

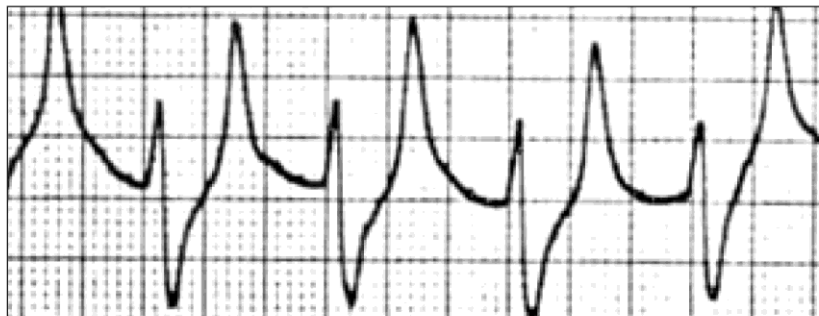
HYPERKALAEMIA • 1/3

RECOGNITION AND ASSESSMENT

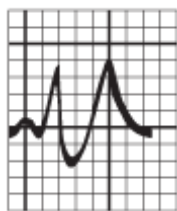
- Plasma potassium >6 mmol/L (normal 3.0–5.5 lithium heparin specimen)
- Babies often tolerate concentrations up to 7.5–8.0 mmol/L without ECG changes

SYMPTOMS AND SIGNS

- Cardiac arrest
- ECG abnormalities (see below):
 - tall peaked T waves
 - widened QRS complex
 - sine waves (widened QRS complex merging with T wave)
 - prolonged PR interval, bradycardia, absent P wave



Tall, peaked T wave, widening of QRS



Sine wave QRS complex (before cardiac arrest)

RISK OF ARRHYTHMIA

- ECG changes as above
- Rapid rise in potassium >7 mmol/L
- Ca^{2+} and Mg^{2+} below normal range
- Oliguria
- Acute kidney injury
- Known cardiac disease

CAUSES

- Renal failure: secondary to hypoxic ischaemic encephalopathy, sepsis and hypotension, or structural abnormalities
- Cellular injury with potassium release e.g. large intraventricular haemorrhage, haemolysis
- Very-low-birth-weight babies without renal failure (non-oliguric hyperkalemia) in first 12–48 hr
- Excess potassium in IV solutions
- Endocrine (congenital adrenal hyperplasia)

INVESTIGATIONS

- Confirm hyperkalemia. Send free-flowing venous or arterial laboratory sample to avoid haemolysed sample. Be guided by capillary gas sample in the meantime
- If potassium >6.0 mmol/L:
 - send Ca^{2+} , Mg^{2+} , Cl^- , glucose and urinalysis to guide treatment and help identify cause
 - commence continuous ECG monitoring and assess for risk of arrhythmia (see above)

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IMMEDIATE TREATMENT

Serum potassium >6.0 mmol/L (stable with normal ECG)

- Stop all sources of potassium including IV solutions (check PN), oral supplements
- Stop all potassium-retaining drugs and potassium-sparing diuretics e.g. spironolactone
- Avoid suxamethonium
- Review and withhold nephrotoxic drugs e.g. gentamicin
- Recheck U&E 4–6 hrly

Serum potassium >7.0 mmol/L without ECG changes

- As above
- Inform consultant
- Give salbutamol 4 microgram/kg IV in glucose 10% over 5–10 min; effect evident within 30 min but sustained benefit may require repeat infusion after at least 2 hr
- Give furosemide 1 mg/kg IV
- If serum potassium still >7.0 mmol/L, give soluble insulin 0.5 units/kg IV in glucose 10% (made up to 2.5 mL and given over 30 min); very effective and has an additive effect with salbutamol
- Repeat U&E 2–3 hrly
- Repeat insulin infusion as necessary until potassium <7.0 mmol/L
- **Monitor blood glucose every 15 min for first 2 hr during and after infusion**
 - aim for blood glucose 4.0–7.0 mmol/L
- Give sodium bicarbonate 1 mmol/kg (2 mL of sodium bicarbonate 4.2% = 1 mmol) if:
 - pH <7.23 or
 - BE more negative than -8 or
 - bicarbonate <14 mmol/L
- Correct other electrolyte abnormalities
- Maintain ionised Ca²⁺ >1 mmol/L

Serum potassium >7.5 mmol/L with ECG changes

- As above, but first institute emergency measures below:
 - give calcium gluconate 10% 0.5 mL/kg IV over 5–10 min
 - flush line with sodium chloride 0.9% or preferably use a different line
 - give sodium bicarbonate (1 mmol/kg IV over 2 min). Effective even in babies who are not acidotic (2 mL of sodium bicarbonate 4.2% = 1 mmol)
- Repeat U&E hourly

Further treatments: discuss with consultant

- A cation-exchange resin, such as calcium resonium (500 mg/kg rectally, with removal by colonic irrigation after 8–12 hr, repeat every 12 hr. Dose can be doubled at least once to 1 g/kg in severe hyperkalaemia). Useful for sustained reduction in serum potassium but takes many hours to act and is best avoided **in sick preterms at risk of necrotising enterocolitis**
- If severe hyperkalaemia persists despite above measures in term babies with otherwise good prognosis, contact renal team for consideration of dialysis
- Exchange transfusion using fresh blood or washed red blood cells is another strategy for sustained and reliable reduction in serum potassium concentration (see **Exchange transfusion** guideline)

SUBSEQUENT MANAGEMENT

- Recheck serum potassium after each intervention or:
 - 4–6 hrly in stable/well baby with potassium <7 mmol/L and no ECG changes
 - 2–3 hrly in unwell baby and/or potassium >7 mmol/L with no ECG changes
 - hourly when arrhythmias or ECG changes present with/without renal failure
- Monitor urine output and maintain good fluid balance
- If urine output <1 mL/kg/hr, unless baby volume depleted, give furosemide 1 mg/kg IV until volume corrected
- Treat any underlying cause (e.g. renal failure)

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Flowchart: Management of hyperkalaemia in neonates

