MONOGRAPH

SODIUM NITROPRUSSIDE

Scope (Staff):	Medical, Pharmacy, Nursing, Anaesthetic Technicians
Scope (Area):	Paediatric Critical Care (PCC), Theatre, Emergency Department

Child Safe Organisation Statement of Commitment

CAHS commits to being a child safe organisation by applying the National Principles for Child Safe Organisations. This is a commitment to a strong culture supported by robust policies and procedures to reduce the likelihood of harm to children and young people.

This document should be read in conjunction with this DISCLAIMER

QUICKLINKS

Dosage/Dosage Adjustments	Administration	Compatibility	Monitoring

DRUG CLASS

Nonselective arteriolar and venous dilator.[1]

INDICATIONS AND RESTRICTIONS[1, 2]

- Hypertension
- Controlled hypotension during surgery to reduce bleeding.
- Short-term therapy of heart failure to enhance cardiac output and lower myocardial oxygen requirements.
- To facilitate vasodilation and improved tissue perfusion during deep hypothermic cardiac arrest and rewarming.[3]

CONTRAINDICATIONS[1, 2, 4, 5]

- Hypersensitivity to sodium nitroprusside or any component of the formulation.
- Compensatory hypertension (e.g. arteriovenous shunt or coarctation of the aorta)
- Vitamin B_{12} deficiency
- Congenital optic atrophy
- Hypovolaemia
- Uncorrected anaemia

PRECAUTIONS

- Increased intracranial pressure, encephalopathy – may be aggravated.[1]
- Cerebral or coronary artery disease.[1]
- Hypothyroidism – thiocyanate (degradation product of sodium nitroprusside) inhibits uptake and binding of iodine.[1, 4]
- Hypothermia – may be aggravated.[1, 4]
- Hyponatraemia.[4]
- Pulmonary impairment – may worsen hypoxaemia.[1]
- Cyanide toxicity – especially with long-term use or at infusion rates greater than 2 microg/kg/minute.[1, 2] Usual duration of treatment should not exceed 72 hours.[1]
- Renal impairment – reduced excretion of thiocyanate increases risk of toxicity. Monitor thiocyanate concentrations during prolonged treatment.[1]
- Avoid use in severe hepatic impairment.[1]
- Avoid abrupt withdrawal - may cause rebound hypertension, reduce rate over at least 10-30 minutes.[1, 4]
- Concomitant use with PDE-5 inhibitor (e.g. sildenafil).[5]

FORMULATIONS

Listed below are products available at PCH, other formulations may be available, check with pharmacy if required:

- Sodium Nitroprusside 50 mg/2 mL vials

Imprest location: Formulary One

DOSAGE & DOSAGE ADJUSTMENTS

Neonates: Refer to Neonatal Medication Protocols

Continuous Intravenous Infusion or Intraosseous:

Hypertension

≥4 weeks: Initial dose 0.3 - 0.5 microg/kg/minute, titrate to effect every 5 minutes in increments of 0.2 microg/kg/minute.[4-6]

- Maximum 4 microg/kg/minute if used for longer than 24 hours.[4]
- Maximum 10 microg/kg/minute for no greater than 10 minutes.[5]

Cardiac output stabilisation

≥4 weeks: Initial dose 0.3 to 1 microg/kg/minute, titrate to effect.[5]

- Maximum 8 microg/kg/minute for no greater than 10 minutes.[5]

Renal impairment:[5, 6]

- Caution should be exercised as renal impairment increases the risk of toxicity.
  - eGFR <30 mL/minute/1.73 m^2: Limit average infusion rate to < 3 microg/kg/minute
  - Anuric patients: Limit average infusion rate to 1 microg/kg/minute
- eGFR calculator

Hepatic impairment:[1, 6]

- No dosage adjustment required; however, caution should be exercised as patients are more susceptible to cyanide toxicity. Avoid use in severe impairment.

ADMINISTRATION

IMPORTANT: Sodium nitroprusside must only be administered in the Paediatric Critical Care (PCC) Unit, Theatre or Emergency Department.

Patient's Weight	Concentration (In Glucose 5%)	Notes
10 kg or less	6 mg in 30 mL (0.2 mg/mL)	In a 3 kg patient, 0.5 microg/kg/min = 0.45 mL/hr
Above 10 kg	50 mg in 50 mL (1 mg/mL)	In a 20 kg patient, 0.5 microg/kg/min = 0.6 mL/hr

- Not available as pre-filled syringes – to be prepared ad-hoc in the clinical area.
- Sodium nitroprusside is photosensitive and should be protected from light. Syringe should be protected from light when in use. It is not necessary to wrap administration sets or tubing.[1, 2, 5]
- Not for direct injection. Must be diluted prior to administration.[5] Once diluted, the solution must be protected from light and used within 24 hours.[7]
- Sodium nitroprusside has a faint brown colour. Discard if solution is blue, green, red or when brighter than normal, or if particles are present.[6, 7]
- Sodium nitroprusside may, if necessary, be administered intraosseously.[8]

COMPATIBILITY *(LIST IS NOT EXHAUSTIVE)*

Compatible fluids:[7]

Glucose 5% (preferred)

Sodium chloride 0.9%, Compound Sodium Lactate (Hartmann's) solution.

Compatible at Y-site:[6, 7]

Giving other drugs via Y-site may change the infusion rate of sodium nitroprusside **.**

Amikacin, aztreonam, buprenorphine, calcium chloride, calcium gluconate, cefazolin, cefotaxime, cefoxitin , ceftriaxone, ciclosporin, clindamycin, dexamethasone, dexmedetomidine, digoxin, dopamine, ephedrine sulfate, esmolol, ethanol, furosemide, gentamicin, glyceryl trinitrate, heparin sodium, hydrocortisone sodium succinate, insulin aspart (Novorapid®), isavuconazole, labetalol, lidocaine, magnesium sulfate, meropenem, metoclopramide, metoprolol, micafungin, midazolam, milrinone, morphine sulfate, noradrenaline (norepinephrine), sodium bicarbonate, suxamethonium, tobramycin, vancomycin, vecuronium, verapamil.

Only commonly used drugs are listed below. This is not a complete list of incompatible drugs. Compatibilities of IV drugs must be checked when two or more drugs are given concurrently.

INCOMPATIBLE drugs:[6, 7]

Aciclovir, azathioprine, caspofungin, ceftazidime, erythromycin, hydralazine, moxifloxacin, mycophenolate mofetil, phenytoin sodium, promethazine, sulfamethoxazole-trimethoprim, voriconazole.

MONITORING

- Continuous monitoring of intra-arterial blood pressure and heart rate.[1, 4]
- Blood gas studies to monitor methaemoglobin level, venous hyperoxaemia, metabolic acidosis – earliest sign of cyanide toxicity.[2, 5]
- Injection site. Extravasation may cause irritation, rash, flushing, redness at injection site and venous streaking.[7]
- Signs of cyanide and thiocyanate toxicity - see “Adverse Effects”.[5]
- Thiocyanate levels if a prolonged infusion (>3 days), high dose (> 4 microg/kg/min) or renal impairment present.[5]
- Cyanide levels if hepatic impairment is present.[5]

ADVERSE EFFECTS

NOTE: Elevated cyanide or thiocyanate levels must be managed in collaboration with the WA Poisons Information Centre (located at Sir Charles Gairdner Hospital).

Parenteral sodium thiosulfate is available from the PCH Pharmacy Department.

Signs of Thiocyanate Toxicity:[1]

Confusion, psychosis, tinnitus, blurred vision, nausea, dyspnoea, hypothyroidism, ataxia.

Signs of Cyanide Toxicity:[1, 2]

Tachycardia, sweating, hyperventilation, headache, arrhythmias, metabolic acidosis, venous hyperoxaemia, areflexia, coma, hypotension, pink colour of skin and mucous membranes, shallow breathing, dilated pupils and death.

Common:[1]

Nausea, vomiting, sweating, apprehension, headache, restlessness, muscle twitching, retrosternal discomfort, palpitations, dizziness, abdominal pain (with too rapid reduction in BP).

Infrequent:[1]

Postural hypotension, hypothyroidism, paraesthesia, feeling of warmth, rash, flushing, increased intracranial pressure.

Rare:[1]

Thrombocytopenia, methaemoglobinaemia, phlebitis.

STORAGE

Store below 25°C. Protect from light. Retain in carton or protective sleeve until time of use.[2]

INTERACTIONS

This medication may interact with other medications; consult PCH approved references (e.g. Clinical Pharmacology), a clinical pharmacist or PCH Medicines Information Service on extension 63546 for more information.

Please note: The information contained in this guideline is to assist with the preparation and administration of **sodium nitroprusside**. Any variations to the doses recommended should be clarified with the prescriber prior to administration

Related CAHS internal policies, procedures and guidelines

Intraosseous access

References

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Document Owner:	Chief Pharmacist		
Reviewer / Team:	Senior Pharmacist, PCC consultant, CNS – PCC, Cardiologist, Anaesthetist		
Date First Issued:	July 2016	**Last Reviewed:**	May 2025
Amendment Dates:	Nov 2022, Jun 2024, May 2025	**Next Review Date:**	May 2028
Approved by:	PCH&N Medication Safety Committee	**Date:**	Aug 2025
Endorsed by:	CAHS Drug & Therapeutics Committee	**Date:**	Sep 2025
1Standards Applicable:	NSQHS Standards: NSMHS: N/A Child Safe Standards: N/A		

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