

SODIUM CHLORIDE 0.9%

Newborn use only

2021

Alert	Osmolarity: 308 mOsm/L. Sodium chloride 0.9% solution is isotonic and contains 0.154 mmol/mL of sodium. When infused at a rate of 1 mL/hour, this will provide 3.7 mmol of sodium per day.
Indication	Volume expansion. Replacement of fluid and electrolyte losses. Partial exchange transfusion for polycythaemia. Maintenance of vascular catheter patency.
Action	Regulation of osmotic pressure and water balance in the extracellular fluid. Sodium also affects conductivity of nerves and muscles, and active transport of glucose and amino acids.
Drug type	Sodium chloride 0.9% contains 0.154 mmol of sodium and 0.154 mmol of chloride per mL.
Trade name	Sodium chloride 0.9% injection or infusion [Various brands exist]
Presentation	Sodium chloride 0.9% solutions are available in ampoules or bags with volumes ranging from 5mL to 1000mL.
Dose	Volume expansion: 10–20 mL/kg Maintaining catheter patency: Capped/IV Cannula 0.5 mL 6 hourly Infusion: 0.5–1 mL/hour Partial exchange transfusion for polycythaemia: Volume exchanged (mL) = $\frac{\text{Blood volume (mL)} \times (\text{Hct observed} - \text{Hct desired})}{\text{Hct observed}}$ (Blood volume = 70–90 mL/kg for term and 85–110 mL/kg for preterm infants. Volume may be higher in growth restricted infants. Refer to www.nicutools.org to calculate volume for partial exchange transfusion.)
Dose adjustment	Restrict sodium intake in fluid overload states e.g. congestive cardiac failure, renal failure.
Maximum dose	Not Applicable
Total cumulative dose	Not Applicable
Route	Intravenous, intra-arterial, intraosseous
Preparation	
Administration	Volume expansion: Rate of infusion is titrated to clinical need/response. Catheter patency: IV bolus/infusion. Partial exchange: Recommend isovolaemic exchange over at least 30 minutes. Refer to local hospital policy for detailed procedure.
Monitoring	Blood pressure, heart rate, urine output, electrolytes, haematocrit.
Contraindications	
Precautions	Severe renal impairment with oliguria or anuria. Use with caution in patients with moderate renal impairment, congestive heart failure, peripheral or pulmonary oedema.
Drug interactions	No information
Adverse reactions	Hypernatraemia (symptoms include irritability, muscle twitching, seizures, hypertension, tachycardia, fluid accumulation). Hyperchloraemic acidosis. Peripheral oedema. Fluid overload.
Compatibility	Fluids: Glucose 5%, glucose 10%, glucose 5% in sodium chloride 0.9%, glucose 5% in sodium chloride 0.45%, sodium chloride 0.45%. See individual drugs for compatibilities.
Incompatibility	See individual drugs for incompatibilities.
Stability	Change continuous IV infusion solution every 24 hours. Ampoules: Once opened, use immediately. Unused portions must be discarded.
Storage	Store below 25°C.
Excipients	
Special comments	Osmolarity of sodium chloride 0.9% is 308 mOsm/L.
Evidence	Volume expansion during resuscitation at birth

	<p>There are no published studies comparing crystalloid and colloid for volume expansion in the setting of immediate resuscitation after birth. American Heart Association 2020 Guidelines state that sodium chloride 0.9% is the crystalloid fluid of choice during neonatal resuscitation. Recommendations are based on evidence extrapolated from different clinical situations.¹ (LOE II, GOR C)</p> <p>Routine early volume expansion in very preterm infants There is no evidence from randomised trials to support the routine use of early volume expansion in very preterm infants without cardiovascular compromise.² (LOE I, GOR A)</p> <p>Volume expansion in hypotension Three small, randomised, controlled trials in neonates support the hypothesis that an isotonic crystalloid solution, rather than an albumin-containing solution, is the fluid of choice for volume expansion in neonatal resuscitation. Oca et al compared normal saline and 5% albumin for the treatment of hypotension in acutely ill term and preterm newborn infants.³ The groups were equivalent in their rate of response and the magnitude of change in mean arterial pressure at 30 minutes, as well as need for a second volume infusion or inotropic support. So et al randomised preterm infants (23 to 34 weeks' gestation) who were hypotensive within the first 2 hours after birth to receive 10 mL/kg isotonic saline or 5% albumin.⁴ The two groups did not differ in their blood pressure or oxygenation through 48 hours; however, the infants who received albumin required significantly more volume expander to maintain normal blood pressure and had a higher mean percentage weight gain within the first 48 hours of life. A study by Emery et al provided indirect evidence in support of the hypothesis, because it demonstrated that the volume of colloid infusion, rather than the albumin load, related to a sustained increase in blood pressure in hypotensive preterm infants of 24 to 36 weeks' gestation.⁵ (LOE II, GOR B)</p> <p>Partial exchange transfusion for polycythaemia Wong et al conducted a randomised, controlled trial comparing normal saline vs 5% albumin as the replacement fluid for partial exchange transfusion for polycythaemia. The criteria for PET were: (1) venous haematocrit > 0.7; (2) venous haematocrit 0.65–0.69 with symptoms or signs attributable to polycythaemia. Isotonic saline was equally effective as 5% albumin in reducing the haematocrit.⁶ (LOE II, GOR B) However, there are no proven, clinically significant, short or long-term benefits of PET in polycythaemic newborn infants who are clinically well or who have minor symptoms related to hyperviscosity. PET may lead to an increase in the risk of NEC.⁷ (LOE I, GOR A)</p> <p>Maintenance of vascular catheter patency The use of normal saline to maintain vascular catheter patency is common practice. A systematic review of heparin compared with no treatment or placebo (including normal saline) for prolonging peripheral intravenous catheter use in neonates was inconclusive due to insufficient data.⁸ The effect of heparin on the duration of peripheral intravenous catheter use varied across studies. Recommendations for heparin use over normal saline in neonates with vascular catheters could not be made. (LOE I, GOR C)</p>
Practice points	
References	<p>1. Aziz K, Lee HC, Escobedo MB, et al. Part 5: Neonatal Resuscitation 2020 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. <i>Pediatrics</i>. 2020; doi: 10.1542/peds.2020-038505E2. Osborn DA, Evans N J. Early volume expansion for prevention of morbidity and mortality in very preterm infants. <i>Cochrane Database of Systematic Reviews</i> <i>Cochrane Database Syst Rev</i> 2004;2:CD002055.</p> <p>3. Oca MJ, Nelson M, Donn SM. Randomized trial of normal saline versus 5% albumin for the treatment of neonatal hypotension. <i>J Perinatol</i> 2003;23:473-6.</p> <p>4. So KW, Fok TF, Ng PC, Wong WW, Cheung KL. Randomised controlled trial of colloid or crystalloid in hypotensive preterm infants. <i>Arch Dis Child Fetal Neonatal Ed</i> 1997;76:F43-6.</p> <p>5. Emery EF, Greenough A, Gamsu HR. Randomised controlled trial of colloid infusions in hypotensive preterm infants. <i>Arch Dis Child</i> 1992;67:1185-8.</p> <p>6. Wong W, Fok TF, Lee CH, Ng PC, So KW, Ou Y, Cheung KL. Randomised controlled trial: comparison of colloid or crystalloid for partial exchange transfusion for treatment of neonatal polycythaemia. <i>Arch Dis Child Fetal Neonatal Ed</i> 1997;77:F115-8.</p> <p>7. Ozek E, Soll R, Schimmel MS. Partial exchange transfusion to prevent neurodevelopmental disability in infants with polycythemia. <i>Cochrane Database Syst Rev</i> 2010 Jan 20;1:CD005089.</p>

	8. Shah PS, Ng E, Sinha AK. Heparin for prolonging peripheral intravenous catheter use in neonates. Cochrane Database of Systematic Reviews 2005;4:CD002774. 9. Micromedex online. Sodium chloride injection BP 0.9% product information. Accessed on 20 May 2021.
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