

South Australian Neonatal Medication Guidelines

Insulin neutral (soluble) – hyperGLYCAEMIA

100 units/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 20 mL of the diluted insulin solution (use same strength as infused) prior to IV administration.**
- > **Do not filter infusion as insulin will also bind to filter.**

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):

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

Insulin Concentration Selection Tables

Insulin 0.05 units/mL

Double dilution to make 50 mL syringe:

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

STEP TWO: Dilute 0.5 mL insulin (5 units/mL) with 49.5 mL of compatible fluid (total of 50 mL)

Discard remaining 5 units/mL solution.

See '[Preparation and Administration](#)' above regarding priming time.

Table 1: Concentration selection table for insulin 0.05 units/mL

Recommended for neonates weighing less than 1 kg.

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



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Insulin 0.1 units/mL

Double dilution to make 50 mL syringe:

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

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

Discard remaining 5 units/mL solution.

See '[Preparation and Administration](#)' above regarding priming time.

Table 2: Concentration selection table for insulin 0.1 units/mL

Recommended for neonates weighing 1 kg to 3 kg.

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

Insulin 0.2 units/mL

Double dilution to make 50 mL syringe:

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

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

Discard remaining 5 units/mL solution.

See '[Preparation and Administration](#)' above regarding priming time.

Table 3: Concentration selection table for insulin 0.2 units/mL

Recommended for neonates weighing greater than 3 kg.

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



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Subcutaneous Injection

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

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

Discard remaining diluted 5 units/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

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 *Intravenous Medication Compatibility Chart* in Neonates neonatal medication guideline found in the A-to-Z listing at www.sahealth.sa.gov.au/neonatal).
- > 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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If so, which version? **V5.0**
Does this Neonatal Medication Guideline replace another Neonatal Medication Guideline with a different title? **N**
If so, which Neonatal Medication Guideline (title)?

Approval Date	Version	Who approved New/Revised Version	Reason for Change
04/07/2024	V5.1	Domain Custodian, Clinical Governance, Safety and Quality	Improved caution for insulin absorption to PVC
26/07/2021	V5	Domain Custodian, Clinical Governance, Safety and Quality	Revised in line with 5-year schedule for review
09/03/2018	V4.1	SA Health Safety and Quality Strategic Governance Committee	New template
03/2015	V4	SA Health Safety and Quality Strategic Governance Committee	Reviewed version
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

