

South Australian Neonatal Medication Guidelines

Insulin neutral (soluble) – hyperGLYCAEMIA

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”
An overdose can be rapidly fatal.

Synonyms

Neutral insulin, soluble insulin, Actrapid®

Dose and Indications

Hyperglycaemia

Continuous Intravenous Infusion

0.01 to 0.1 units/kg/hour

Subcutaneous Injection

Seek endocrinologist advice



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Preparation and Administration

Continuous Intravenous Infusion

Insulin adsorbs to PVC: new IV tubing should be flushed/primed with 20mL of a diluted insulin solution (use same strength as infused) prior to IV 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.

The three standard concentrations to select from are:

Insulin 0.05 units/mL

Insulin 0.1 units/mL

Insulin 0.2 units/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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Insulin Concentration Selection Tables

Insulin 0.05 units/mL

Double dilution to make 50mL syringe:

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 (5units/mL) with 49.5mL of compatible fluid (total of 50mL)

Recommended for neonates weighing <1kg

| Rate (mL/hr) | 0.2 | 0.4 | 0.6 | 0.8 | 1 | Rate (mL/hr) |
|--------------|---------------------------|-------|------|------|------|--------------|
| Weight (kg) | Approximate units/kg/hour | | | | | Weight (kg) |
| 0.5 | 0.02 | 0.04 | 0.06 | 0.08 | 0.1 | 0.5 |
| 1 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 | 1 |
| 1.5 | 0.007 | 0.01 | 0.02 | 0.03 | 0.03 | 1.5 |
| 2 | 0.005 | 0.01 | 0.02 | 0.02 | 0.03 | 2 |
| 2.5 | 0.004 | 0.008 | 0.01 | 0.02 | 0.02 | 2.5 |
| 3 | 0.003 | 0.007 | 0.01 | 0.01 | 0.02 | 3 |

Discard remaining solution

Insulin 0.1units/mL

Double dilution to make 50mL syringe:

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 (5units/mL) with 49mL of compatible fluid (total of 50mL)

Recommended for neonates weighing 1kg - 3kg

| 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



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Insulin 0.2 units/mL

To make 50mL syringe:

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 (5units/mL) with 48mL of compatible fluid (total of 50mL)

Recommended for neonates weighing >3kg

| 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

Subcutaneous Injection

Add 0.5mL of 100unit/mL soluble insulin to 9.5mL of sodium chloride 0.9% (to give a total volume of 10mL). The resulting solution contains 5unit/mL insulin.

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

Discard the diluted 5 unit/mL solution.

The vial of insulin may be reused for the same patient for up to 28 days.

Compatible Fluids

Glucose 5%, glucose 10%, sodium chloride 0.9%

Adverse Effects

Hypoglycaemia, hypokalaemia



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Monitoring

- > Monitor blood glucose as frequently as guided by the prescriber. It is important that the nursing staff have a documented plan as to the frequency of monitoring the blood glucose level and for glycosuria
- > 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 (check [parenteral compatibility/stability references](#) on SALUS website for more information)
- > Y-site compatible with a line containing TPN (with or without lipid) or heparin

References

- > Hewson M, Nawadra V, Oliver J, Odgers C, Plummer J, Simmer K. Insulin infusions in the neonatal unit: delivery variation due to adsorption. J Paediatr Child Health. 2000 Jun;36(3):216-20.
- > Thompson CD, Vital-Carona J, Faustino EVS, The Effect of Tubing Dwell Time on Insulin Adsorption During Intravenous Insulin Infusions, 2012, Diabetes Technology and Therapeutics, Vol 14, No 10 pp912-916



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Document Ownership & History

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| 03/2015 | V4 | SA Health Safety and Quality Strategic Governance Committee | Revised in line with 5 year schedule for review |
| 10/2014 | V3 | SA Health Safety and Quality Strategic Governance Committee | Clarification of type of insulin to be used |
| 02/2013 | V2 | SA Health Safety and Quality Strategic Governance Committee | Revised version |
| 11/2012 | V1 | SA Maternal & Neonatal Clinical Network | Original SA Maternal & Neonatal Clinical Network approved version |

