Intravenous - CHILD Insulin (soluble) human

Medicine name

Insulin (soluble) human

Trade name(s)

Humulin S® , Actrapid®

Overdose of insulin due to abbreviations or incorrect device is a Medication Never Event.

To reduce the risk of giving an incorrect dose always write the word 'units' in full next to the dose of insulin, do not use abbreviations such as 'U' or 'IU' Withdraw insulin from vials ONLY and always use an insulin syringe (graduated in units)

Risk of severe harm and death due to withdrawing insulin from pen devices; Patient safety alert 11/2016

Preparation and Administration

Summary

IV infusion, Continuous IV infusion

See the BNFc link

Before treatment

View 'Guidance on this section' for checks that should be made before giving the medicine.

Preparation (6,11 13,14)

Diabetic ketoacidosis, Hyperglycaemia during illness, Diabetes during surgery:
Draw up required amount of soluble insulin using an insulin syringe and dilute with

sodium chloride 0.9%.
If available follow local guidelines, otherwise use

NPPG standard infusion concentrations:
Use 100units in 1mL solution to prepare infusions

Less than 2kg:

- Use a concentration of 0.1unit in 1mL
- Dilute 5units diluted to 50mL with sodium chloride 0.9%

2 - 5kg:

- Use a concentration of 0.5unit in 1mL
- Dilute 25units diluted to 50mL with sodium chloride 0.9%

Greater than 5kg:

- Use a concentration of 1unit in 1mL
- Dilute 50units diluted to 50mL with sodium chloride 0.9%

The NPPG standard infusion concentration specified for a particular weight-band may be used for patients of a different weight if required e.g in fluid restriction or if weaning. Where 50mL volume has been suggested 20mL volumes of the same concentration may be prepared for neonatal patients. Avoid rates of less than 0.1mL/hour due to limitations of infusion pumps.

Alternative concentrations currently used in some organisations:
Organisations are encouraged to phase out use of the following concentrations and adopt the NPPG recommended concentrations above.
Fixed dilutions:

- 0.2unit in 1mL in sodium chloride 0.9%

Weight based dilutions in neonatal units:
10units/kg patient weight diluted to 50mL with sodium chloride 0.9%
25units/kg patient weight diluted to 50mL with sodium chloride 0.9%

Use of glucose 10% as a diluent
Standardising IV infusion concentrations for neonates and children in the UK (NPPG Nov 2024)

Expiry time to write on label of continuous infusion

24 hours.

Administration [6,8]

Diabetic ketoacidosis, Hyperglycaemia during illness, Diabetes during surgery
Continuous IV infusion: Give using an infusion pump. Prime the line as described below.

Acute severe hyperkalaemia (unlicensed).
IV infusion: Give using an infusion pump.
Ensure sufficient glucose is given alongside insulin.

If diluted in glucose 12.5% or higher preferably give via a central venous access device as venous irritation and tissue damage may occur in cases of extravasation. If a central venous access device is unavailable administer via a large peripheral vein monitoring injection site closely using a recognised phlebitis scoring tool. Re-site cannula at first signs of inflammation.

Priming the line before continuous IV infusion
Insulin may be adsorbed by plastics. In neonates and infants prime the administration line with diluted insulin solution and leave for 10 minutes then flush the line through with 5-20mL insulin solution before connecting to the patient. Repeat procedure when lines are changed.

Example calculations

Infusion rate (mL/hour) can be calculated from the following equation:

$$= \frac{\text{Dose (units/kg/hour) x patient weight (kg)}}{\text{Concentration (units/mL)}}$$

For example (figures for illustration only):
Infusion rate (mL/hour) to give 0.1unit/kg/hour insulin to a 10kg child using a 1unit in 1mL solution:

$$= \frac{\text{0.1unit/kg/hour x 10kg}}{\text{1unit/mL}} = \text{1mL/hour}$$

Infusion rates (mL/hour) for different patient weights and doses using 0.1unit, 0.5unit and 1unit in 1mL insulin solutions.

Flushing

Flush with sodium chloride 0.9%. Follow local guidelines.

Adverse effects and suggested monitoring

Acute reactions:

- hypoglycaemia
- anaphylaxis
- redness, swelling and itching at injection site.

Monitor: blood glucose, blood pressure; potassium and other electrolytes; blood ketones, bicarbonate and venous pH in DKA.

Extravasation

Extravasation is likely to cause tissue damage when diluted in glucose due to low pH and high osmolarity of the diluent. If extravasation occurs follow local policies

Infiltration and Extravasation: A toolkit to improve practice. (NIVAS 2024)

Other comments [1]

- Store unopened vials at 2-8°C and protect from light. Do not freeze.
- Actrapid®: Once in use vials may be used for up to 6 weeks; store below 25°C and do not refrigerate.
- Humulin S®: Once in use vials may be used for up to 28 days; store below 30°C.
- Vials contain glycerol and m-cresol as preservatives.
- The monograph does not cover Insuman Rapid® (Sanofi Aventis)

Cambridge Diabetes Education Programme (CDEP): Safe use of insulin in hospital.

Compatibility [4]

The compatibility information is based on the concentrations recommended in the preparation section of the monographs and relates to two drug combinations only.

Compatible infusions (it is assumed that medicines meet close to the vascular access device):

- acetylcysteine, adrenaline, alfentanil, aminophylline, amiodarone, aprotinin, atracurium,
- caspofungin, clarithromycin, clonidine
- dobutamine, dopexamine
- esmolol
- fentanyl, furosemide
- gentamicin, glucose 5%, glucose 10%, glucose with potassium chloride, glucose 4% sodium chloride 0.18%, glyceryl trinitrate,
- heparin
- isosorbide dinitrate
- labetalol
- magnesium sulfate, meropenem, midazolam, milrinone, morphine,
- pantoprazole potassium chloride propofol,
- remifentanil,
- sodium chloride 0.9%, sodium nitroprusside,
- tacrolimus, terbutaline,, tobramycin
- vancomycin, vasopressin, vecuronium

Incompatible (do not assume a medicine not listed here is compatible): digoxin, dopamine, noradrenaline (norepinephrine), omeprazole, pantoprazole.

Medicines and infusions that should be infused separately from other medicines - Jan 2025

Preparations available and suppliers

Presentation of medicine [1]

Insulin (soluble) human solution
Available as: 1,000units in 10mL (100units per mL) vials.

A 'ready-diluted' 50units in 50mL sodium chloride 0.9% preparation is available in some hospitals.

Version: **Version 11** **Status:**