Dear Colleague

This letter authorises the extended use of the following Guidance until 1st August 2022:

**NHS Grampian Staff Guideline for the Management of Acute Hyperkalaemia in Adults**
**Version 1**

This guidance is currently under review. The guidance has been extended for use until the review is complete. This letter provides permission to continue using the guidance to a new expiry date of 1st August 2022.

If you have any queries regarding this please do not hesitate to contact the Pharmacy and Medicines Directorate.

Yours sincerely

Lesley Coyle
Chair Medicines Guidelines and Policies Group
# NHS Grampian Staff Guideline for the Management of Acute Hyperkalaemia In Adults

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<thead>
<tr>
<th>Co-ordinators:</th>
<th>Consultation Group:</th>
<th>Approver:</th>
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<tbody>
<tr>
<td>Senior Medicines</td>
<td>See Page 7</td>
<td>Medicine Guidelines and Policies Group</td>
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<td>Information Pharmacist</td>
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<tr>
<th>Identifier:</th>
<th>Review Date:</th>
<th>Date Approved:</th>
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<tbody>
<tr>
<td>NHSG_Guid_Hyperkal/MGPG980</td>
<td>December 2018</td>
<td>December 2021</td>
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Uncontrolled when printed  
Version 1

**Executive Sign-Off**

This document has been endorsed by the Director of Pharmacy and Medicines Management

Signature: ________________________________
Title: NHS Grampian Staff Guideline for the Management of Acute Hyperkalaemia In Adults

Unique Identifier: NHSG_Guid_Hyperkal_MGPG980

Replaces: N/A

Across NHS Boards | Organisation Wide | Directorate | Clinical Service | Sub Department Area
---|---|---|---|---

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Lead Author/Co-ordinator: Medicines Information Pharmacist

Subject (as per document registration categories): Clinical Guideline

Key word(s): Guideline, acute, hyperkalaemia, potassium

Process Document: Policy, Protocol, Procedure or Guideline

Document application: NHS Grampian

Purpose/description: To guide the management of hyperkalaemia in adults in Grampian

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
This document is also available in large print and other formats and languages, upon request. Please call NHS Grampian Corporate Communications on (01224) 551116 or (01224) 552245.

Responsibilities for review of this document: Lead Author/Co-ordinator

Responsibilities for ensuring registration of this document on the NHS Grampian Information/ Document Silo: Pharmacy and Medicines Directorate

Physical location of the original of this document: Pharmacy and Medicines Directorate

Job/group title of those who have control over this document: Medicine Information Pharmacist

Responsibilities for disseminating document as per distribution list: Medicine Information Pharmacist

Revision History:

<table>
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<tr>
<th>Revision Date</th>
<th>Previous Revision Date</th>
<th>Summary of Changes (Descriptive summary of the changes made)</th>
<th>Changes Marked* (Identify page numbers and section heading)</th>
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<tr>
<td>N/A</td>
<td>New Guideline</td>
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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</td>
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<tr>
<td>(Routine review required)</td>
<td>(Urgent review or treatment required)</td>
<td>or &gt;6.0mmol/L and ECG changes present</td>
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<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

No

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

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

Monitor serum potassium 2-4 hourly until stable

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

Calcium gluconate injection 10% w/v
To protect heart

Nebulised salbutamol
For intracellular potassium

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

Monitor serum potassium 2-4 hourly until stable

Consider dialysis
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


Consultation Group

Brian Porteus (Renal Pharmacist)
Charity Shonge (Endocrine Pharmacist)
Craig Rore (Lead Medicines Information Pharmacist)
Dr Adelle Dason (Consultant)
Dr Andrew Clarkin (Consultant)
Dr Andrew Hannah (Consultant)
Dr Andrew Stewart (Consultant)
Dr Awsan Noman (Consultant)
Dr Carol Brunton (Consultant)
Dr Christopher Skinner (Consultant)
Dr Ciprian Dospinescu (Consultant)
Dr Dana Dawson (Consultant)
Dr Dana Kidder (Consultant)
Dr David Walbaum (Consultant)
Dr Deepak Garg (Consultant)
Dr Duncan Hogg (Consultant)
Dr Gordon Christie (Consultant)
Dr Ian Scott (Consultant)
Dr Izhar Khan (Consultant)
Dr James MacBrayne (Consultant)
Dr James Smith (Consultant)
Dr Jonathan Affolter (Consultant)
Dr Kevin Sim (Consultant)
Dr Kim Milne (Consultant)
Dr Lee Allen (Consultant)
Dr Nicola Ryan (Consultant)
Dr Paul Broadhurst (Consultant)
Dr Paul Gamble (Consultant)
Dr Paul Holder (Consultant)
Dr Sharon Burns (Consultant)
Dr Shona Methven (Consultant)
Dr Stephen Friar (Consultant)
Dr Susan McGeoch (Consultant)
Janet Hasell (ITU Pharmacist)
Lynne Davidson (Cardiology Pharmacist)
Ruth Wright (Unscheduled Care Pharmacist)