NHS Grampian Staff Guideline for the Management of Acute Hyperkalaemia In Adults

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<th>Co-ordinators:</th>
<th>Consultation Group:</th>
<th>Approver:</th>
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<tbody>
<tr>
<td>Senior Medicines Information Pharmacist</td>
<td>See Page 7</td>
<td>Medicine Guidelines and Policies Group</td>
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Executive Sign-Off
This document has been endorsed by the Director of Pharmacy and Medicines Management

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Lead Author/Co-ordinator: Medicines Information Pharmacist

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Responsibilities for implementation:

Organisational: Chief Executive and Management Teams
Corporate: Senior Managers
Departmental: Heads of Service/Clinical Leads
Area: Line Managers
Hospital/Interface services: Assistant General Managers and Group Clinical Directors
Operational Management Unit: Unit Operational Managers

Policy statement: It is the responsibility of all staff to ensure that they are working to the most up to date and relevant policies, protocols procedures.

Review: This policy will be reviewed in three years or sooner if current treatment recommendations change.
Responsibilities for review of this document: Lead Author/Co-ordinator

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Revision History:

<table>
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<tr>
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<th>Changes Marked* (Identify page numbers and section heading)</th>
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* Changes marked should detail the section(s) of the document that have been amended, i.e. page number and section heading.
NHS Grampian Staff Guideline for the Management of Acute Hyperkalaemia in Adults

Definition

This guideline is for use by healthcare professionals within primary or secondary care in NHS Grampian. Intravenous treatment should only occur in an acute setting.

The NHS Grampian reference range for serum potassium in patients over 16 years of age is 3.5 – 5.3mmol/L.

Table 1 – Serum Potassium Classification

<table>
<thead>
<tr>
<th>Mild hyperkalaemia:</th>
<th>Moderate hyperkalaemia:</th>
<th>Severe hyperkalaemia:</th>
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<tr>
<td>5.4-6.0mmol/L</td>
<td>6.1-6.5mmol/L</td>
<td>&gt;6.5mmol/L or &gt;6.0mmol/L and ECG changes present</td>
</tr>
<tr>
<td>(Routine review required)</td>
<td>(Urgent review or treatment required)</td>
<td>(Potentially life threatening. Emergency treatment required)</td>
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Causes of Hyperkalaemia

The following list is not exhaustive:

- Acute kidney injury
- Chronic kidney disease
- Haemolysis
- Heart failure
- Rhabdomyolysis
- Metabolic acidosis
- Addison's disease
- Massive blood transfusion
- Burns
- Medications (e.g. Angiotensin Converting Enzyme inhibitors, Angiotensin II Receptor Antagonists, Non Steroidal Anti-inflammatory Drugs, potassium sparing diuretics [e.g. spironolactone], heparin, co-trimoxazole, potassium supplements, beta blockers, trimethoprim)
- Diabetic ketoacidosis (DKA) - Caution, during treatment of DKA life threatening hypokalaemia may develop
- Digitalis toxicity
- Use of salt substitutes/diet
- Acute tumour lysis
- Constipation
Many patients, particularly those who are elderly, may have more than one risk factor for the development of hyperkalaemia.

**Signs and Symptoms of Hyperkalaemia**

Symptoms may include:

- ECG abnormalities (see below) *requires urgent treatment*
- Fast irregular pulse
- Chest pain
- Muscle weakness and paralysis
- Muscle cramps
- Fatigue and malaise
- Palpitations
- Cardiac arrest
- Light-headedness
- Nausea/vomiting
- Diarrhoea
- Abdominal pain
- Myalgia

**ECG abnormalities**

- Peaked T waves
- Prolongation of PR interval
- Loss of (or small) P waves
- QRS widening
- Eventual merger of QRS complex with the T wave
- Ventricular arrhythmias
- Asystole

**Management and Monitoring**

See flowchart on **Page 4**, information below and information on individual drugs on **Page 5** and **6**.

**Exclude pseudohyperkalaemia**

If the patient is well, and has none of the above signs and symptoms, repeat the test urgently as it may not be a true level.

Possible causes of pseudohyperkalaemia:

- Haemolysis
- Delayed analysis
- Issues during venepuncture (prolonged tourniquet use, small needle calibre, excessive fist clenching, excessive plunger force to draw blood into syringe)
- Thrombocytosis
- Leukocytosis
Medication

Discontinue or reduce the dose of medications known to cause hyperkalaemia (see Causes, Page 1).

Monitoring

If ECG changes have been identified, or if serum potassium is greater than 6.5mmol/L irrespective of ECG changes, begin continuous ECG monitoring.

Visible bedside monitoring should be in place before administration of intravenous calcium gluconate.

Measure serum potassium level 2-4 hourly post treatment until stable, to ensure adequate treatment and detect any ‘rebound’ rise in potassium requiring further treatment.
Hyperkalaemia (serum potassium ≥ 5.4 mmol/L)

Airway Breathing Circulation Disability Exposure (ABCDE) approach
Seek advice from seniors if A, B or C compromised

Mild
5.4-6.0mmol/L

Consider and address causes

Moderate
6.1-6.5mmol/L

12 lead ECG
Ensure ECG monitoring in place if ‘Moderate hyperkalaemia’ with ECG changes or ‘Severe hyperkalaemia’

Severe
>6.5mmol/L

Get senior assistance and treat as emergency

Acute ECG changes present?

Yes

Get senior assistance and treat as emergency

Calcium gluconate injection 10% w/v
To protect heart

Insulin-glucose intravenous infusion
For intracellular potassium shift

INSULIN-GLUCOSE
If prescribing insulin-glucose infusion, monitor capillary blood glucose at:
- Baseline
- 15 minutes
- 30 minutes
- 60 minutes
- 90 minutes
- 120 minutes
- Then hourly for up to 6 hours post dose

Using NHS Grampian Blood Glucose Monitoring

No

Consider calcium resonium
To remove potassium

Consider causes and address to prevent occurrence
Senior review may be necessary

Monitor serum potassium 2-4 hourly until stable

Nebulised salbutamol
For intracellular potassium

Consider dialysis
Refer to Renal team
(E.g. CKD or serum potassium >6.5mmol/L despite medical treatment)

Refer to Renal team
(E.g. CKD or serum potassium >6.5mmol/L despite medical treatment)
Dosage and Administration

**Calcium gluconate injection 10% w/v**
- Function: protect the heart
- **NB:** does not lower potassium
- Ensure visible bedside ECG and blood pressure monitoring are in place
- **Dose:** Administer 10mL calcium gluconate 10% w/v injection intravenously
- Use a large vein. Central administration is preferred if immediately available.
- Give over 5-10 minutes
- Give as an infusion over 20-30 minutes in patients on **digoxin** (e.g. dilute 10mL 10% calcium gluconate injection to 100mL in sodium chloride 0.9% or glucose 5%)
- Flush with sodium chloride 0.9% or glucose 5%
- Onset of action: 1-3 minutes
- Can repeat dose at 5-10 minute intervals until ECG features of hyperkalaemia have normalised. Some patients require up to 50mL of calcium gluconate 10% w/v.
- Duration of action: 30-60 minutes
- Contraindications: hypercalcaemia
- Caution: May potentiate arrhythmias in digoxin toxicity
- Extravasation can cause tissue necrosis

**Soluble insulin-glucose intravenous infusion**
- Function: move potassium into cells
- **Dose:** 10 units soluble insulin in 50 mL 50% glucose over 15 minutes
- Soluble insulin: e.g. Actrapid
- Use a large vein. Central administration is preferred if immediately available.
- Monitor patient for hypoglycaemia as per the instruction box in the flowchart on page 4, for up to 6 hours post dose
- Onset of action: 15-30 minutes
- Duration of action: 4-6 hours
- Peak action: 30-60 minutes
- Caution: Patients with End Stage Renal Disease (ESRD) are more susceptible to hypoglycaemia due to decreased excretion of insulin
- Serum potassium may fall by up to 1 mmol/L
- Increased effectiveness if given with nebulised salbutamol

**Nebulised salbutamol**
- Function: move potassium into cells
- **Dose:** 10-20mg via nebuliser. Caution: Cardiovascular disease. High doses can precipitate arrhythmias, use 10mg if history of Ischaemic Heart Disease
- Onset of action: within 30 minutes
- Duration of action: up to 2 hours
- Avoid if tachyarrhythmia present
- Some patients may not respond to nebulised salbutamol treatment
- Serum potassium may fall by 0.5-1 mmol/L
- May be ineffective in up to 40% of patients with ESRD
Calcium resonium powder

- Function: remove potassium from body
- **Dose:** 15g made into a paste using a small amount of water and given orally four times daily OR 30g resin in 150mL of water or 10% dextrose given rectally as a retention enema twice daily
- Oral route is preferable
- Not appropriate for emergency treatment
- Onset: slow and variable, hours to days
- Contraindications: bowel obstruction
- Administer calcium resonium at least 3 hours before or 3 hours after other oral medications. For patients with gastroparesis, a 6-hour separation should be considered
- Consider risk of bowel obstruction and perforation
- **Oral use:** consider co-prescribing a laxative
- **Rectal use:** enema should be retained for at least 9 hours then colon irrigated with water by medical staff to remove resin as per SmPC.

References


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