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Title: <b>Insulin for Hyperglycaemia in Neonates</b>			Effective date: <b>11 August 2022</b>	
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## BRIEF ADMINISTRATION GUIDE

For detailed information refer to The Australasian Neonatal Medicines Formulary [insulin for hyperglycaemia](#) guideline



**Critical Note:** there are minor variations between the ANMF and Waikato DHB best practice within this drug guideline – see **yellow shaded text**

**Indications:** Hyperglycaemia (consider if blood glucose level  $\geq 8\text{mmol/L}$  for two consecutive levels taken four hours apart or a single level  $>10\text{mmol/L}$ )

**Route:** Intravenous or subcutaneous, continuous infusion

- Supplied as insulin regular 100 units per mL (Actrapid®)
- pH of insulin is 6.6 to 8

**Dose:** 0.01 – **0.2** units/kg/hr (starting dose 0.05 units/kg/hr). Titrate to blood glucose level.  
Note: very low birth weight neonates during first two weeks of life occasionally require high doses due to insulin resistance, inappropriate insulin secretion and decreased liver sensitivity to insulin effects.

**Note:** insulin solution is not generally included in daily total fluid volume


## Preparation and administration

**Compatible fluids:** sodium chloride 0.9%, glucose 5%, glucose 10%, glucose in sodium chloride solutions

- Select the **concentration** of insulin required based on the weight of the infant and in the context of any fluid restrictions (refer to appendix for assistance) and dilute the appropriate volume of insulin injection using compatible fluid in accordance with the below table:

Final Insulin Concentration	0.2 unit/mL	0.5 unit/mL	1 unit/mL
Volume of insulin 100 unit/mL	0.1 mL	0.25 mL	0.3 mL
Volume of compatible fluid	49.9 mL	49.75 mL	29.7 mL
Total volume	50 mL	50 mL	30 mL

- Ensure solution is well mixed
- Administer at the prescribed rate by continuous infusion using a syringe driver with Guardrails settings  
**Note:** Do not filter insulin or bolus other medications through the insulin line.
- Insulin binds to the plastic of the fine bore tubing. When a new sterile fine bore tubing set is used for the first time, **before attaching the infusion to the infant**, prime the fine bore tubing by slowly injecting **5mL** of the diluted insulin through the tubing and if there is time **leave this prime to dwell in the tubing for up to 30 minutes** (e.g. prepare insulin infusion first if setting up multiple infusions). **Just before attaching the tubing to the infant slowly inject a further 3mL of the diluted insulin to flush out the initial prime.** When replacing a nearly empty syringe with a new full syringe, if the old fine bore tubing is not being replaced then there is no need to allow for a dwell time as the plastic will already be saturated with insulin.
- Adjust dose according to blood glucose levels. Target pre-feed blood glucose is usually **4 to 7** mmol/L (whilst on insulin therapy).
- Recheck blood glucose within 1 to 2 hours of changing the dose, then check every 2 to 4 hours until stable

	Document reference: <b>2932</b>	Effective date: <b>11 Aug 2022</b>	Expiry date: <b>22 Feb 2025</b>	Page: <b>2 of 3</b>
	Title: <b>Insulin for Hyperglycaemia in Neonates</b>	Type: <b>Drug Guideline</b>	Version: <b>3.1</b>	Authorising initials:

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

Note: If the insulin is running via a PIV or CVAD with no other fluids infusing administer sodium chloride 0.9% concurrently at 1mL/hr to maintain patency of the line

## Monitoring

- Monitor blood glucose concentration more frequently until stable, then 4-6 hourly. When the infusion is stopped check blood glucose after one hour.

## Storage and Stability

- Prepare a fresh solution at least every 24 hours
- The insulin vial can be accessed for 14 days after first opening

## Competency for Administration

This procedure is carried out by, or under, the direct supervision of a registered nurse/registered midwife who holds current Waikato DHB Generic Medicine Management and IV certification plus Guardrails competency (if administering IV) as well as Neonatal specific competency NCV/NAC (if administering via CVAD).

## Guardrails

Insulin is Guardrail profiled on the CC pump for NICU. Following are the guardrail limits (from 2022):


Guardrails Drug Name	Insulin (Hyperglyc)
<b>Concentration (unit/mL)</b>	
<b>Minimum</b>	0.1
<b>Maximum</b>	1
<b>Administration Rate (unit/kg/h)</b>	
<b>Default</b>	0.05
<b>Soft minimum</b>	0.01
<b>Soft maximum</b>	0.21
<b>Hard maximum</b>	0.8

## Associated Documents

- [Hypoglycaemia – guidelines for management](#). Waikato DHB NICU protocol #3122
- [Subcutaneous insulin infusion in NewBorn Intensive Care](#). Waikato DHB NICU protocol #0392

## References

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	Document reference: <b>2932</b>	Effective date: <b>11 Aug 2022</b>	Expiry date: <b>22 Feb 2025</b>	Page: <b>3 of 3</b>
	Title: <b>Insulin for Hyperglycaemia in Neonates</b>	Type: <b>Drug Guideline</b>	Version: <b>3.1</b>	Authorising initials:

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## Appendix

### Infusion tables to assist concentration selection

**Table 1:** Infusion rates when using insulin concentration **0.2 unit/mL**

Rate (mL/hr)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
Weight (kg)	<b>Approximate units/kg/hour</b>									
0.5	0.04	0.08	0.12	0.16	0.2	0.24	0.28	0.32	0.36	0.4
1	0.02	0.04	0.06	0.08	0.1	0.12	0.14	0.16	0.18	0.2
1.5	0.01	0.03	0.04	0.05	0.07	0.08	0.09	0.11	0.12	0.13
2	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.1
2.5	0.01	0.02	0.02	0.03	0.04	0.05	0.06	0.06	0.07	0.08

**Table 2:** Infusion rates when using insulin concentration **0.5 unit/mL**

Rate (mL/hr)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
Weight (kg)	<b>Approximate units/kg/hour</b>									
0.5	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
1	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5
1.5	0.03	0.07	0.1	0.13	0.17	0.2	0.23	0.27	0.3	0.33
2	0.03	0.05	0.08	0.1	0.13	0.15	0.18	0.2	0.23	0.25
2.5	0.02	0.04	0.06	0.08	0.1	0.12	0.14	0.16	0.18	0.2
3	0.02	0.03	0.05	0.07	0.08	0.1	0.12	0.13	0.15	0.17
3.5	0.01	0.03	0.04	0.06	0.07	0.09	0.1	0.11	0.13	0.14
4	0.01	0.03	0.04	0.05	0.06	0.08	0.09	0.1	0.11	0.13
4.5	0.01	0.02	0.03	0.04	0.06	0.07	0.08	0.09	0.1	0.11
5	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.1

**Table 3:** Infusion rates when using insulin concentration **1 unit/mL**

Rate (mL/hr)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
Weight (kg)	<b>Approximate units/kg/hour</b>									
1	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
1.5	0.07	0.13	0.2	0.27	0.33	0.4	0.47	0.53	0.6	0.67
2	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5
2.5	0.04	0.08	0.12	0.16	0.2	0.24	0.28	0.32	0.36	0.4
3	0.03	0.07	0.1	0.13	0.17	0.2	0.23	0.27	0.3	0.33
3.5	0.03	0.06	0.09	0.11	0.14	0.17	0.2	0.23	0.26	0.29
4	0.03	0.05	0.08	0.1	0.13	0.15	0.18	0.2	0.23	0.25
4.5	0.02	0.04	0.07	0.09	0.11	0.13	0.16	0.18	0.2	0.22
5	0.02	0.04	0.06	0.08	0.1	0.12	0.14	0.16	0.18	0.2