

Neonatal Medication Guideline

Clinical Guideline

Milrinone

Policy developed by: SA Maternal, Neonatal & Gynaecology Community of Practice

Approved SA Health Safety & Quality Strategic Governance Committee on:
11 August 2017

Next review due: 31 August 2020

Summary The purpose of this guideline is to guide nursing, midwifery, medical and pharmacy staff in the dosing and administration of milrinone

Keywords Milrinone, neonatal medication guideline, low cardiac output, persistent pulmonary hypertension, PPHN, hypotension, hypertension

Policy history Is this a new policy? **Y**
Does this policy amend or update an existing policy? **N**
Does this policy replace an existing policy? **N**
If so, which policies?

Applies to All Health Networks
CALHN, SALHN, NALHN, CHSALHN, WCHN

Staff impact All Clinical, Medical, Midwifery, Nursing, Students, Allied Health, Emergency, Mental Health, Pathology, Pharmacy

PDS reference CG264

Version control and change history

Version	Date from	Date to	Amendment
1.0	Aug 2017	current	Original

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milrinone

10mg/10mL injection

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Note

This guideline provides advice of a general nature. This statewide guideline has been prepared to promote and facilitate standardisation and consistency of practice, using a multidisciplinary approach. The guideline is based on a review of published evidence and expert opinion.

Information in this statewide guideline is current at the time of publication.

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Health practitioners in the South Australian public health sector are expected to review specific details of each patient and professionally assess the applicability of the relevant guideline to that clinical situation.

If for good clinical reasons, a decision is made to depart from the guideline, the responsible clinician must document in the patient's medical record, the decision made, by whom, and detailed reasons for the departure from the guideline.

This statewide guideline does not address all the elements of clinical practice and assumes that the individual clinicians are responsible for discussing care with consumers in an environment that is culturally appropriate and which enables respectful confidential discussion. This includes:

- The use of interpreter services where necessary,
- Advising consumers of their choice and ensuring informed consent is obtained,
- Providing care within scope of practice, meeting all legislative requirements and maintaining standards of professional conduct, and
- Documenting all care in accordance with mandatory and local requirements

Dose and Indications

Treatment of low cardiac output states and as an adjunct to inhaled nitric oxide in neonates with PPHN

Treatment of post PDA ligation syndrome

Treatment of myocardial dysfunction in neonates with shock

Intravenous

Corrected Age (weeks) [Gestational Age PLUS Postnatal Age]	Continuous IV infusion (adjusted according to haemodynamic and clinical response)	Loading dose* (OPTIONAL)
< 30 weeks	0.2 micrograms/kg/min	0.75 micrograms/kg/min for 3 hrs
30 – 37 weeks	0.33 – 0.5 micrograms/kg/min	0.83 micrograms/kg/min for 1 hr
> 37 weeks	0.33 – 0.99 micrograms/kg/min Increase by 0.33 micrograms/kg/min as required	0.83 micrograms/kg/min for 1 hr

****Loading dose is considered optional and may be omitted if patient has hypotension/borderline low blood pressure****

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Preparation and Administration

Loading Dose

The loading dose can be given undiluted if patient is fluid restricted.

Intravenous Infusion

Select the strength required based on the weight of the infant in the context of any fluid restrictions. Milrinone Concentration Selection Tables can be found on the following pages of this guideline to assist prescribers to gauge which strength is best for the patient.

The three standard strengths used are:

- > Milrinone 50micrograms/mL
- > Milrinone 100micrograms/mL
- > Milrinone 200micrograms/mL

Dilute before use and administer by 24 hour infusion.

Formulae

To calculate infusion rate (mL/hr):

$$\text{Rate (mL/hr)} = \frac{\text{Dose (micrograms/kg/min)} \times 60 \text{ (minutes)} \times \text{Weight (kg)}}{\text{Strength (micrograms/mL)}}$$

To calculate the dose (micrograms/kg/min):

$$\text{Dose (micrograms/kg/min)} = \frac{\text{Rate (mL/hr)} / 60 \times \text{Strength (micrograms/mL)}}{\text{Weight (kg)}}$$

milrinone

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Dilution for Milrinone 50micrograms/mL

Dilute 2.5mL of Milrinone 1mg/mL with a compatible fluid to a total volume of 50mL to give a concentration of 50micrograms/mL.

Rate (mL/hr)	0.2	0.4	0.6	0.8	1
Weight (kg)	Approximate micrograms/kg/minute				
0.5	0.33	0.67	1.00	1.33	1.67
1	0.17	0.33	0.50	0.67	0.83
1.5	0.11	0.22	0.33	0.44	0.56
2	0.08	0.17	0.25	0.33	0.42
2.5	0.07	0.13	0.20	0.27	0.33
3	0.06	0.11	0.17	0.22	0.28
3.5	0.05	0.10	0.14	0.19	0.24

Dilution for Milrinone 100micrograms/mL

Dilute 5mL of Milrinone 1mg/mL with a compatible fluid to a total volume of 50mL to give a concentration of 100micrograms/mL.

Rate (mL/hr)	0.2	0.4	0.6	0.8	1
Weight (kg)	Approximate micrograms/kg/minute				
0.5	0.67	1.33	2.00	2.67	3.33
1	0.33	0.67	1.00	1.33	1.67
1.5	0.22	0.44	0.67	0.89	1.11
2	0.17	0.33	0.50	0.67	0.83
2.5	0.13	0.27	0.40	0.53	0.67
3	0.11	0.22	0.33	0.44	0.56
3.5	0.10	0.19	0.29	0.38	0.48

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Dilution for Milrinone 200micrograms/mL

Dilute 10mL of Milrinone 1mg/mL to a total volume of 50mL to give a concentration of 200micrograms/mL.

Rate (mL/hr)	0.2	0.4	0.6	0.8	1
Weight (kg)	Approximate micrograms/kg/minute				
1	0.67	1.33	2.00	2.67	3.33
1.5	0.44	0.89	1.33	1.78	2.22
2	0.33	0.67	1.00	1.33	1.67
2.5	0.27	0.53	0.80	1.07	1.33
3	0.22	0.44	0.67	0.89	1.11
3.5	0.19	0.38	0.57	0.76	0.95
4	0.17	0.33	0.50	0.67	0.83

Maximum concentration for infusion is 200micrograms/mL

Compatible Fluids

Sodium chloride 0.9%, Sodium Chloride 0.45%, Glucose 5%

Adverse Effects

Common

Hypotension, tachycardia, arrhythmias, nausea, somnolence

Infrequent

Mild thrombocytopenia, tremor

Monitoring

- > Continuous monitoring of blood pressure, heart rate and rhythm
- > Cardiac output
- > Fluid and electrolyte changes
- > Renal function
- > Platelet counts

Practice Points

- > Ensure adequate vascular volume prior to initiating therapy
- > Arterial and central venous access must be available before commencing milrinone
- > Consider co-administration of fluid bolus with loading dose of Milrinone due to risk of hypotension
- > Half-life of milrinone is usually 3 hours, and up to 10 hours in premature infants

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References

1. Cabral JEB & Belik J 2012, 'Persistent pulmonary hypertension of the newborn: recent advances in pathophysiology and treatment, *Jornal de Pediatria*, vol. 89, no. 3, pp. 226-242
2. McNamara PJ, Laique F, Muang-In S, Whyte HE 2006, 'Milrinone improves oxygenation in neonates with severe persistent pulmonary hypertension of the newborn', *Journal of Critical Care*, vol. 21, pp. 217-223
3. McNamara PJ, Shivananda SP, Sahni M, Freeman D & Taddio A 2013, 'Pharmacology of Milrinone in Neonates with Persistent Pulmonary Hypertension of the Newborn and Suboptimal Response to Inhaled Nitric Oxide', *Pediatric Critical care Medicine*, vol 14, no. 1 pp. 74-84
4. Paradisis M, Jiang X, McLachlan AJ, Evans N, Kluckow M, Osborn D. Population pharmacokinetics and dosing regimen design of milrinone in preterm infants. *Archives of disease in childhood Fetal and neonatal edition*. 2007;92:F204-9
5. El-Khuffash AF, Jain A, McNamara PJ, 2013, Ligation of the Patent Ductus Arteriosus in Preterm Infants: Understanding the Physiology. *Journal of Pediatrics*, vol. 162, issue 6, pp 1100-1106
6. James A T, Bee C, Corcoran J D, McNamara P J, Franklin O and EL-Khuffash A F, 2015, Treatment of premature infants with pulmonary hypertension and right ventricular dysfunction with milrinone: a case series. *Journal of Perinatology*, vol 35, pp 268-273

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