		Type: Drug Guideline	Document reference: 2920	Manual Classification: Waikato DHB Drug Guidelines
Title: Furosemide for neonates			Effective date: 22 June 2022	
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			Document expiry date: 20 October 2024	

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BRIEF ADMINISTRATION GUIDE

For detailed information refer to [The Australasian Neonatal Medicines Formulary furosemide guideline](#)



Critical Note: there are minor variations between the ANMF and Waikato DHB best practice within this drug guideline – see **yellow shaded text**

Indications:

- Fluid overload, oedema
- Chronic lung disease

Route: Intravenous (Direct IV Injection and continuous IV infusion) or Oral

- Injection supplied as furosemide 20 mg/2 mL ampoule (concentration 10 mg/mL)
 - pH of furosemide 8 to 9.3
- Oral supplied as furosemide 10 mg/mL oral solution, or can use injection solution to avoid alcohol content (Note: commercial oral solution contains 12.7% ethanol)

Dose: Intravenous Injection

- 1 mg/kg/dose (range 0.5 to maximum 2 mg/kg/dose)

Dose interval according to table below:

Corrected Gestational Age	Interval
Preterm infant < 34 weeks	Every 24 hours
Preterm infant > 34 weeks	12 – 24 hours
Term infant 0-30 days	Every 12 hours
Term infant >30 days	8 – 12 hours

Continuous Intravenous Infusion

- 0.05 – 0.2 mg/kg/hour, adjusted according to urine output
- Maximum dose rate **1** mg/kg/h

Oral

- 0.5 – 2 mg/kg every 12 – 24 hours.
- Maximum 6 mg/kg/dose

Note: Chlorothiazide can be used to augment the effects of furosemide if tolerance has developed.

Preparation and administration

Compatible fluids: sodium chloride 0.9% (preferred), glucose 5% and glucose 10%


Direct IV Injection

- Draw up dose of undiluted solution
- Give via a peripheral or central line slowly over 2 to 5 minutes (not exceeding rate of 0.5 mg/kg/min)

Continuous IV Infusion

- Select the **concentration** of furosemide required based on the weight of the infant and in the context of any fluid restrictions (refer to appendix 2 for assistance) and dilute the appropriate volume of furosemide injection using compatible fluid in accordance with the table below:

Final Furosemide Concentration	0.5 mg/mL	3 mg/mL
Volume of furosemide (20 mg / 2 mL)	2 mL	6 ml
Volume of compatible fluid	38 mL	14 mL
Total volume	40 mL	20 mL

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- Administer at the prescribed rate by continuous IV infusion using a syringe driver with Guardrails settings (furosemide contin)

$$\text{Rate (mL/hr)} = \frac{\text{Dose (mg/kg/hr)} \times \text{Weight (kg)}}{\text{Concentration (mg/mL)}}$$

Oral

- Draw up prescribed dose in an oral syringe
- Administer on an empty stomach if possible (but can administer with milk to reduce gastrointestinal distress)

Monitoring

- Serum electrolytes, renal function, blood pressure
- Fluid status (input and output and body weight)
- Observe for extravasation
- Tolerance may develop with time, consider addition of Chlorothiazide to augment effects
- Hearing if prolonged or high dose treatment or co-administration with other ototoxic medication

Storage and Stability

- Discard any unused ampoule contents
- Diluted IV solutions are stable for up to 24 hours at 2 to 8 °C
- Prepare a fresh solution at least every 24 hours if using continuous IV
- Discard bottle of oral solution 8 weeks after opening

Competency for administration

This procedure is carried out by, or under, the direct supervision of a registered nurse/registered midwife who holds current Waikato DHB Generic Medicine Management and IV certification. For CVAD administration Neonatal specific competency NCV/NAC is also required.

Guardrails

Furosemide continuous infusion is Guardrail profiled on the CC pump for NICU. The limits are:


Guardrails Drug Name	Furosemide (contin)
Concentration (mg/ml)	
Standard	0.5 and 3
Minimum	0.4
Maximum	10
Dose rate (mg/kg/hr)	
Default	0.1
Soft minimum	0.05
Soft maximum	0.4
Hard max	1

Associated Documents

- Audiology testing

References

- Australasian Neonatal Medicines Formulary. Furosemide 2021. Available from www.anmfonline.org
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Appendix

Infusion tables

Table 1: Infusion rates when using furosemide concentration **0.5 mg/mL**
(most useful for neonates ≤ 3 kg)

Rate (mL/hr)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
Weight (kg)	Approximate mg/kg/hour									
0.5	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
1	0.05	0.1	0.15	0.2	0.25	0.30	0.35	0.40	0.45	0.5
1.5	0.03	0.07	0.1	0.13	0.17	0.2	0.23	0.27	0.3	0.33
2	0.03	0.05	0.08	0.1	0.13	0.15	0.18	0.2	0.23	0.25
2.5	0.02	0.04	0.06	0.08	0.1	0.12	0.14	0.16	0.18	0.2
3	0.02	0.03	0.05	0.07	0.08	0.1	0.12	0.13	0.15	0.17
3.5	0.01	0.03	0.04	0.06	0.07	0.09	0.1	0.11	0.13	0.14
4	0.01	0.03	0.04	0.05	0.06	0.08	0.09	0.1	0.11	0.13
4.5	0.01	0.02	0.03	0.04	0.06	0.07	0.08	0.09	0.1	0.11
5	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.1

Table 2: Infusion rates when using furosemide concentration **3 mg/mL**
(most useful for neonates > 3 kg)

Rate (mL/hr)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
Weight (kg)	Approximate mg/kg/hour									
2	0.15	0.3	0.5	0.6	0.75	0.9	1.05	1.2	1.35	1.5
2.5	0.12	0.24	0.36	0.48	0.6	0.72	0.84	0.96	1.08	1.2
3	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
3.5	0.09	0.17	0.26	0.34	0.43	0.51	0.6	0.69	0.77	0.86
4	0.08	0.15	0.23	0.3	0.38	0.45	0.53	0.6	0.68	0.75
4.5	0.07	0.13	0.2	0.27	0.33	0.4	0.47	0.53	0.6	0.67
5	0.06	0.12	0.18	0.24	0.3	0.36	0.42	0.48	0.54	0.6