South Australian Neonatal Medication Guidelines

alprostadil

10microgram/mL injection (WCH), 500microgram/mL injection

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

Synonyms

Prostagladin E_1, PGE_1

Dose and Indications

1 microgram = 1000nanograms

Maintain patency of ductus arteriosus

Intravenous infusion

Adjusted with response in increments of 5 nanograms/kg/minute in consultation with cardiologist

Maximum 100 nanograms/kg/minute (but associated with increased side-effects)

- **Widely patent duct in a stable neonate (confirmed on echocardiogram)**
  Initial dose 5 to 6 nanograms/kg/min
- **Symptomatic neonate presenting with a closing duct in the context of suspected or confirmed duct dependent congenital heart disease**
  Initial dose between 10 to 50 nanograms/kg/min; weaned slowly if adequate response. Commence at lower end of the range if neonate is stable

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Preparation and Administration

Continuous Intravenous Infusion

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

A **double dilution** will be required if using alprostadil 500microgram/mL solution.

If 10microgram/mL syringe is available only one dilution (STEP 2) is required.

STEP ONE: Dilute 0.5mL of alprostadil (500micrograms/mL) with 24.5mL of sodium chloride 0.9% injection (total of 25mL). The resulting solution contains 10micrograms/mL.

STEP TWO: Dilute the appropriate volume of alprostadil (10microgram/mL) 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:

- alprostadil 1microgram/mL (equivalent to 1000nanograms/mL)
- alprostadil 2micrograms/mL (equivalent to 2000nanograms/mL)
- alprostadil 4micrograms/mL (equivalent to 4000nanograms/mL)

Formulae

To calculate infusion rate (mL/hr):

$$\text{Rate (mL/hr)} = \frac{60 \times \text{dose (nanograms/kg/min)} \times \text{weight (kg)}}{\text{Strength (nanogram/mL)}}$$

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

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

Compatible Fluids

Glucose 5%, sodium chloride 0.9%

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Alprostadil Concentration Selection Table for 25mL syringes

Double Dilution for Alprostadil 1micrograms/mL

STEP ONE: Dilute 0.5mL of alprostadil (500micrograms/mL) with 24.5mL of sodium chloride 0.9% injection (total of 25mL). The resulting solution contains 10micrograms/mL.

STEP TWO: Dilute 2.5mL alprostadil (10micrograms/mL) with 22.5mL of compatible fluid (total of 25mL). This makes a 1microgram/mL solution (1000nanograms/mL).

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 nanograms/kg/minute									Weight (kg)
0.5	7	10	13	17	20	23	27	30	33	0.5
1.5	2	3	4	6	7	8	9	10	11	1.5
2.5	1	2	3	3	4	5	5	6	7	2.5
3.5	1	1	2	2	3	3	4	4	5	3.5

Discard any remainder

Double Dilution for Alprostadil 2micrograms/mL

STEP ONE: Dilute 0.5mL of alprostadil (500micrograms/mL) with 24.5mL of sodium chloride 0.9% injection (total of 25mL). The resulting solution contains 10micrograms/mL.

STEP TWO: Dilute 5mL alprostadil (10micrograms/mL) with 20mL of compatible fluid (total of 25mL). This makes a 2micrograms/mL solution (2000nanograms/mL).

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 nanograms/kg/minute									Weight (kg)
1	7	10	13	17	20	23	27	30	33	1
2		5	7	8	10	12	13	15	17	2
3				6	7	8	9	10	11	3
4					5	6	7	8	8	4

Discard any remainder

Double Dilution for Alprostadil 4micrograms/mL

STEP ONE: Dilute 0.5mL of alprostadil (500micrograms/mL) with 24.5mL of sodium chloride 0.9% injection (total of 25mL). The resulting solution contains 10micrograms/mL.

STEP TWO: Dilute 10mL alprostadil (10micrograms/mL) with 15mL of compatible fluid (total of 25mL). This makes a 4micrograms/mL solution (4000nanograms/mL).

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 nanograms/kg/minute									Weight (kg)
2	7	10	13	17	20	23	27	30	33	2
3		7	9	11	13	16	18	20	22	3
4		5	7	8	10	12	13	15	17	4
5			5	7	8	9	11	12	13	5

Discard any remainder

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Alprostadil Concentration Selection Table for 50mL syringes

Double Dilution for Alprostadil 1micrograms/mL

STEP ONE: Dilute 0.5mL of alprostadil (500micrograms/mL) with 24.5mL of sodium chloride 0.9% injection (total of 25mL). The resulting solution contains 10micrograms/mL.

STEP TWO: Dilute 5mL alprostadil (10micrograms/mL) with 45mL of compatible fluid (total of 50mL). This makes a 1microgram/mL solution (1000nanograms/mL).

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 nanograms/kg/minute									Weight (kg)
0.5	7	10	13	17	20	23	27	30	33	0.5
1.5	2	3	4	6	7	8	9	10	11	1.5
2.5	1	2	3	3	4	5	5	6	7	2.5
3.5	1	1	2	2	3	3	4	4	5	3.5

Discard any remainder

Double Dilution for Alprostadil 2micrograms/mL

STEP ONE: Dilute 0.5mL of alprostadil (500micrograms/mL) with 24.5mL of sodium chloride 0.9% injection (total of 25mL). The resulting solution contains 10micrograms/mL.

STEP TWO: Dilute 10mL alprostadil (10micrograms/mL) with 40mL of compatible fluid (total of 50mL). This makes a 2micrograms/mL solution (2000nanograms/mL).

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 nanograms/kg/minute									Weight (kg)
1	7	10	13	17	20	23	27	30	33	1
2		5	7	8	10	12	13	15	17	2
3				6	7	8	9	10	11	3
4					5	6	7	8	8	4

Discard any remainder

Double Dilution for Alprostadil 4micrograms/mL

STEP ONE: Dilute 0.5mL of Alprostadil (500micrograms/mL) with 24.5mL of sodium chloride 0.9% injection (total of 25mL). The resulting solution contains 10micrograms/mL.

STEP TWO: Dilute 20mL alprostadil (10micrograms/mL) with 30mL of compatible fluid (total of 50mL). This makes a 4micrograms/mL solution (4000nanograms/mL).

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 nanograms/kg/minute									Weight (kg)
2	7	10	13	17	20	23	27	30	33	2
3		7	9	11	13	16	18	20	22	3
4		5	7	8	10	12	13	15	17	4
5			5	7	8	9	11	12	13	5

Discard any remainder

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Adverse Effects

Common

Respiratory depression, apnoea, hypotension, fever, flushing, bradycardia, leukocytosis. Gastric outlet obstruction and reversible cortical proliferation of the long bones (with treatment >120 hours). Hypokalaemia (with treatment >20 days)

Infrequent

Seizures, hypoventilation, tachycardia, cardiac arrest, oedema, sepsis, diarrhoea, disseminated intravascular coagulation

Rare

Urticara, bronchospasm, haemorrhage, hypoglycaemia and hypocalcaemia. Widened fontanels, pretibial and soft tissue swelling and swelling of the extremities (> 9 days therapy).

Monitoring

- Respiratory and cardiovascular status, including improvement in oxygenation
- Blood pressure
- Temperature
- Intravenous access
- Blood glucose levels
- Electrolytes and full blood count

Practice Points

- Adjust rate of infusion until patency of the ductus arteriosus has been established through improvement in oxygenation, palpable femoral pulses, improved lower extremity perfusion and increased urine output
- Maintenance dose is usually with one half or less of the initial effective dose
- Intravenous route is preferred, although effective with intra-arterial infusion
- Doses greater than 100nanograms/kg/minute are rarely more effective and may cause serious adverse effects
- Alprostadil is a peripheral vasodilator and can decrease blood pressure significantly. If using in the higher doses consider giving a volume load if blood pressure is low
- It is preferable to have a central line or two peripheral venous lines available when using alprostadil
- Use with CAUTION in patients with bleeding tendencies and seizure disorders.

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