South Australian Neonatal Medication Guidelines

Insulin neutral (soluble) – hyperKALAEMIA

100 units/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

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

Hyperkalaemia

Intravenous Injection: Infuse Over 15 Minutes

0.1 unit/kg

Always prescribe with glucose to maintain glucose(g):insulin (units) ratio of 5:1

Reserved for the emergency treatment of cardiac arrhythmia due to hyperkalaemia.

Continuous Intravenous Infusion

0.1 to 0.2 units/kg/hour

Take care to avoid hypoglycaemia. Where plasma glucose levels are normal at baseline, consider the following to maintain glucose(g):insulin (units) ratio 2.5:1.

- Central access available: insulin 0.1 units/mL standard concentration in 25% glucose
- Central access **not** available: insulin 0.04units/mL standard concentration in 10% glucose

If there is concern regarding high plasma glucose levels, consider alternative diluent. If glucose infusion is running concurrently (rather than as diluent above), ensure rate changes in insulin are adequately matched with glucose delivery to reduce the risk of hypoglycaemia.

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Preparation and Administration

Intravenous Injection

STEP ONE:

Dilute 0.1 mL of the 100 units/mL soluble insulin with compatible fluid (e.g., sodium chloride 0.9%), to a total of 10 mL. The solution now contains 1 unit/mL.

Dose	0.05 units	0.1 units	0.2 units	0.3 units	0.4 units	0.5 units
Volume	0.05 mL	0.1 mL	0.2 mL	0.3 mL	0.4 mL	0.5 mL

Draw up the prescribed dose of insulin (0.1 unit/kg = 0.1 mL/kg) for dilution in glucose solution (see STEP TWO)

Discard the remaining diluted insulin 1 unit/mL solution.

STEP TWO:

Where central access available - further dilute dose with 1 mL/kg glucose 50% (glucose:insulin ratio of 5:1) and administer as a push over at least 15 minutes OR

Where central access is not available – further dilute dose with 5 mL/kg glucose 10% (glucose:insulin ratio of 5:1) and administer as a push over at least 15 minutes.

Continuous Intravenous Infusion

Insulin adsorbs to PVC:

- **New IV tubing should be flushed/primed with 20mL 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.**

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 two standard concentrations to select from are:

- Insulin 0.04 units/mL in 10% glucose
- Insulin 0.1 units/mL in 25% glucose

Formulae

To calculate infusion rate (mL/hr):

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

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

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

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Insulin Concentration Selection Tables

Insulin 0.04 units/mL

Double dilution to make 50 mL syringe:

STEP ONE: Dilute 0.5 mL of 100units/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 0.4 mL insulin (5 units/mL) with 49.6 mL of glucose 10% (or other compatible fluid) (total of 50mL)

Discard remaining 5 units/mL solution.

See *'Preparation and Administration'* above regarding priming time.

Table 1: Concentration selection table for insulin 0.04 units/mL

Recommended for neonates who are limited to peripheral IV access

Rate (mL/hr)	1	1.5	2	2.5	3	3.5	4	4.5	5	Rate (mL/hr)
Weight (kg)	Approximate units/kg/hour									Weight (kg)
0.5	0.08	0.12	0.16	0.2	0.24	0.28	0.32	0.36	0.4	0.5
1	0.04	0.06	0.08	0.1	0.12	0.14	0.16	0.18	0.20	1
1.5	0.03	0.04	0.05	0.07	0.08	0.09	0.11	0.12	0.13	1.5
2	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.1	2
2.5	0.02	0.02	0.03	0.04	0.05	0.06	0.06	0.07	0.08	2.5
3	0.01	0.02	0.03	0.03	0.04	0.05	0.05	0.06	0.07	3

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 25% glucose (or other compatible fluid) (total of 50mL)

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 with central IV access.

Rate (mL/hr)	0.5	1	1.5	2	2.5	3	Rate (mL/hr)
Weight (kg)	Approximate units/kg/hour						Weight (kg)
0.5	0.1	0.2	0.3	0.4	0.5	0.6	0.5
1	0.05	0.1	0.15	0.2	0.25	0.3	1
1.5	0.03	0.07	0.1	0.13	0.17	0.2	1.5
2	0.03	0.05	0.08	0.1	0.13	0.15	2
2.5	0.02	0.04	0.06	0.08	0.1	0.12	2.5
3	0.02	0.03	0.05	0.07	0.08	0.1	3

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Compatible Fluids

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

Glucose 25% (MUST be administered via central line)

Glucose 50% (MUST be administered via central line)

Adverse Effects

Hypoglycaemia, hypokalaemia

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 for up to 28 days.
- If ceasing insulin or changing the concentration, 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 parenteral nutrition, lipid emulsion and 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.

Oschman A, Gansen A, Kilbride H, et al. Safety and Efficacy of Two Potassium Cocktail Formulations for Treatment of Neonatal Hyperkalemia, 2011, Annals of Pharmacotherapy, vol 45, pp1371-1377

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

Royal Children's Hospital - Clinical Practice Guideline: Hyperkalaemia. Viewed 27 May 2020

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Is this a new Neonatal Medication Guideline (V1)? **N**
Does this Neonatal Medication Guideline amend or update and existing Neonatal Medication Guideline? **Y**
If so, which version? **V4.1**
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	V4.2	Domain Custodian, Clinical Governance, Safety and Quality	Improved caution for insulin absorption to PVC
16/08/2021	V4.1	Domain Custodian, Clinical Governance, Safety and Quality	Minor amendment to ensure correct dilution
26/07/2021	V4.0	Domain Custodian, Clinical Governance, Safety and Quality	Revised in line with 5-year schedule for review
09/03/2018	V3.1	SA Health Safety and Quality Strategic Governance Committee	Review date extended to 5 years following risk assessment. New template
03/2015	V3.0	SA Health Safety and Quality Strategic Governance Committee	Reviewed version
10/2014	V2.0	SA Health Safety and Quality Strategic Governance Committee	Reviewed version
11/2012	V1.0	SA Maternal & Neonatal Clinical Network	Original SA Maternal & Neonatal Clinical Network approved version.

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