

Neonatal Medication Guideline

Clinical Guideline

Midazolam

Policy developed by: SA Maternal & Neonatal Clinical Community of Practice

Approved by

Safety & Quality Strategic Governance Committee on: 28 April 2017

Next review due: 30 April 2020

Summary The purpose of the Midazolam Neonatal Medication Guideline is to guide nursing, medical and pharmacy staff in the dosing and administration of midazolam

Keywords Midazolam, neonatal medication guidelines, flumazenil, sedation, conscious sedation, seizure, status epilepticus, respiratory depression, hypotension, clinical guideline, Midazolam Neonatal Medication Guideline

Policy history Is this a new policy? **N**
Does this policy amend or update an existing policy? **Y v1.0**
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 CG042

Version control and change history

Version	Date from	Date to	Amendment
1.0	November 2012	April 2017	Original version
2.0	28 April 2017	Current	Full Review

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midazolam

1mg/mL injection, 5mg/mL injection,
1mg/mL oral solution

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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

This is a High Risk Medication ⚠

An overdose can be rapidly fatal.

Dose and Indications

1mg = 1000micrograms

Short Term Sedation

Oral

0.25mg/kg as a single dose

Conscious Sedation in Ventilated Neonates

Intravenous Infusion

10 to 60 micrograms/kg/hour

A loading dose of 100micrograms/kg may be used prior to the infusion commencing

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Health:NeoMed@sa.gov.au

midazolam

1mg/mL & 5mg/mL injection, 1mg/mL oral solution

Seizure Control**Intranasal**

0.2 to 0.3 mg/kg using the 5mg/mL (plastic) ampoule

Intravenous Bolus

200micrograms/kg (0.2mg/kg) as a loading dose followed by a continuous intravenous infusion

Intravenous infusion

60microgram/kg/hour increasing dose every 15 minutes up to a maximum rate of 300microgram/kg/hour

Preparation and Administration**Oral**

Available as a 1mg/mL solution * not commercially available however is manufactured by Women's and Children's Hospital and available at most public hospitals

Oral absorption is rapid, although erratic. Maximum effect within 30 to 60 minutes and duration up to 2 hours

Intranasal

Always use the 5mg/mL PLASTIC ampoule for this indication to reduce the volume to administer. The 5mg/mL (plastic) ampoule contains:

Dose	0.25mg	0.5mg	0.75mg	1mg	1.25mg
Volume	0.05mL	0.1mL	0.15mL	0.2mL	0.25mL

Administration technique is important. Drop dose into alternating nostrils over 15 seconds. Absorption is rapid; maximum effect in 10 mins and duration up to 2 hrs. May be irritating and should only be used if a rapid effect is required.

Intravenous Bolus

The 1mg/mL injection contains:

Dose	100micrograms	200micrograms	300micrograms	400micrograms	500micrograms
Volume	0.1mL	0.2mL	0.3mL	0.4mL	0.5mL

Administer as a push over at least 2 minutes

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Intravenous Infusion

Select the strength required based on the weight of the infant in the context of any fluid restrictions. Midazolam 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.

Dilute the appropriate volume of the 1mg/mL midazolam injection using compatible fluid and administer by continuous infusion. Diluted preparation is stable for 24 hours at room temperature.

The three standard concentrations to select from are:

- > Midazolam 50micrograms/mL (0.05mg/mL)
- > Midazolam 100micrograms/mL (0.1mg/mL)
- > Midazolam 200micrograms/mL (0.2mg/mL)

Formulae

To calculate infusion rate (mL/hr):

$$\text{Rate (mL/hour)} = \frac{\text{Dose (microgram/kg/hr)} \times \text{Weight (kg)}}{\text{Strength (microgram/mL)}}$$

To calculate the dose (microgram/kg/hour):

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

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Midazolam Concentration Selection Table**Dilution for Midazolam 50microgram/mL****To make a 25mL syringe:**

Dilute 1.25mL midazolam (1mg/mL) with 23.75mL of compatible fluid (total of 25mL).

To make a 50mL syringe:

Dilute 2.5mL midazolam (1mg/mL) with 47.5mL of compatible fluid (total of 50mL).

Rate (mL/hr)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	Rate (mL/hr)
Weight (kg)	Approximate micrograms/kg/hour									Weight (kg)
0.5	20	30	40	50	60	70	80	90	100	0.5
1	10	15	20	25	30	35	40	45	50	1
1.5	7	10	13	17	20	23	27	30	33	1.5
2	5	8	10	13	15	18	20	23	25	2
2.5	4	6	8	10	12	14	16	18	20	2.5
3	3	5	7	8	10	12	13	15	17	3
3.5	3	4	6	7	9	10	11	13	14	3.5
4	3	4	5	6	8	9	10	11	13	4

Discard remaining solution

Dilution for Midazolam 100microgram/mL**To make a 25mL syringe:**

Dilute 2.5mL midazolam (1mg/mL) with 22.5mL of compatible fluid (total of 25mL).

To make a 50mL syringe:

Dilute 5mL midazolam (1mg/mL) with 45mL of compatible fluid (total of 50mL).

Rate (mL/hr)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	Rate (mL/hr)
Weight (kg)	Approximate micrograms/kg/hour									Weight (kg)
0.5	40	60	80	100	120	140	160	180	200	0.5
1	20	30	40	50	60	70	80	90	100	1
1.5	13	20	27	33	40	47	53	60	67	1.5
2	10	15	20	25	30	35	40	45	50	2
2.5	8	12	16	20	24	28	32	36	40	2.5
3	7	10	13	17	20	23	27	30	33	3
3.5	6	9	11	14	17	20	23	26	29	3.5
4	5	8	10	13	15	18	20	23	25	4

Discard remaining solution

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Dilution for Midazolam 200microgram/mL**To make a 25mL syringe:**

Dilute 5mL midazolam (1mg/mL) with 20mL of compatible fluid (total of 25mL).

To make a 50mL syringe:

Dilute 10mL midazolam (1mg/mL) with 40mL of compatible fluid (total of 50mL).

Rate (mL/hr)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	Rate (mL/hr)
Weight (kg)	Approximate micrograms/kg/hour									Weight (kg)
1.5	27	40	53	67	80	93	107	120	133	1.5
2	20	30	40	50	60	70	80	90	100	2
2.5	16	24	32	40	48	56	64	72	80	2.5
3	13	20	27	33	40	47	53	60	67	3
3.5	11	17	23	29	34	40	46	51	57	3.5
4	10	15	20	25	30	35	40	45	50	4
4.5	9	13	18	22	27	31	36	40	44	4.5
5	8	12	16	20	24	28	32	36	40	5

Discard remaining solution

Compatible Fluids

Glucose 5%, glucose 10%, glucose and sodium chloride containing solutions, sodium chloride 0.9%

Adverse Effects**Common**

Drowsiness, oversedation, hypersalivation, nasal discomfort (with intranasal), seizure-like myoclonus (premature neonates receiving via intravenous route with fast administration), hypotension

Infrequent

Paradoxical excitation, respiratory depression,

Intravenous route: thrombophlebitis, severe hypotension, arrhythmias, respiratory arrest

Rare

Blood disorders, including leucopenia and leucocytosis, jaundice, transient elevated liver function tests, allergic reactions, including rash and anaphylaxis

Monitoring

- > Oximetry
- > Cardiac Monitoring
- > Sedation

Practice Points**ISBN number:****Endorsed by:****Last Revised:****Contact:**

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- > Withdraw use slowly after chronic administration. Seizures may occur following abrupt discontinuation of chronic treatment.
- > Midazolam interacts with other central nervous system depressants e.g. opioids and may increase the risk of drowsiness, respiratory depression and hypotension
- > Midazolam has been associated with respiratory depression and arrest when used for conscious sedation. Only use in non critical care settings if respiratory and cardiac function can be monitored, and resuscitation equipment is available.
- > Midazolam has a relatively short duration of action compared to some other benzodiazepines
- > Flumazenil is a specific benzodiazepine antagonist and may be used to rapidly reverse respiratory depression.
- > Increased sensitivity to central nervous system (CNS) effects in renal and hepatic impairment; use doses at lower end of range.

Version control and change history**PDS reference:** OCE use only

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1.0	November 2012	April 2017	Original version
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