SODIUM CHLORIDE

Sodium Chloride 0.45%, 0.9%, 3% Infusion, solution

DESCRIPTION

The active ingredient is sodium chloride formulated in Water for Injection. The chemical name is sodium chloride with molecular formula NaCl and molecular weight of 58.44 (CAS:7647-14-5). It occurs as a colourless or white crystal and is freely soluble in water.

Sodium Chloride infusion preparations are sterile, non-pyrogenic solutions of sodium chloride in Water for Injection. The concentration of sodium chloride in each preparation is shown in Table 1 (see Presentation and storage conditions). The preparations do not contain an antimicrobial agent or added buffer. However, during the sterilisation step a small amount of hydrochloric acid may leach out resulting in a slightly acidic solution with a pH of 4.0–7.0. Sodium Chloride 0.9% solutions are isotonic as indicated by their osmolarity shown in Table 1. Sodium chloride 3% (1026mOsmol/L) is hypertonic and sodium chloride 0.45% (154mOsmol/L) is hypotonic, as shown by their osmolarities.

PHARMACOLOGY

Mechanism of action

Sodium is the major cation of extracellular fluid and functions principally in the control of water distribution, fluid and electrolyte balance and osmotic pressure of body fluids. Chloride, the major extracellular anion, closely follows the physiological disposition of sodium cation in maintenance of acid-base balance, isotonicity and electrodynamic characteristic of the cells.

Thus, Sodium Chloride infusion has a value as a source of water and electrolytes.

Pharmacokinetics

As Sodium Chloride infusion is administered to the systemic circulation by intravenous infusion, the bioavailability (absorption) of the active components is complete (100 per cent).

INDICATIONS

Sodium Chloride (0.9%) infusion is indicated for extracellular fluid replacement and in the management of metabolic alkalosis in the presence of fluid loss, and for restoring or maintaining the concentration of sodium and chloride ions.

Hypertonic Sodium Chloride (3%) infusion is used in the management of severe sodium chloride depletion when electrolyte restoration is required.
Hypotonic Sodium Chloride (0.45%) infusion is mainly used as a hydrating agent solution.

**CONTRAINDICATIONS**

The use of Sodium Chloride infusion requires careful evaluation of risks and benefits by the attending physician. It must not be used in the following conditions unless the physician has determined that potential benefits outweigh risks:

- congestive heart failure
- severe impairment of renal function
- clinical states in which there exists oedema with sodium retention

(see **Precautions**).

Sodium Chloride 3% infusion is contraindicated for electrolyte replacement in the presence of increased, normal, or only slightly decreased serum electrolyte concentrations.

**PRECAUTIONS**

**Warning**

Care should be exercised regarding possible incompatibility outcomes resulting from the interaction between the plastic container (Viaflex® plastic bag fabricated from a specially formulated polyvinyl chloride, PL 146 Plastic) or active ingredients and the added therapeutic substances (see also **Dosage and Administration**). Small amounts of the components, e.g. di-2-ethylhexyl phthalate (DEHP) up to 5ppm, may leach out during its shelf life. During the sterilisation step a small amount of hydrochloric acid may leach out resulting in a slightly acidic solution (see **Description**). The safety of the Viaflex plastic bag containers has been shown in tests with animals according to the USP biological tests for plastic container, as well as by tissue culture toxicity studies.

In a dilute condition, osmolarity/L is approximately the same as osmolality/kg. As shown in Table 1, Sodium Chloride (3%) infusion is hypertonic as indicated by its osmolarity, 1026mOsmol/L. The administration of substantially hypertonic solution may lead to a wide variety of complications. This includes crenation (cell shrinkage) of red blood cells and general cellular dehydration. Thus it should be administered through a large central vein, for rapid dilution of the hypertonic solution (see **Dosage and Administration**).

In contrast, the Sodium Chloride (0.45%) is hypotonic (154mOsmol/L). It may be infused with caution by peripheral vein administration, but may lead to cell swelling or oedema.

Hypersensitivity/infusion reactions, including hypotension, pyrexia, tremor, chills, urticaria, rash, and pruritus, have been reported with Sodium Chloride 0.9%.

Stop the infusion immediately if signs or symptoms of hypersensitivity/infusion reactions develop. Appropriate therapeutic countermeasures must be instituted as clinically indicated.
Hyponatraemia

The infusion of solutions with sodium (0.45 or <0.9%) may result in hyponatraemia, which may warrant close clinical monitoring. Hyponatraemia can lead to headache, nausea, seizures, lethargy, coma, cerebral edema and death.

The risk for hyponatraemia is increased in children, elderly patients, women, postoperatively, persons with psychogenic polydipsia, patients treated with medications that increase the risk of hyponatraemia (such as certain antiepileptic and psychotropic medications).

The risk for developing hyponatraemic encephalopathy is increased in paediatric patients (≤16 years of age), women (in particular pre-menopausal women), patients with hypoxemia and in patients with underlying central nervous system disease.

General

Clinical evaluation and appropriate laboratory determinations are essential to monitor renal function, changes in fluid balance, electrolyte concentration and acid-base balance.

**Sodium Chloride** infusion may cause fluid and/or solute overload. The risk of dilutional states is inversely proportional to the electrolyte concentrations of the injections. The risk of solute overload causing congested states with peripheral and pulmonary oedema is directly proportional to the electrolyte concentration administered.

Clinical evaluation and periodic laboratory determinations may be necessary to monitor changes in fluid balance, electrolyte concentrations, and acid-base balance during prolonged parenteral therapy or whenever the condition of the patient or the rate of administration warrants such evaluation.

Thus, caution should be exercised in patients with hypertension, heart failure, cerebral oedema, renal disease, pulmonary or peripheral oedema, pre-eclampsia, liver cirrhosis, conditions associated with sodium retention, and in geriatric patients, and infants.

**Sodium Chloride** infusion should be used with caution in patients receiving corticosteroids or corticotrophin, because of potential sodium and fluid retention.

**Sodium Chloride** infusion should be used with particular caution, if at all, in patients with or at risk for hypernatraemia, hyperchloreaemia, hypervolaemia and conditions that may cause sodium retention, fluid overload and oedema (central and peripheral).

Its use may result in electrolyte abnormalities, including hypokalaemia or hyperkalaemia (see **Adverse Reactions and Overdosage**).

Rapid correction of hyponatraemia or hypernatraemia is potentially dangerous.

Carcinogenicity/mutagenicity

Studies with sodium chloride have not been performed to evaluate carcinogenic or mutagenic potential.
Use in pregnancy (Category A)

There are no adequate and well-controlled studies of Sodium Chloride infusion in animals or in pregnant women. However, Sodium Chloride infusion contains no components known to have adverse effects on the foetus at physiological concentrations.

Physicians should carefully consider the potential risks and benefits for each specific patient before administering Sodium Chloride.

Use in lactation

Following intravenous administration, a fraction of sodium and chloride ions is expected to be excreted into human milk. However, at physiological concentrations, neither of these ions is known to have adverse effects on a breastfeeding baby.

Physicians should carefully consider the potential risks and benefits for each specific patient before administering Sodium Chloride.

Paediatric use

Plasma electrolyte concentrations should be closely monitored in the paediatric population because of their impaired ability to regulate fluids and electrolytes.

Use in the elderly

Geriatric patients are generally more likely to have cardiac, renal, hepatic, and other diseases or concomitant drug therapy and should be taken into consideration for selecting the type of infusion solution and the volume/rate of infusion.

The infusion of hypotonic fluids together with the non-osmotic secretion of anti-diuretic hormone may result in hyponatraemia. Hyponatraemia can lead to headache, nausea, seizures, lethargy, coma, cerebral oedema and death; therefore, acute symptomatic hyponatraemic encephalopathy is considered a medical emergency.

Effects on ability to drive and use machines

There is no information on the effects of Sodium Chloride infusion on the ability to operate an automobile or other heavy machinery.

INTERACTIONS WITH OTHER MEDICINES

Sodium Chloride infusion should not be administered simultaneously with blood products through the same administration set, because of the possibility of pseudo-agglutination or haemolysis.

If Sodium Chloride (0.45% or 0.9%) infusion is used as a vehicle for a drug delivery, a thorough review of the prescribing information document(s) of such medicine(s) should be made.
to ensure that no incompatibility might occur. Salting out, i.e., a precipitation of organic base drug may occur in the presence of salt.

Caution is advised in patients treated with lithium. Renal sodium and lithium clearance may be increased during administration of Sodium Chloride resulting in decreased lithium levels.

**ADVERSE EFFECTS**

Adverse effects, which may occur because of the solution or the technique of administration, include febrile response, infection at the site of injection, venous thrombosis or phlebitis extending from the site of injection, extravasation and hypervolaemia.

If an adverse reaction does occur, discontinue the infusion, evaluate the patient, institute appropriate therapeutic countermeasures and save the remainder of the fluid for examination if deemed necessary.

Inappropriate use of Sodium Chloride infusion may cause fluid or solute overload resulting in electrolyte abnormalities, overhydration, congestive conditions, including central, peripheral or pulmonary oedema, electrolyte imbalances and acid-base imbalance.

**Post-marketing adverse reactions**

The following adverse reactions have been reported in the post-marketing experience, listed by MedDRA System Organ Class (SOC), then, where feasible, by Preferred Term in order of severity.

**IMMUNE SYSTEM DISORDERS:** Hypersensitivity/infusion reactions, including hypotension, pyrexia, tremor, chills, urticaria, rash, pruritus.

**GENERAL DISORDERS AND ADMINISTRATION SITE CONDITIONS:** Infusion site reactions, such as infusion site erythema, injection site streaking, burning sensation, infusion site urticaria.

**Other adverse reactions/class reactions**

Use appropriate section of your label to incorporate the following class like reactions.

The following adverse reactions have not been reported with this product but may occur:

- Hypernatraemia
- Hyperchloraemic metabolic acidosis
- Hyponatremia, which may be symptomatic

**DOSAGE AND ADMINISTRATION**

**General directive**

Sodium Chloride (0.45%, 0.9% % 3%) is for intravenous infusion.
To be used as directed by the doctor.

Dosage, rate, and duration of administration are to be individualised and depend upon the indication for use, the patient’s age, weight, clinical condition, and concomitant treatment, and on the patient’s clinical and laboratory response to treatment.

Parenteral drug products should be inspected visually for particulate matter and discolouration prior to administration whenever solution and container permit. The solution should be clear and free from particles. Do not administer unless solution is clear and seal is intact. Additives may be incompatible. Suitability of potential additives has not been demonstrated. Complete information is not available. Those additives known to be incompatible should not be used. Before adding a substance or medication, verify that it is soluble and/or stable in water and that the pH range of Sodium Chloride solution is appropriate. The instructions for use of the medication to be added and other relevant literature must be consulted. Consult with a pharmacist, if available.

If in the informed judgment of the doctor, it is deemed advisable to introduce additives, use aseptic technique. Mix thoroughly when additives have been introduced. After addition, check for a possible colour change and/or the appearance of precipitates, insoluble complexes or crystals. Do not store solutions containing additives. The stability of this product when mixed with additive has not been demonstrated (See Precautions, Interactions with other medicines).

When other electrolytes or medicines are added to this solution, the dosage and the infusion rate will also be dictated by the dose regimen of the additions.

The product should be used for one patient on one occasion only. Any unused portion should be discarded.

Hypertonic solutions are preferably administered via a large central vein. If hypertonic solutions are administered peripherally, a large arm vein should be used and, if possible, the injection site should be altered daily. IV infusion of 3% Sodium Chloride solution should not exceed 100mL/hr and serum electrolyte concentrations should be determined to assess the need for further administration.

**Directions for use of Viaflex plastic container**

**Warning**

Do not use flexible plastic containers in series connections. Such use could result in embolism due to residual air being drawn from the primary container before administration of the fluid from the secondary container is completed.

Pressurising intravenous solutions contained in flexible plastic containers to increase flow rates can result in air embolism if the residual air in the container is not fully evacuated prior to administration.
Use of a vented intravenous administration set with the vent in the open position could result in air embolism. Vented intravenous administration sets with the vent in the open position should not be used with flexible plastic containers.

To open

Tear overwrap down side at slit and remove solution container. Some opacity of the plastic due to moisture absorption during the sterilisation process may be observed. This is normal and does not affect the solution quality or safety. The opacity will diminish gradually. Check for minute leaks by squeezing inner bag firmly. If leaks are found, discard the product as sterility may be impaired. If supplemental medication is desired, follow directions below.

Preparation for administration

Sodium Chloride infusion is a sterile preparation. Thus, aseptic technique must be applied throughout the administration.

1. Suspend container from eyelet support.
2. Remove plastic protector from outlet port at the bottom of container.
3. Attach administration set.

To add medication

Warning

Additives may be incompatible (see sections Precautions and Interactions with other medicines).

To add medication before solution administration

Supplemental medication may be added with needle through the medication injection port. To proceed, swab medication site (port) with alcohol swab. Using a syringe with 0.63 to 0.80mm needle, puncture resealable medication port and inject. Mix solution and medication thoroughly. For high density medication such as potassium chloride, squeeze ports while ports are upright and mix thoroughly.

To add medication during solution administration

Close clamp on the set. Prepare medication port. Using syringe with 0.63 to 0.80mm needle, puncture resealable medication port and inject. Remove container from IV pole and/or turn to upright position. Evaluate both ports by squeezing them while container is in the upright position. Mix solution and medication thoroughly. Return container to in use position and continue administration.

OVERDOSAGE

Infusion of excess Sodium Chloride infusion preparations may cause
- fluid overload
- sodium overload (which can lead to central and/or peripheral oedema)
- hypernatraemia (0.9% or 3% Sodium Chloride infusions)
- hyponatraemia (0.9% or 0.45% Sodium Chloride infusions)
- other electrolyte abnormalities.

No specific antidotes to this preparation are known.

Should overdose occur, prompt and careful clinical assessment is essential. Treat the symptoms and institute appropriate supportive measures as required.

**Symptoms of hypernatraemia**

Hypernatraemia may cause nausea, vomiting, diarrhoea and cramps, reduced salivation and lacrimation, increased thirst, hypotension, and tachycardia.

CNS effects include headache, dizziness, restlessness, weakness, muscle twitching or rigidity, respiratory paralysis, seizures, coma, and death.

**Treatment of hypernatraemia**

Treatment usually requires free water replacement. Plasma sodium concentrations should be corrected slowly. If hypernatraemia is severe, I.V. hypotonic or isotonic saline or 5 percent glucose may be used to restore normal plasma sodium concentrations at a rate of no more than 10 to 12mmol/L daily (0.5mmol/L per hour). If plasma sodium levels are greater than 200mmol/L or if the patient has renal impairment or is moribund, dialysis may be needed. Diazepam or other appropriate treatment may be required to treat convulsions.

**Symptoms of hyponatraemia**

Symptoms may include headache, confusion, nausea, vomiting, somnolence weakness, cerebral oedema, seizures, coma, respiratory arrest, and death.

**Treatment of hyponatraemia**

Acute hyponatraemia requires immediate assessment.

Symptomatic hyponatraemia associated with plasma sodium concentrations below 120mmol/L may require the administration of I.V. isotonic or hypertonic sodium chloride.

A loop diuretic may be required if there is fluid overload.

The aim is to render the patient asymptomatic, usually by restoring plasma sodium concentration to between 120mmol/L and 130mmol/L, at a rate of 10 to 12mmol/L in each 24 hour period.

Careful monitoring of plasma sodium concentrations and total body water is essential.

As in hypernatraemia, rapid correction of hyponatraemia is potentially dangerous.
If neurological deterioration occurs, further investigation by MRI imaging of brain, including brain stem, is indicated.

In the event of over dosage, please contact the Poisons Information Centre for assistance. Phone number 13 11 26 (in Australia) or 0800 764 766 [0800 POISON] in New Zealand.

**PRESENTATION AND STORAGE CONDITIONS**

Sodium Chloride infusions are supplied in Viaflex plastic bags, in the following pack sizes below:

**Table 1 : Sodium Chloride (0.45%, 0.9%, 3%) infusion solution preparations**

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Name of the active components [concentrations (%, mmol/1000mL)]</th>
<th>Osmolarity&lt;sup&gt;a&lt;/sup&gt; (mOsmol/L)</th>
<th>ARTG / AUST</th>
<th>NZ TT50-registration number</th>
<th>Pack Size*</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHB1306A</td>
<td>Sodium Chloride (0.9%, 154)</td>
<td>308 [300]</td>
<td>19477</td>
<td>5536/4a</td>
<td>50mL</td>
</tr>
<tr>
<td>AHB1307</td>
<td>Sodium Chloride (0.9%, 154)</td>
<td>308 [300]</td>
<td>48515</td>
<td>5536/4a</td>
<td>100mL</td>
</tr>
<tr>
<td>AHB1322</td>
<td>Sodium Chloride (0.9%, 154)</td>
<td>308 [300]</td>
<td>48517</td>
<td>5536/4a</td>
<td>250mL</td>
</tr>
<tr>
<td>AHB1323</td>
<td>Sodium Chloride (0.9%, 154)</td>
<td>308 [300]</td>
<td>48519</td>
<td>5536/4a</td>
<td>500mL</td>
</tr>
<tr>
<td>AHB1324</td>
<td>Sodium Chloride (0.9%, 154)</td>
<td>308 [300]</td>
<td>48520</td>
<td>5536/4a</td>
<td>1000mL</td>
</tr>
<tr>
<td>AHB1363</td>
<td>Sodium Chloride (0.9%, 154)</td>
<td>308 (300)</td>
<td>19477</td>
<td>5536/4a</td>
<td>2 x 50ml</td>
</tr>
<tr>
<td>AHB1364</td>
<td>Sodium Chloride (0.9%, 154)</td>
<td>308 (300)</td>
<td>48515</td>
<td>5536/4a</td>
<td>2 x 100mL</td>
</tr>
<tr>
<td>AHB1313</td>
<td>Sodium Chloride (0.45%, 77)</td>
<td>154 [150]</td>
<td>19472</td>
<td>5536/4</td>
<td>500mL</td>
</tr>
<tr>
<td>AHB1354</td>
<td>Sodium Chloride (3%, 513)</td>
<td>1026 [1000]</td>
<td>19500</td>
<td>5536/4b</td>
<td>1000mL</td>
</tr>
</tbody>
</table>

Note: Osmolarities<sup>a</sup> are calculated figures, whilst those in the [bracket] are approximate Osmolalities (mOsmol/kg). Sodium Chloride 3% Infusion solution is **hypertonic** as indicated by the osmolarity of 1026mOsmol/L, whilst Sodium Chloride 0.45% Infusion solution is **hypotonic**.

* Not all pack sizes may be marketed.

**Storage Condition**

Store product below 30°C.
MEDICINE CLASSIFICATION

General Sale Medicine.

NAME AND ADDRESS

**Sodium Chloride** infusion solution is distributed in New Zealand by:

Baxter Healthcare Ltd
33 Vestey Drive
Mt Wellington
Auckland 1060.

Distributed in Australia by:

Baxter Healthcare Pty Ltd
1 Baxter Drive
Old Toongabbie, NSW 2146.

DATE OF PREPARATION

18 August 2014

*Based on Australian PI most recent amendment 22 October 2013 and CCSI(0.45%)42820130507, CCSI(0.9%)42320130507, and CCSI(3-5%)42920130507.*

*Please refer to the Medsafe website (www.medsafe.govt.nz) for most recent data sheet.*

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