribed rate - see DOSE section	Infuse at prescribed rate - see DOSE section
NEONATE	No information	No information	No information
REQUIREMENTS	IV infusion device. Central line preferred **Continuous infusion:** via a peripheral line for up to 5 days, after which a central line is required. Central line is required for rates greater than 50 mL/h **Continuous infusion via peripheral line**: use small bore needle into large vein, if possible		

MONITORING

REQUIRED

- BP and HR; baseline, then every 30 minutes during infusion until stable
- If given peripherally, assess IV site for pain, redness or swelling every 30 minutes

RECOMMENDED

- Advise patients to report burning/stinging/pain at IV site promptly
- Serum sodium: baseline, then as clinically indicated. Frequency will depend on clinical status and indication
- 24 hour fluid balance, urine sodium values, daily weight
- Serum and urine osmolarity

RECONSTITUTION

- None required

COMPATIBILITY/STABILITY

- Compatible by Y-site administration with dextrose, Ringer's and lactated Ringer's solutions[3]
- For drug-drug compatibility, contact pharmacy

ADVERSE EFFECTS

FLUID AND ELECTROLYTE[3]

- Hypernatremia, hypokalemia, hyperchloremia and subsequent acidosis
- Fluid retention, edema, and circulatory overload

CNS[5]

- Osmotic demyelination: symptoms, which are often irreversible or only partially reversible include speech difficulty, dysphagia, paraparesis or quadriparesis, behavioural disturbances, lethargy, confusion, disorientation, obtundation, and coma. Due to too rapid correction of hyponatremia. Typically occur within 2 to 6 days after administration

LOCAL EFFECTS[3]

- Venous thrombosis or phlebitis extending from site of injection – solution is strongly hypertonic (osmolarity 1027 mOsmol/L). If extravasation occurs, stop infusion immediately and disconnect (leave cannula/needle in place); gently aspirate extravasated solution (do **NOT** flush the line); remove needle/cannula; elevate extremity. Apply dry warm compresses. See VIHA Intravenous Therapy Practice and Clinical Standards – Extravasation

DOSE

ADULT

Hyponatremia with severe symptoms regardless of whether hyponatremia is acute or chronic - signs and symptoms of severe cerebral edema include vomiting, cardiorespiratory distress, respiratory depression, abnormal and deep somnolence, encephalopathy, seizures, coma (Glascow Coma Scale less than or equal to 8)

- **First hour management:** 150 mL over 20 minutes[1]
  Suggested to draw serum sodium after 20 min while repeating 150 mL for the next 20 minutes[1] Note: turnaround time for STAT electrolytes will vary with site
  May repeat twice (for a total of 450 mL) or until target of 5 mmol/L increase in serum sodium is attained[1]
  Alternative dosing: 100 mL over 10 minutes, may repeat twice (for a total of 300 mL) [4]
  A weight-based dose (2 mL/kg) may be used for extremes of weight[1]
- ***Improvement of symptoms*** after 5 mmol/L increase in 1st hour; limit increase to a total of 10 mmol/L during first 24 hours and an additional 8 mmol/L during every 24 h thereafter until serum sodium is 130 mmol/L[1]
- ***No improvement of symptoms*** after 5 mmol/L increase in 1st hour: continue infusion aiming for an additional 1 mmol/L/h increase. Stop infusion when symptoms improve, serum sodium increases 10 mmol/L in total or reaches 130 mmol/L, whichever occurs first. Suggest checking serum sodium q4h while infusion is running[1]

Hyponatremia with moderately severe symptoms, including but not limited to, nausea without vomiting, confusion, headache.

- 150 mL over 20 minutes x 1. Target a 5 mmol/L/24h increase in serum sodium concentration. Suggested to draw serum sodium after 1, 6 and 12 hours[1]
- Alternatively: 0.5 to 2 mL/kg/h[4]
- Limit increase in serum sodium to a total of 10 mmol/L during first 24 hours and an additional 8 mmol/L during every 24 h thereafter until serum sodium is 130 mmol/L[1]

Acute neurologic hyponatremia

- Start infusion at 20 mL/h and titrate based on serum sodium levels to maintain serum sodium within normal range[2,6]

ELDERLY

- Refer to adult dosing[3]

PEDIATRIC

Treatment of refractory intracranial hypertension, without hypernatremia

- Acute management: 4 to 6 mL/kg.[7] Typically infused over 30 minutes, but can be administered more rapidly (push) depending on the clinical scenario.[8] May repeat q2 to 4 hours to obtain serum sodium greater than 160 mmol/L and serum osmolality less than 360 [7]
- Maintenance: 0.1 to 1 mL/kg/h[9]

NEONATE

- No information available at this time

RENAL IMPAIRMENT ADJUSTMENTS

- Excessive sodium loading should be avoided in patients with severe renal impairment

HEPATIC IMPAIRMENT ADJUSTMENTS

- Higher risk of developing osmotic demyelination syndrome; avoid overcorrection of serum sodium [5]

HEMO/PERITONEAL DIALYSIS

- Not applicable

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MISCELLANEOUS

- Extravasation: Irritating to tissues. Use dry warm compresses. [3] Osmolarity 1027 mOsmol/L
- 3% sodium chloride = 30 g/L of sodium chloride = 513 mmol/L of sodium and 513 mmol/L of chloride ~ 1 mmol/2 mL
- 1 mmol (1 mEq) of sodium chloride = 1 mmol (1 mEq) of each sodium and chloride ions
- IM and subcutaneous administration: no information available at this time

sodium chloride 3% - references

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6. Sterns RH. Treatment of hyponatremia: Syndrome of inappropriate antidiuretic hormone secretion (SIADH) and reset osmostat. In: UpToDate, Basow, DS (Ed), UpToDate, Waltham, MA, 2014. [cited Mar 2014]

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8. Sodium chloride In: Lexi-Comp OnlineTM , Pediatric and Neonatal Lexi-Drugs OnlineTM, Hudson, Ohio: Lexi-Comp, Inc.; [cited 2014 Apr].

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11. Vaidya C, Ho W, Freda BJ. Management of hyponatremia: providing treatment and avoiding harm. Clev Clin J Med 2010; 77 (10): 715-726.