OTHER NAMES
Hypertonic saline

CLASSIFICATION
Electrolyte solution - irritant

pH 5

HIGH ALERT DRUG
Concentrated Electrolyte

INDICATIONS FOR IV USE

HEALTH CANADA APPROVED
- Emergency treatment of profound hyponatremia with severe symptoms, eg seizures, coma

NON HEALTH CANADA APPROVED BUT SUBSTANTIATED IN THE LITERATURE
- Acute neurologic hyponatremia in critically ill patients with neurological and neurosurgical diseases

CONTRAINDICATIONS
- None when used for emergency management of profound hyponatremia
- Hypernatremia

CAUTIONS
- 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
- For drug-drug compatibility, contact pharmacy
**ADVERSE EFFECTS**

### FLUID AND ELECTROLYTE
- Hypernatremia, hypokalemia, hyperchloremia and subsequent acidosis
- Fluid retention, edema, and circulatory overload

### CNS
- 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
- 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 (Glasgow Coma Scale less than or equal to 8)
- **First hour management:** 150 mL over 20 minutes
  - Suggested to draw serum sodium after 20 min while repeating 150 mL for the next 20 minutes
  - 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
  - Alternative dosing: 100 mL over 10 minutes, may repeat twice (for a total of 300 mL)
  - A weight-based dose (2 mL/kg) may be used for extremes of weight
- **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
- **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

**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
- Alternatively: 0.5 to 2 mL/kg/h
- 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

#### Acute neurologic hyponatremia
- Start infusion at 20 mL/h and titrate based on serum sodium levels to maintain serum sodium within normal range

#### ELDERLY
- Refer to adult dosing

#### PEDIATRIC

**Treatment of refractory intracranial hypertension, without hyponatremia**
- Acute management: 4 to 6 mL/kg. Typically infused over 30 minutes, but can be administered more rapidly (push) depending on the clinical scenario.
- May repeat q2 to 4 hours to obtain serum sodium greater than 160 mmol/L and serum osmolality less than 360
- Maintenance: 0.1 to 1 mL/kg/h

#### 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

#### HEMO/PERITONEAL DIALYSIS
- Not applicable
**MISCELLANEOUS**

- Extravasation: Irritating to tissues. Use dry warm compresses.
- 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


5. Sterns RH. Osmotic demyelination syndrome and overly rapid correction of hyponatremia. In: UpToDate, Basow, DS (Ed), UpToDate, Waltham, MA, 2014. [cited 2014 Mar].

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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