

South Australian Neonatal Medication Guidelines

insulin – hyperkalaemia

100units/mL 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

This is a High Risk Medication

Use the term "units" (written in full) as the abbreviation of "U" can be misinterpreted as a "0"

Synonyms

Neutral insulin, soluble insulin

Dose and Indications

Hyperkalaemia

Intravenous Bolus Injection

0.1 unit/kg

Always prescribe with glucose 50% (see Preparation and Administration)

Reserved for the emergency treatment of cardiac arrhythmia due to hyperkalaemia

Intravenous Infusion

0.1 to 0.2 units/kg/hour in conjunction with a 25% intravenous glucose infusion. Take care to avoid hypoglycaemia. Always infuse via a central line.

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Preparation and Administration

Intravenous Bolus Injection

Dilute 0.5mL of the 100units/mL soluble insulin with 9.5mL of compatible fluid (to a total of 10mL). The solution now contains 5 units/mL.

| Dose | 0.05 units | 0.1 units | 0.15 units | 0.2units | 0.3 units | 0.4units | 0.5units |
|--------|------------|-----------|------------|----------|-----------|----------|----------|
| Volume | 0.01 mL | 0.02 mL | 0.03 mL | 0.04 mL | 0.06 mL | 0.08 mL | 0.1 mL |

Further dilute dose with 2mL/kg glucose 50% and administer as a push over at least 5 minutes

Discard the diluted 5 unit/mL solution.

Continuous Intravenous Infusion

Insulin adsorbs to PVC: new intravenous tubing should be flushed/primed with 5mL of a diluted insulin solution (use same strength as infused) prior to intravenous administration (no filter required).

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

STEP ONE: Dilute 0.5mL of 100unit/mL soluble insulin with 9.5mL of compatible fluid (total of 10mL). The resulting solution contains 5unit/mL insulin.

STEP TWO: Dilute the appropriate volume of the 5unit/mL insulin solution 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:

- > Insulin 0.05 units/mL
- > Insulin 0.1units/mL
- > Insulin 0.2units/mL

Formulae

To calculate infusion rate (mL/hr):

$$\text{Rate (mL/hour)} = \frac{\text{dose (units/kg/hour)} \times \text{weight(kg)}}{\text{Infusion Strength(units/mL)}}$$

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

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

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100units/mL injection

Insulin Concentration Selection Table for **25mL** syringes

Double Dilution for Insulin 0.1units/mL

STEP ONE: Dilute 0.5mL of 100unit/mL soluble insulin with 9.5mL of compatible fluid (total of 10mL). The resulting solution contains 5 unit/mL insulin.

Step TWO: Dilute 0.5mL insulin (5 units/mL) with 24.5mL of compatible fluid (total of 25mL)

| Rate (mL/hr) | 0.2 | 0.4 | 0.6 | 0.8 | 1 | Rate (mL/hr) |
|--------------|---------------------------|------|------|------|------|--------------|
| Weight (kg) | Approximate units/kg/hour | | | | | Weight (kg) |
| 1 | 0.02 | 0.04 | 0.06 | 0.08 | 0.1 | 1 |
| 1.5 | 0.01 | 0.03 | 0.04 | 0.05 | 0.07 | 1.5 |
| 2 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 | 2 |
| 2.5 | 0.008 | 0.02 | 0.02 | 0.03 | 0.04 | 2.5 |
| 3 | 0.007 | 0.01 | 0.02 | 0.03 | 0.03 | 3 |
| 3.5 | 0.006 | 0.01 | 0.02 | 0.02 | 0.03 | 3.5 |

Discard remaining solution

Double Dilution for Insulin 0.2 units/mL

STEP ONE: Dilute 0.5mL of 100unit/mL soluble insulin with 9.5mL of compatible fluid (total of 10mL). The resulting solution contains 5 unit/mL insulin.

STEP TWO: Dilute 1mL insulin (5 units/mL) with 24mL of compatible fluid (total of 25mL)

| Rate (mL/hr) | 0.2 | 0.4 | 0.6 | 0.8 | 1 | Rate (mL/hr) |
|--------------|---------------------------|------|------|------|------|--------------|
| Weight (kg) | Approximate units/kg/hour | | | | | Weight (kg) |
| 2 | 0.02 | 0.04 | 0.06 | 0.08 | 0.1 | 2 |
| 2.5 | 0.02 | 0.03 | 0.05 | 0.06 | 0.08 | 2.5 |
| 3 | 0.01 | 0.03 | 0.04 | 0.05 | 0.07 | 3 |
| 3.5 | 0.01 | 0.02 | 0.03 | 0.05 | 0.06 | 3.5 |
| 4 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 | 4 |
| 4.5 | 0.01 | 0.02 | 0.03 | 0.04 | 0.04 | 4.5 |

Discard remaining solution

Double Dilution for Insulin 0.4 units/mL

STEP ONE: Dilute 0.5mL of 100unit/mL soluble insulin with 9.5mL of compatible fluid (total of 10mL). The resulting solution contains 5 unit/mL insulin.

STEP TWO: Dilute 2mL insulin (5 units/mL) with 23mL of compatible fluid (total of 25mL)

| Rate (mL/hr) | 0.2 | 0.4 | 0.6 | 0.8 | 1 | Rate (mL/hr) |
|--------------|---------------------------|------|------|------|------|--------------|
| Weight (kg) | Approximate Units/kg/hour | | | | | Weight (kg) |
| 2.5 | 0.03 | 0.06 | 0.1 | 0.13 | 0.16 | 2.5 |
| 3 | 0.03 | 0.05 | 0.08 | 0.1 | 0.13 | 3 |
| 3.5 | 0.02 | 0.05 | 0.07 | 0.09 | 0.11 | 3.5 |
| 4 | 0.02 | 0.04 | 0.06 | 0.08 | 0.1 | 4 |
| 4.5 | 0.02 | 0.04 | 0.05 | 0.07 | 0.09 | 4.5 |
| 5 | 0.02 | 0.03 | 0.05 | 0.06 | 0.08 | 5 |

Discard remaining solution

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Insulin Concentration Selection Table for **50mL** syringes

Double Dilution for Insulin 0.1units/mL

STEP ONE: Dilute 0.5mL of 100unit/mL soluble insulin with 9.5mL of compatible fluid (total of 10mL). The resulting solution contains 5 unit/mL insulin.

Step TWO: Dilute 1mL insulin (5 units/mL) with 49mL of compatible fluid (total of 50mL)

| Rate (mL/hr) | 0.2 | 0.4 | 0.6 | 0.8 | 1 | Rate (mL/hr) |
|--------------|---------------------------|------|------|------|------|--------------|
| Weight (kg) | Approximate units/kg/hour | | | | | Weight (kg) |
| 1 | 0.02 | 0.04 | 0.06 | 0.08 | 0.1 | 1 |
| 1.5 | 0.01 | 0.03 | 0.04 | 0.05 | 0.07 | 1.5 |
| 2 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 | 2 |
| 2.5 | 0.008 | 0.02 | 0.02 | 0.03 | 0.04 | 2.5 |
| 3 | 0.007 | 0.01 | 0.02 | 0.03 | 0.03 | 3 |
| 3.5 | 0.006 | 0.01 | 0.02 | 0.02 | 0.03 | 3.5 |

Discard remaining solution

Double Dilution for Insulin 0.2 units/mL

STEP ONE: Dilute 0.5mL of 100unit/mL soluble insulin with 9.5mL of compatible fluid (total of 10mL). The resulting solution contains 5 unit/mL solution.

STEP TWO: Dilute 2mL insulin (5 units/mL) with 48mL of compatible fluid (total of 50mL)

| Rate (mL/hr) | 0.2 | 0.4 | 0.6 | 0.8 | 1 | Rate (mL/hr) |
|--------------|---------------------------|------|------|------|------|--------------|
| Weight (kg) | Approximate units/kg/hour | | | | | Weight (kg) |
| 2 | 0.02 | 0.04 | 0.06 | 0.08 | 0.1 | 2 |
| 2.5 | 0.02 | 0.03 | 0.05 | 0.06 | 0.08 | 2.5 |
| 3 | 0.01 | 0.03 | 0.04 | 0.05 | 0.07 | 3 |
| 3.5 | 0.01 | 0.02 | 0.03 | 0.05 | 0.06 | 3.5 |
| 4 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 | 4 |
| 4.5 | 0.01 | 0.02 | 0.03 | 0.04 | 0.04 | 4.5 |

Discard remaining solution

Double Dilution for Insulin 0.4 units/mL

STEP ONE: Dilute 0.5mL of 100unit/mL soluble insulin with 9.5mL of compatible fluid (total of 10mL). The resulting solution contains 5 unit/mL insulin.

STEP TWO: Dilute 4mL insulin (5 units/mL) with 46mL of compatible fluid (total of 50mL)

| Rate (mL/hr) | 0.2 | 0.4 | 0.6 | 0.8 | 1 | Rate (mL/hr) |
|--------------|---------------------------|------|------|------|------|--------------|
| Weight (kg) | Approximate units/kg/hour | | | | | Weight (kg) |
| 2.5 | 0.03 | 0.06 | 0.1 | 0.13 | 0.16 | 2.5 |
| 3 | 0.03 | 0.05 | 0.08 | 0.1 | 0.13 | 3 |
| 3.5 | 0.02 | 0.05 | 0.07 | 0.09 | 0.11 | 3.5 |
| 4 | 0.02 | 0.04 | 0.06 | 0.08 | 0.1 | 4 |
| 4.5 | 0.02 | 0.04 | 0.05 | 0.07 | 0.09 | 4.5 |
| 5 | 0.02 | 0.03 | 0.05 | 0.06 | 0.08 | 5 |

Discard remaining solution

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Compatible Fluids

Glucose 5%, glucose 10%, glucose5%/sodium chloride 0.45%, sodium chloride 0.9%

Glucose 25% (MUST be administered via central line)

Glucose 50% (MUST be administered via central line)

Adverse Effects

Hypoglycaemia

Monitoring

- > Frequent blood and urine glucose levels as guided by the prescriber. Document in nursing care plan
- > Electrolytes, particularly potassium.

Practice Points

- > The original vial of insulin may be reused for the same patient for up to 28 days
- > Unopened vials to be stored in the fridge. Opened vials may be kept at room temperature
- > If ceasing insulin or changing the strength, be careful to remove and replace the previous line and T-piece to avoid flushing through any insulin remaining in the tubing
- > Insulin is incompatible with many drugs.

References

- > RPA Newborn Care Drug Database. Viewed 3 August 2011,
<http://www.sswahs.nsw.gov.au/rpa/neonatal/html/listview.asp?DrugID=69>
- > Royal Children's Hospital Pharmacopeia. Viewed 31 August 2011,
<http://www.rch.org.au/pharmacopeia/pages/insulin.html>

Version control and change history

PDS reference: OCE use only

| Version | Date from | Date to | Amendment |
|---------|---------------|---------|------------------|
| 1.0 | November 2012 | current | Original version |
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