



PAEDIATRIC ACUTE CARE GUIDELINE

Hyperkalaemia

Scope (Staff):	All Emergency Department Clinicians
Scope (Area):	Emergency Department

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<http://kidshealthwa.com/about/disclaimer/>

Hyperkalaemia

Hyperkalaemia is defined as a serum potassium (K^+) of more than 5.5 mmol/L

Background

- Serum K^+ over 6.5 – 7 mmol/L, especially when associated with ECG changes is **potentially life-threatening**, and should be treated as an emergency
- Cardiac toxicity is enhanced by hypocalcaemia, hyponatraemia or acidosis, and patients with these abnormalities may experience complications at lower potassium levels

General

In children, severe hyperkalaemia may result from:

- drug ingestions (e.g. digoxin, ACE-inhibitors, oral potassium)
- acute renal failure
- massive tissue damage (major trauma or burns, tumour lysis syndrome, haemolysis)
- severe metabolic acidosis
- adrenogenital syndromes

Assessment

- Perform an ECG
- Exclude an erroneous high potassium (pseudo-hyperkalaemia) due to haemolysis during

collection or transport of the specimen

History

Clinical features of hyperkalaemia relate to potassium's effect on cellular membrane polarisation

- Early symptoms include nausea, vomiting and paraesthesia

Examination




Assess for:

- Muscle weakness, progressing to flaccid paralysis and respiratory failure
- Cardiac conduction disturbance, resulting in wide complex tachycardia, ventricular fibrillation and circulatory failure

Investigations

ECG Changes

In acute hyperkalaemia, cardiac conduction disturbance results in ECG changes which correlate roughly with serum K^+ levels.

$K^+ > 6 \text{ mmol/L}$		<ul style="list-style-type: none"> • Tall, symmetrical peaked T-waves
$K^+ > 7.5 \text{ mmol/L}$		<ul style="list-style-type: none"> • PR interval lengthens (1st degree AV block) • Widened QRS (intraventricular block)
$K^+ > 9 \text{ mmol/L}$		<ul style="list-style-type: none"> • Absent P-wave • Pre-arrest, QRS and T-waves merge to form a sine wave

Management

- Hyperkalaemia should be treated when serum K^+ is **over 7 mmol/L**, or at levels lower than this if **ECG changes** are present
- Emergency management of hyperkalaemia should include early consultation with the Paediatric Intensive Care Unit (PICU)

Initial management

Step 1: Protect the myocardium from the effects of hyperkalaemia

- Discontinue any potassium supplement and potassium-containing IV fluids

Calcium	<ul style="list-style-type: none"> Doesn't lower the serum K^+, but is cardioprotective in that it stabilises the myocardium, reducing the risk of arrhythmias Contraindicated in digitalis toxicity and hypercalcaemia Dose can be repeated after 15 minutes if ECG is still abnormal Can be given as either calcium gluconate or calcium chloride 	10% calcium <i>gluconate</i> 0.5mL/kg (maximum 20mL) IV over 2-5 minutes (10% calcium gluconate = 2.2mmol in 10ml) OR 10% calcium <i>chloride</i> 0.2mL/kg (maximum 10mL) IV over 2-5 minutes
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Step 2: Lower the serum potassium level urgently

- Note: All of these methods act by shifting potassium intracellularly, thereby reducing the serum K^+ level. None of these methods actually reduce total body potassium.

Salbutamol	<ul style="list-style-type: none"> Nebulised or intravenous As effective as glucose and insulin Acts within 60 minutes and lasts about 6 hours 	Nebulised: 5 mg (child > 5 years) or 2.5mg (child < 5 years) IV: 5 micrograms/kg/minute for 1 hour, then 1 microgram/kg/min
Glucose	<ul style="list-style-type: none"> Similar onset and duration of effect to salbutamol Patients endogenous insulin drives potassium intracellularly 	10% glucose at 2mL/kg slow IV bolus then commence 10% glucose + 0.9% saline infusion at maintenance rate
Insulin	<ul style="list-style-type: none"> Discuss with a senior doctor before commencing Insulin is only to be given once the glucose infusion has commenced Onset of action 15 minutes Monitor glucose every 30-60 minutes 	Insulin short acting infusion at 0.1units/kg/hr Make up 50 units of Actrapid or Humulin R in 50mL 0.9% saline (1unit/mL). Prime line with 20mL of solution before commencing the infusion.
Sodium bicarbonate	<ul style="list-style-type: none"> Discuss with Emergency Department Senior Doctor or PICU prior to use Not routine, but can be used in emergency even in the absence of metabolic acidosis Do not administer via same line as calcium Contraindicated in alkalosis, hypernatraemia Any hypocalcaemia must first be corrected 	Infuse at 1 mmol/kg intravenous over 30 minutes

Frusemide	Consider (in consultation with PICU)	1mg/kg (IV)
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Step 3: Promote elimination of potassium from the body

Sodium polystyrene sulphonate (Kayexelate / Resonium)	<ul style="list-style-type: none"> Cease Resonium treatment when the serum potassium is less than 5 mmol/L (to avoid hypokalaemia) 	Oral dose: 0.5 - 1g/kg (max 60g daily). Administer in a small volume of water or lactulose Rectal dose: 0.5 - 1 g/kg (max 30g daily). To administer, mix each 1g of resin with 5mL of water or 10% dextrose. Irrigate the colon after 8 to 12 hours to remove the resin.
Dialysis	Peritoneal dialysis or haemodialysis	

Nursing

- Continuous ECG monitoring is required due to the risk of lethal dysrhythmias

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