Referral Support Service

Renal

R05

Hyperkalaemia in adult patients in the community

Definition

Normal range for serum potassium	3.5 – 5.3 mmol/L
Mild **hyperkalaemia**	5.4 – 5.9
Moderate **hyperkalaemia**	6.0 – 6.4
Severe **hyperkalaemia**	≥6.5

This scale of severity is arbitrary and serves only as a guide - the severity is actually dependent on the impact on the patient.

Laboratory staff may telephone a high potassium result through to primary care. This does not automatically mean patients require admission to hospital (see guidance below). The clinical urgency of the situation is mainly dependent on three factors: **The severity of the hyperkalaemia** and the **rate of change in potassium** and **any change in serum creatinine/eGFR.** Rapid rises in potassium or significantly impaired renal function increase the likelihood of the need for hospital admission.

Significant changes are:

a sudden (within 1 week) rise in potassium
a >10% increase in serum creatinine or >10% decrease in eGFR

Why is the potassium elevated?
If the potassium is elevated in the presence of either normal kidney function or stable chronic kidney disease, consider the following explanations for a high potassium:

- **Spurious hyperkalaemia**

1. Haemolysis

The laboratory will not report a K+ result if the sample is grossly haemolysed (K+ result will appear as NA with a comment stating haemolysed sample). The laboratory will report a numerical K+ result along with a cautionary comment if a sample is slightly haemolysed. At this level of haemolysis, the contribution to K+ measured in serum will be very small (~0.2 mmol/L). Haemolysis has various causes e.g. difficult sample collection, shaking of the tube etc.

2. EDTA contamination

Collection of blood samples in reverse traffic light order, i.e., green topped tube first, then amber, lastly red, prevents EDTA contamination of the sample. Gross EDTA contamination is usually detected within the laboratory and the K+ result will be reported as NA with an appropriate comment.

3. Delay in centrifugation / receipt in lab
   If there has been a delay in processing the sample, K+ will move from the red blood cells into the serum and contribute to high K+ results. This effect is more pronounced at low temperatures and so there is increased incidence in winter. Serum samples for K+ should NEVER be refrigerated. It is useful for the labs to have the time the sample was taken written on the blood bottle and request form, to help detect when this effect may have occurred. The laboratory will usually comment on reports if they consider a delay in receipt many have contributed to high K+.
4. Abnormally high Red cell count / White cell count / Platelet count
   Patients with abnormally high red cell, white cell or platelet counts may have spurious hyperkalaemia. A repeat blood test should be obtained in a lithium heparin tube obtained and taken at the hospital phlebotomy service to remove any transport effects. Please contact the Duty Biochemist to discuss.

5. Secondary to a metabolic acidosis – serum bicarbonate is automatically added on to all potassium results greater than 6.0mmol/L in York and Scarborough hospitals.

- **Causes of genuinely raised serum potassium**

1. Medications – see below
2. Abnormal kidney function:
   - Acute Kidney Injury
   - Chronic Kidney Disease (usually stage 4/5)
3. Other causes
   - Increased intake – very unusual, except in dialysis patients
   - Redistribution
     - Diabetic ketoacidosis (before treatment)
     - Severe metabolic acidosis
     - Diabetic nephropathy (patients with longstanding diabetes and moderate renal impairment)
     - Trauma/burns
     - Rhabdomyolysis and/or tumour lysis syndrome
   - Decreased excretion
     - Hypoadrenalism/Mineralocorticoid deficiency

Medications

- ACE inhibitors
- Angiotensin-2 receptor antagonists
- Aldosterone antagonists e.g. spironolactone/eplerenone
- Potassium supplements
- Potassium sparing diuretics
- NSAIDS
- Trimethoprim
- Heparin
- Ciclosporin
- Tacrolimus
- Ketoconazole
- Theophylline
- Digoxin
- Dietary eg LoSalt
- Herbal remedies

This list is not exhaustive but covers the majority of commonly implicated substances. When reviewing medication, consider the indication for it and the potential consequences of stopping it.

Arrangements for reporting raised potassium results

Duty Biochemist (9am-5pm) 01904 726366 or via 01904 726802, via switchboard out of hours

Working day 9-5

The duty biochemist will review all potassium results >5.8mmol/L Results >6.5mmol/L are always phoned through to the GP surgery. Results <6.5mmol/L may be rung through to the GP surgery, at the discretion of the biochemist.

Out of hours

All potassium results >6.5 are actioned immediately by the laboratory staff and usually are telephoned to the Out Of Hours (OOH) GP Service. Results between 5.8 and 6.5mmol/L will be reviewed by the duty biochemist at 9am the next morning. Results may be telephoned through to the GP in the morning, at their discretion.

Clinical features of hyperkalaemia

Symptoms	Signs	Examination required
Muscle weakness Fatigue Otherwise unexplained breathlessness Muscular paralysis Palpitations Chest pain	Bradycardia (secondary to heart block) Tachypnoea (from respiratory muscle weakness) Muscle weakness and flaccid paralysis Depressed/absent tendon reflexes	Temperature Pulse Blood pressure Respiratory rate If Pulse <50 or >100 and/or RR >16 arrange hospital assessment

Do not offer patients with hyperkalaemia dietary advice. Except in end stage kidney disease, dietary restriction is rarely appropriate in the management of high potassium and may lead to inappropriate restriction of healthy food choices when diet is rarely the cause of the hyperkalaemia. It is important in End Stage Kidney Disease and these patients should be supervised by a renal dietitian, who can both identify potential sources of high potassium foods and ensure that nutritional needs are met.

Do not prescribe calcium resonium. It has no place in the acute or long-term management of hyperkalaemia. Other oral potassium exchange agents that have been approved by NICE (Patiromer and Zirconium) have a very specific role in long term management and are usually initiated in secondary care.

This guideline is a summary of an 11-page York and Scarborough Hospital document published here in April 2021

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Management of abnormal Potassium levels

1. Check if the result is spurious
2. Consider causes of hyperkalaemia

Potassium 5.4 – 5.9mmol/L

Action A)
If eGFR has not decreased by >10% AND
The rise in K+ is not recent (within 1 week) THEN
Review the patient's medications and consider any possible changes to be made
Repeat U&E within 1 week

Action B)
If eGFR has decreased by > 10% OR
The rise in K+ is recent (within 1 week) THEN
Review potential causes and repeat U&E within 48 hours
Consider discussion with a Renal Physician if not improving
01904 631313 (York hospital switchboard or bed manager bleep 998
The majority of these patients do not need emergency admission.

Potassium 6.0 – 6.4mmol/L (May have been rung through urgently or next morning)

Assess for the presence of "high risk" features

1) Any ECG changes – peaked T waves, widened QRS complex, absent P wave, sine wave
2) K+ >6.0mmol/l and any of the following
    - Fall in eGFR > 10ml/min or by >25% since last test AND / OR
    - Acute Kidney Injury (AKI) alert AND / OR
    - Bicarbonate ≤ 15mmol/L AND / OR
    - new eGFR <45 ml/min

Action A)
If high risk features – arrange emergency assessment via ED

Action B)

- If no high-risk features are present and potassium result is believed to be genuine, contact the patient and **assess them**
- Review the medication, consider if any drugs could be stopped safely
- Repeat U&E within 24 to 48 hours, depending on clinical context (as per this document)

Potassium ≥ 6.5 (Result will have rung through urgently)

If the potassium result is believed to be genuine, this is high risk hyperkalaemia.
Contact the patient and arrange repeat potassium and ECG as emergency via ED