

Milrinone

APPLICABLE AREAS

THIS SECTION WILL BE LEFT BLANK FOR EACH HOSPITAL TO COMPLETE IN ACCORDANCE WITH LOCAL PRACTICE. EXAMPLES: ICU, ED, OR, WARD 2B

MECHANISM OF ACTION/PHARMACOLOGY

Milrinone is a positive inotrope and vasodilator, with little chronotropic activity. Milrinone selectively inhibits PEAK III cAMP (cyclic adenosine monophosphate) phosphodiesterase isozyme in cardiac and vascular muscle, leading to an increase in intracellular ionised calcium and contractile force in cardiac muscle.^{1,2} This activity results in left ventricular afterload reduction, with an increase in cardiac output and a reduction in total peripheral resistance.³

Onset of action: 5–15 minutes.⁴

Duration of action: 3–5 hours.¹

Half-life: 2–4 hours, renal impairment prolongs half-life.⁴

INDICATIONS

Cardiogenic shock secondary to acute decompensated systolic heart failure.

Short-term therapy for severe heart failure refractory to other treatment.

Low cardiac output states post cardiac surgery.^{2,5}

PRECAUTIONS

- Hypersensitivity to milrinone or other bipyridines²
- Hypotension due to uncorrected hypovolaemia
- Severe obstructive aortic or pulmonary valvular disease or hypertrophic subaortic stenosis – milrinone may aggravate outflow tract obstruction²
- Risk of systolic anterior motion of the mitral valve and/or dynamic left ventricular outflow tract obstruction
- Supraventricular and ventricular arrhythmias
- Severe renal impairment (CrCl < 30 mL/min) increases the terminal elimination half-life; consider dose reduction.²

MEDICATION PRESENTATION

10 mg/10mL ampoule.

MEDICATION STORAGE

Store vials below 30°C. Do not freeze.⁶

Infusion solutions are stable for up to 24 hours.⁶

PREPARATION

	IV bag	Syringe driver
Prescribe	20 mg in 100 mL	10 mg in 50 mL
Make up infusion in	100 mL bag of glucose 5%*	Glucose 5%*
Volume to be removed from IV bag	20 mL	Not applicable Draw up 40 mL in the syringe
Drug dose to be added	20 mg (20 mL)	10 mg (10 mL)
Final volume	100 mL	50 mL
Final concentration	200 microg/mL	200 microg/mL
1mL/hr =	200 microg/hr	200 microg/hr

* Glucose 5% is preferred for dilution of all inotropes and vasopressors. However, milrinone is also compatible with Hartmann's and sodium chloride 0.9%.⁶

ADMINISTRATION – THIS GUIDELINE IS INTENDED FOR CENTRAL ACCESS ONLY

Administer continuous intravenous infusion through a central access line.⁶

Infusions should be administered via a syringe driver or infusion pump, preferably with medication error reduction software enabled.

Avoid administration via lines where other drugs or fluids may be bolused or flushed.⁷

DOSING

Starting rate: 0.1 microg/kg/min.⁸

In common practice the loading dose is omitted as it is associated with hypotension.

Usual rate range: 0.125 to 0.35 microg/kg/min.⁹

Titrate in accordance with haemodynamic and clinical response, with dose adjustments every 2–4 hours due to long half-life.

Maximum rate: 0.75 microg/kg/min.²

Dose based on actual body weight up to a maximum of 120 kg.¹⁰

Weaning: The infusion should be weaned slowly (2–4-hourly), monitoring for clinical signs of inadequate cardiac output.

Infusion rate guide: Maintenance continuous infusion rate for milrinone (mL/hr) (using 200 microg/mL solution).

Patient weight (kg)	Infusion rate (mL/hr) 0.05 microg/kg/min	Infusion rate (mL/hr) 0.1 microg/kg/min	Infusion rate (mL/hr) 0.15 microg/kg/min	Infusion rate (mL/hr) 0.2 microg/kg/min	Infusion rate (mL/hr) 0.25 microg/kg/min	Infusion rate (mL/hr) 0.3 microg/kg/min	Infusion rate (mL/hr) 0.35 microg/kg/min
40	0.6	1.2	1.8	2.4	3	3.6	4.2
50	0.75	1.5	2.25	3	3.8	4.5	5.25
60	0.9	1.8	2.7	3.6	4.5	5.4	6.3
70	1.05	2.1	3.15	4.2	5.3	6.3	7.35
80	1.2	2.4	3.6	4.8	6	7.2	8.4
90	1.35	2.7	4.05	5.4	6.8	8.1	9.45
100	1.5	3	4.5	6.0	7.5	9	10.5
110	1.65	3.3	4.95	6.6	8.3	9.9	11.55
120	1.8	3.6	5.4	7.2	9	10.8	12.6

Calculation:

Infusion rate (mL/hr) = (patient weight (kg) × dose (microg/kg/min) × 60) ÷ infusion strength (microg/mL).

MONITORING

Continuous blood pressure and cardiac monitoring for the duration of the infusion.⁶

Daily 12-lead ECG.

Monitor fluid balance and electrolytes at least daily.

SIDE EFFECTS

- Supraventricular and ventricular arrhythmias⁵
- Hypotension – concomitant vasopressor use may be required⁵
- Mild thrombocytopenia.⁵

COMPATIBILITIES

Consult the following references, which are available online through the Clinicians Health Channel:

- Australian injectable drugs handbook
- Trissel's™ in IV compatibility (Micromedex) – from the site homepage, select the 'IV Compatibility' tab.

IMPORTANT DRUG INTERACTIONS

Anagrelide or **cilostazol** are agents that also inhibit phosphodiesterase III and, in combination with milrinone, may increase the risk of adverse effects.^{5,11}

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ACKNOWLEDGEMENTS

We would like to thank the pharmacists involved in writing the guidelines: Melissa Ankravs, Melanie Kowalski, Rachel Fyfe, Robyn Ingram, Annalie Jones, Susan Trevillian, and Lucy Sharrock.

To receive this publication in an accessible format phone 9096 1384, using the National Relay Service 13 36 77 if required, or email info@safercare.vic.gov.au

Printed copies of this document may not be the most recent version.

Authorised and published by the Victorian Government, 1 Treasury Place, Melbourne.

© State of Victoria, Australia, Safer Care Victoria, December 2018

ISBN 978-1-76069-720-4 (online/print)

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