

HYPERKALAEMIA PATHAWAY

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Scope:	All trust employees.	
Document Approval, History/Changes	Changes since version 1.0: -Additions made to algorithm (10 units of insulin to 250mls Glucose 10% given over 30 mins. -Sodium zirconium cyclosilicate 10g STAT + TDS For further information contact the Governance Department on Tel: [REDACTED]	

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1. Introduction

Hyperkalaemia is defined as a K⁺ value higher than 5.5mmol/L. It is further classified as:

- Mild – 5.5-5.9 mmol/L
- Moderate – 6.0-6.4 mmol/L
- Severe – 6.5 mmol/L or greater

All patients presenting with hyperkalaemia should undergo a full medical and drug history and clinical examination to identify risk factors for and determine the cause of hyperkalaemia. Symptoms may be non-specific or absent, muscle weakness and/ or paraesthesia may occur in severe cases. If known dialysis patient contact renal team urgently

Potassium is essential for the body's normal function, including maintenance of normal heart rhythm. Hyperkalaemia is a potentially life-threatening emergency which can be managed with the appropriate treatment. Hyperkalaemia can lead to cardiac arrest and arrhythmias. The symptoms of hyperkalaemia include fatigue, nausea, muscle pains or cramps, shortness of breath and chest pain (although many of the patients can be asymptomatic).

Hyperkalaemia occurs when the extracellular potassium ion [K⁺] concentration is above the normal value. This can be caused by acute and chronic renal failure, glomerulonephritis, lupus nephritis, kidney transplant rejection, obstructive diseases of the urinary tract, such as urolithiasis (stones in the urinary tract), Addison's disease (adrenal insufficiency), dehydration, destruction of red blood cells due to severe injury or burns, type 1 diabetes mellitus and excessive use of potassium supplements or other medications known to cause hyperkalaemia.

The purpose of the guideline is to improve the management of acute hyperkalaemia and reduce the risk of complications associated with hyperkalaemia and its treatment.

It is important to escalate to the SMART team all patients with known or suspected hyperkalaemia. Patients must undergo an urgent assessment by SMART Team (Bleep 2216) and medical staff to assess clinical status using ABCDE approach, NEWS2 and an appropriate escalation plan.

2. Monitoring during hyperkalaemia

All patients with mild, moderate or severe hyperkalaemia will need an urgent 12-lead ECG.

Patients with moderate or severe hyperkalaemia need continuous cardiac monitoring and IV access. If symptomatic or hyperkalaemia is not resolving with the initial management, seek advice from the intensive care team and consider admission to high dependency unit.

The risk of arrhythmias is highest when there are sudden increases in potassium levels. An ECG will identify conduction disturbance:

- Peaked T wave (early)
- Prolonged PR, flattening of P wave, widening of QRS (increased risk of arrhythmia)
- Absence of P wave, sine wave (fusion of QRS and T wave)
- Ventricular arrhythmia, asystole

When treating hyperkalaemia it is important to monitor serum potassium. Serum potassium should be measured at the following times after identification and initiation of treatment of hyperkalaemia: 1hr, 2hr, 4hr, 6hr and 24hrs, to be documented on pathway, (providing they are responding to the treatment)

3. Treatment

Step 1 Protect the Heart

Administer 10 ml of 10% Calcium Chloride or 30 ml of 10% Calcium Gluconate intravenously over 5 minutes for patients with ECG changes (peaked T waves, flat/absent P waves, broad QRS, sine-wave pattern, bradycardia, cardiac arrhythmias)
Repeat ECG, consider further dose in 5 mins if changes persist

If a patient has moderate or severe hyperkalaemia with acute ECG changes, give calcium Chloride or Calcium gluconate. This is to ensure cardiac protection from the effects of hyperkalaemia; it does not reduce the potassium level. Ensure patient has ECG monitoring during administration of calcium gluconate. (2.2-4.4mmol Ca²⁺)

For administration of 10% calcium infusion consider a central line, however large peripheral venous lines may also be used.

Step 2 Shift potassium into Cells

Insulin-Glucose infusion

If a patient has moderate to severe hyperkalaemia without acute ECG changes add 10 units soluble insulin (usually Actrapid) to 250ml 10% glucose IV and infuse over 30 min. Alternatively 10 units of soluble insulin in 50ml 50% glucose IV over 15 min may be given if the patient is overloaded.

For administration of 50% glucose consider a central line, however large peripheral venous lines may also be used.

Repeat every 2 hours until K⁺ less than 5.5mmol/L for at least 4hrs.

Salbutamol (helps shift K⁺ into cells)

If a patient has moderate to severe hyperkalaemia without acute ECG changes administer salbutamol 5mg via nebuliser (10-20mg can be given back to back). Ensure heart rate stays less than 120 bpm.

Sodium bicarbonate (help shift K⁺ into cells)

If a patient has moderate to severe hyperkalaemia without acute ECG changes administer IV sodium bicarbonate 1.26% 500ml over 4hours if serum bicarbonate less than 20mmol/L and not volume overloaded.

Step 3 Remove potassium from the body- potassium binders.

1. Sodium Zirconium Cyclosilicate 10g TDS. Stop once potassium <5.3mmol/L. Maximum of 72 hours.
OR
2. Patiromer 8.4g orally stat then once daily. Stop once potassium <5.3mmol/L
OR
3. Calcium (or sodium) resonium 15g TDS PO or 30g OD PR only if oral route

unavailable to be retained > 6 hours. Stop once potassium < 5.3mmol/L. Maximum of 72hours. Sodium Resonium 30g qds can be used in patients with hypercalcaemia. Wean once potassium levels normalised.

Step 4 Monitor and prevent reoccurrence.

Monitor U&E`s daily until these agents are discontinued.

Consider Causes

Consider drug related cause of hyperkalaemia. These can include: angiotensin converting enzyme inhibitor (ACE inhibitors e.g. perindopril), angiotensin receptor blockers (ARBs e.g. losartan), trimethoprim, K⁺ sparing diuretics e.g. spironolactone, nonsteroidal anti-inflammatory drugs (NSAIDS e.g. ibuprofen). This list is not exhaustive. Contact a pharmacist to review the patient's prescription for causative agents if required.

Contact Dietician for low potassium diet advice.

If serum bicarbonate low (<22mmol/L consider adding oral bicarbonate starting at 500mg TDS. IV sodium bicarbonate is not routinely recommended for treatment of hyperkalaemia outside of cardiac arrest situation (see ALS guidance on hyperkalaemia in cardiac arrest) it can be considered in non-arrest situation this should be discussed with senior clinician.

4. References

- NICE TA623. Patiromer for treating hyperkalemia. February 2020.
- NICE TA599. Sodium zirconium cyclosilicate for treating hyperkalaemia. September 2019.
- Summary of Product Characteristics. Veltassa (Patiromer) 8.4 g powder for oral suspension. Vifor Fresenius Medical Care Renal Pharma UK Ltd. Date of revision of text 11/2020. Accessed via www.medicines.org.uk (24/03/2021)
- Summary of Product Characteristics. Lokelma 10 g powder for oral suspension. AstraZeneca UK Limited. Date of revision of text 22/01/2021. Accessed via www.medicines.org.uk (24/03/2021)

IMMEDIATE MANAGEMENT		TIME
Airway Breathing Circulation Disability Exposure (ABCDE) Approach Seek expert help if airway, breathing or circulation compromised Obtain IV access X 2 (If using 50% glucose or 10% calcium infusions consider central line) Assess Fluid status and Resuscitate or Replace fluid loss		0 – 30 MINS
Exclude Pseudo-Hyperkalaemia if required. This shouldn't delay treatment Repeat U&E using lithium heparin anti-coagulated sample container Check Venous or Arterial Blood Gas for prompt K ⁺ result		Check & document Early Warning Score Start Treatment Cardiac Monitor If unwell, K ⁺ 6.5 mmol/L or acute ECG changes present
Perform 12 Lead ECG		
SEVERITY BASED MANAGEMENT		Within 60 MINS
		IF NOT IN PULMONARY OEDEMA Start 10% Dextrose infusion at 25 - 50 ml/hr [Adjust to blood sugars] AND Start an infusion of soluble insulin (usually actrapid), 50 units in 50ml 0.9% sodium chloride, starting at 1ml/hr (2ml/hr if patient has diabetes) Until Se. K < 5.5 for 4 hours Insulin Regimen <u>Cap. Blood Glucose</u> < 4: Reduce by 0.5ml/h Treat hypoglycaemia <u>Cap. Blood Glucose</u> 4-11: Continue rate <u>Cap. Blood Glucose</u> > 11: Increase by 0.5ml/h Monitor every 30min if any change in rate, otherwise hourly Dialysis If there is poor response to medical therapy discuss with Renal / Critical care urgently Other than chronic dialysis patients, any one with the likelihood of requiring dialysis to have an urgent Hep B, C and HIV serology
Protect the Heart Shift K⁺ into cells		
Remove/Block K⁺ from body		ONGOING Serum Potassium should be measured at the following times after identification and initiation of treatment of hyperkalaemia 1hr 2hr 4hr 6hr 24hr
Monitor & avoid cause		
Monitor serum K⁺ and blood glucose as suggested. Continue to correct acidosis with PO sodium bicarbonate titrated up from 500 mg tds Consider cause of hyperkalaemia, prevent further rise and recurrence Stop medications that can cause hyperkalaemia such as ACE-I, ARB, Aliskiren, Trimethoprim, K sparing diuretics & Spironolactone. Commence on a potassium restricted diet and consider dietician input Complete AKI Bundle		