

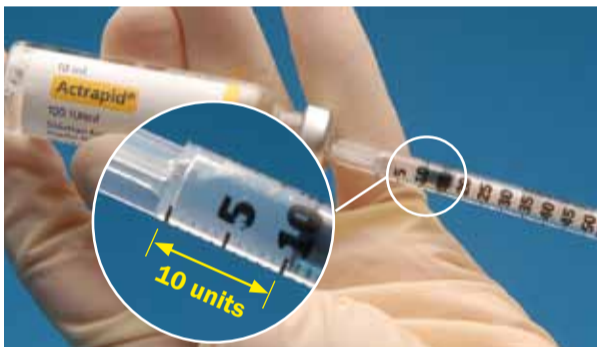
How to make up 10 units of Actrapid® (soluble) insulin in 50ml glucose 50% Minijet® using the hyperkalaemia kit

Protect the cardiac membrane: give 10ml of calcium gluconate 10% IV over 2 mins (NB if patient on digoxin, and calcium gluconate required, give slowly over 20 mins in 100ml of glucose 5%).

- 1 With the nurse in charge, obtain an Actrapid® vial from the pharmaceutical fridge.



- 2 Take the glucose 50% Minijet® glass vial from the kit. Remove its blue protective cap.



- 3 Measure 10 units of insulin using an insulin syringe from the kit:
 - a. Draw the plunger back to the 10 unit mark on the insulin syringe. Check the 10 units of insulin obtained with the senior nurse on duty.
 - b. Note 10 units of insulin is contained in 0.1ml
 - c. Record administration of this and other medicines used to treat hyperkalaemia on the Kardex. Ensure both signatures for double check are documented on the Kardex.



- 4 Inject the 10 units of insulin through the blue stopper of the glucose 50% Minijet® glass vial.

- 5 Mix.

- 6 Remove the yellow protector cap from the Minijet® injector.



- 7 Thread the glucose 50% Minijet® glass vial into the Minijet® injector three half turns or until the needle penetrates the stopper.



- 8 Remove the yellow cap from the tip of the Minijet® injector and expel air.

- 9 Administer into a large vein by slow IV injection over 5 mins.

- 10 If difficulty in administering insulin/ glucose using the Minijet® (preferred method), use the glucose 50% vial in the kit.

- 11 Monitor and document blood glucose 30 mins after administration of insulin/ glucose and then hourly up to 6 hours after completion of administration.

- 12 Monitor U&Es 30 mins after each administration of insulin/ glucose. If good response, check U&Es 1-2 hours after last intervention.

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Emergency management of hyperkalaemia in adults

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Incidence between 1 and 10% in hospitalised patients. Majority of cases are related to pre-existing or new Renal Failure, potassium supplementation or diuretics/medicines with potassium - sparing properties. Classified as mild (serum potassium 5.5 - 6.0 mmol/L), moderate (serum potassium 6.1 - 6.9 mmol/L), severe (serum potassium ≥ 7.0 mmol/L) Consult senior colleagues in clinical team

COMMON CAUSES OF HYPERKALAEMIA IN ADULTS

RENAL CAUSES	TRANSCELLULAR SHIFT OF POTASSIUM	INCREASED CIRCULATING POTASSIUM
<ul style="list-style-type: none"> Acute or Chronic Renal Failure* Medicines inhibiting R-A-A system (ACE inhibitors, ARBs, NSAIDs, heparin)* Medicine induced inhibition of potassium excretion (eg amiloride, spironolactone)* Hyperkalaemic RTA (Type IV)* 	<ul style="list-style-type: none"> Acidosis (including Diabetic Ketoacidosis)* Medicines (digoxin poisoning, suxamethonium) 	<ul style="list-style-type: none"> Exogenous serum potassium (potassium supplements in medicines) Endogenous (burns, trauma, rhabdomyolysis)

* = MOST COMMON CAUSES

STEP 1: COMPREHENSIVE HISTORY AND EXAMINATION to determine and treat reversible causes of hyperkalaemia: **ALWAYS TREAT THE UNDERLYING CAUSE.**

- Non-specific symptoms include fatigue, weakness, paresthesias, palpitations (may be absent even with severe hyperkalaemia).
- Focus on past history of renal problems and medication usage: **Stop potassium containing fluids/foods and medicines inhibiting potassium excretion.**
- Exclude urinary tract obstruction (examine for bladder distension/prostatic hyperplasia). Catheterise if appropriate.

STEP 2: QUESTIONS AND INITIAL INVESTIGATIONS

Q: Is hyperkalaemia really present?:

Pseudohyperkalaemia (e.g. haemolysed sample). Repeat **serum potassium** urgently but do not delay treatment if **renal failure** or if **hyperkalaemic ECG changes**.

Q: Is Emergency Treatment needed?:

Yes if ECG changes present (Peaked T waves, PR prolongation, decreased or absent P waves, QRS widening, AV block, sine wave QRST)

A normal ECG does not obviate the need for therapy - the ECG can be normal in severe hyperkalaemia.

Yes if severe hyperkalaemia. Acute changes in serum potassium are more likely to cause cardiac arrhythmias.

A 12-lead ECG with cardiac monitoring, **repeated** assessment of **glucose** (BM, testing) urea and electrolytes is mandatory. Creatinine kinase/blood gas analysis (if indicated).

STEP 3: MANAGEMENT Use Hyperkalaemia Kit

1. Protect the cardiac membrane:

Administer 10ml calcium gluconate 10% solution IV over 2 minutes. Effects noted 1 to 3 minutes and last approximately 30-60 minutes. Caution if patient taking digoxin.

2. Shift potassium into cells:

(a) Insulin

Withdraw 10 units of Actrapid® insulin using an INSULIN syringe.

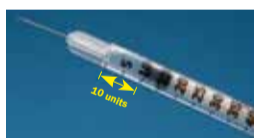
Always obtain a check of volume from a senior nurse before proceeding. Add to 50ml glucose 50% and administer by slow IV injection over 5 minutes. Effects observed in 15 minutes and last 4-6 hours. Monitoring – blood glucose should be measured 30 minutes after insulin/glucose administration and then hourly up to 6 hours after completion of administration. Check urea and electrolytes 30 minutes after each administration of insulin/glucose.

(b) Beta 2 Adrenergic Therapy

Administer 10mg nebulised salbutamol.

Effect observed 15-30 minutes. May not always reduce **serum potassium** and not used as a single agent. Synergistic **serum potassium** lowering effect when used with insulin/glucose above.

Calcium gluconate, Insulin and Beta-2 agonists buy time and can be repeated multiple times while definitive measures are pursued.



3. Stop potassium intake:

Stop potassium supplements and potassium containing drugs. Avoid potassium rich fluids or foodstuffs in diet.

4. Remove potassium from the body:

(a) Use dialysis

Required only in exceptional circumstances where severe hyperkalaemia persists despite appropriate management. Ask senior colleague to consult with renal team.

(b) Use the gut

Calcium polystyrene sulphonate (Calcium Resonium®) orally. Limited efficacy and delayed action (BNF for details)