The Royal Wolverhampton NHS Trust

GDL11
Treatment of Hyperkalaemia in Adults

1.0 Procedure Statement (Purpose / Objectives of the Procedure)
The purpose of this policy is to provide clear guidance for all health professionals for the treatment of Adult Hyperkalaemia.

2.0 Accountabilities
The renal directorate is the owner of this policy.

Professional leads and managers of medical, nursing, midwives, pharmacy and allied healthcare professionals are accountable for distributing this policy to all relevant staff within their spheres of responsibility.

All relevant healthcare staff are accountable for their own compliance with the policy, and for reporting any incidents of non-compliance (whether this has had an adverse effect or not).

3.0 Procedure Detail / Actions
See below table on page 2 for details.

The Royal Wolverhampton NHS Trust

HYPERKALAEMIA (plasma K^+ >6 mmol/L)

Symptoms and signs

Frequently none, or non-specific neuromuscular symptoms
Muscular weakness may occur if blood K >7.0 mmol/L
Cardiac arrest without warning
ECG changes (see **Treatment**)

Common causes

1. Artefact: release from blood cells (e.g. during clotting, blood dyscrasias, haemolysis, delayed centrifugation of sample for >2 hr)
2. Low-molecular-weight heparin
3. Failure of excretion: renal failure, mineralocorticoid deficiency, drugs e.g. spironolactone, amiloride, ACE inhibitors (~prils), angiotensin II blockers (~sartans), aliskiren, NSAIDs, cyclosporin
4. Release from cell: severe tissue damage, acidosis (consider DKA, lactic acidosis)
5. Excess ingestion or supplementation

Investigations

1. Serum samples are used routinely but are less accurate for true potassium concentration as K^+ is released from cells during clotting: Repeat K^+ (U&E) on **plasma sample** (using a Lithium Heparin 4ml Green Tube). Management should depend on **plasma K^+**
2. Glucose, FBC
3. HCO_3^-, in venous blood (or from blood gases, if indicated for other reasons) and lactate
4. ECG **(cardiac monitoring if ECG changes, or if plasma K^+ ≥7.0 mmol/L)**
5. Monitor urine output [use urimeter (urinary catheter + graduated collector system)] + accurate recording
6. If cause not obvious, take blood for cortisol

Treatments

Plasma K^+ 6.1-6.4 mmol/L	Plasma K^+ 6.5-6.9 mmol/L	Plasma K^+ ≥7.0 mmol/L	**ECG changes override plasma K^+**
and	**or**	**and**	
ECG – No K^+-related changes	ECG – Peaked T, small P	ECG – Peaked T, small P or K^+-related changes	ECG – Absent P, wide QRS, blurring ST into T, or VT

Monitor Plasma K^+, identify and correct cause. Commence low K^+ diet, stop/switch K^+ sparing diuretic to loop/thiazide

1. Give soluble insulin 10 units in 50 mL glucose 50% IV over 90 min - through a large peripheral vein or if access poor give via central line
2. Followed by glucose 10% 1L IV over 12 hrs. Do not administer insulin unless glucose >10 mmol/L (except for appropriate treatment in diabetic patients)
3. Nebulized salbutamol 10-20mg (never use as monotherapy)

First-line treatment:
30mL of 10% Calcium Gluconate - To be administered by slow intravenous injection of the whole dose over 10 minutes. Monitor for extravasation. Repeat if necessary, until K^+ is corrected (**see below for further information**).

1. Give glucose and insulin, nebulized salbutamol (see green box)
2. If persistent **hyperkalaemia, AKI or CKD** (poor urine output, rising creatinine or acidosis) **refer to renal team**
3. Consider use of bicarbonate. (If pH<7.1, give 250mL 1.26% sodium bicarbonate)
4. If continuing K^+ retention and dialysis unavailable for next few hours, start oral Sodium Zirconium 10g TDS for the first 72 hrs, then 5g once a day. If unavailable, then start oral Calcium Resonium 15g in water (not fruit juice) 6 hourly or 30g rectally in methylcellulose

Monitoring treatment

Monitor plasma U&E and glucose 2-hrly until K^+ stable and <6.0 mmol/L
Attend to underlying cause (e.g. drugs); if creatinine raised, refer to renal team.

GDL

Insulin/glucose or intravenous calcium do not cause excretion of excess total body K^+. Use only as temporary measures until underlying cause can be treated.

Further information:

Calcium Gluconate should show an effect on ECG abnormalities within 3 minutes of administration. The dose should be repeated if there is no effect within 5-10 minutes. The duration of action is only 30-60 minutes, so further doses may be necessary if hyperkalaemia remains uncontrolled. As IV calcium does not lower serum potassium, other interventions are urgently required.

First-line treatment is **30mL** of 10% Calcium Gluconate. If not available, **10mL** of 10% Calcium Chloride may be used.

30ml of Calcium Gluconate 10% provides **6.8mmol of Calcium** (equivalent to **10ml of Calcium Chloride 10%**).

Advice for clinicians:

1. Clinicians must ensure they administer 30mL of 10% calcium gluconate, a lower dose may lead to an inadequate response.
2. 12-lead ECG must be repeated after administration to assess response. Look for a narrowing of the QRS complex, reduction in T wave amplitude, increase in heart rate if bradycardic or reversal of arrhythmia.
3. IV Calcium can cause bradycardia but it remains indicated and may be live-saving in hyperkalaemia induced bradycardia.
4. The relatively short duration of action of IV calcium (30-60 minutes) should be considered in patients with prolonged hyperkalaemia. Repeat ECG and consider a further dose if patient remains hyperkalaemic.
5. IV calcium is essential when emergency dialysis is planned or being initiated for severe hyperkalaemia.
6. For further support, **escalate to either the renal or critical care outreach teams.**

4.0 Equipment Required

N/A.

5.0 Training

No specific training required.

6.0 Financial Risk Assessment

1	Does the implementation of this document require any additional Capital resources	No
2	Does the implementation of this document require additional revenue resources	No
3	Does the implementation of this document require additional manpower	No
4	Does the implementation of this document release any manpower costs through a change in practice	No
5	Are there additional staff training costs associated with implementing this document which cannot be delivered through current training programs or allocated training times for staff.	No
	Other comments	

7.0 Equality Impact Assessment

An initial equality analysis has been carried out and it indicates that there is no likely adverse impact in relation to Personal Protected Characteristics as defined by the Equality Act 2010.

8.0 Maintenance

The renal directorate is responsible for maintenance of this procedure.

9.0 Communication and Training

Via Governance meetings.

Update to be communicated by Trust-wide medication safety briefing.

Guideline to be published on Trust intranet under adult medical guidelines.

10.0 Audit Process

Criterion	Lead	Monitoring method	Frequency	Evaluation
Review of Datix for incidents relating to treatment of hyperkalaemia	Medication Safety Officer	Datix reports	6 monthly	Medication Safety Group

11.0 References - Legal, professional or national guidelines

https://www.cas.mhra.gov.uk/ViewandAcknowledgment/ViewAttachment.aspx?Attachment_id=104140

ukkidney.org/sites/renal.org/files/RENAL ASSOCIATION HYPERKALAEMIA GUIDELINE - JULY 2022 V2_0.pdf

https://www.medusaimg.nhs.uk/

The Royal Wolverhampton NHS Trust

Part A - Document Control

Procedure/ Guidelines Version no. GDL11 – Version 2.0 (Prev. RN 25)	**Title of Procedure / Guidelines** Hyperkalaemia	**Status:** Final		**Author:** Dr M Janmohamed **For Trust-wide Procedures and Guidelines Director Sponsor:** **Chief Medical Officer - BM** Dr S Cherukuri Clinical Director Renal Services **Reviewed by:** Mohammed Hasan Medication Safety Pharmacist
Version / Amendment History	Version	Date	Author	Reason
	Version 1	July 2015	Dr S Cherukuri	Creation of procedure
	Version 2	Sept 2019	Dr S Cherukuri	Reviewed
	Version 3	Sept 2021	Dr M Janmohamed	Reviewed
	Version 1.0 (Trust-wide Guideline)	Nov. 2023	Dr M Janmohamed and Mohammed Hasan	Updated in line with national patient safety alert (NatPSA/2023/007/MHRA) – Trust-wide Guideline
	Version 2.0	January 2024	Dr M Janmohamed and Mohammed Hasan	Full review
Intended Recipients: All relevant healthcare staff.				
Consultation Group / Role Titles and Date: Renal Governance Meeting – 23rd November 2023.				

Name and date of group where reviewed	Renal Governance Meeting – November 2023 Medicines Management Group Chair – 29/11/23 Medicines Management Group - 5th December 2023 Trust Policy Group – November 2023 (Chair's approval) Trust Policy Group – January 2024
Name and date of final approval committee (if trust-wide document)/ Directorate or other locally approved committee (if local document)	Trust Management Committee – January 2024
Date of Procedure/Guidelines issue	Version 2.0 – January 2024
Review Date and Frequency (standard review frequency is 3 yearly unless otherwise indicated – see section 3.8.1 of Attachment 1)	January 2024 – 3 yearly review Next review – January 2027
Training and Dissemination: Communicated as required through Renal service and training for new staff.	
To be read in conjunction with: N/A.	
Initial Equality Impact Assessment: N/A.	
Contact for Review	Dr M Janmohamed
Monitoring arrangements	Local governance Day to day practice
Document summary/key issues covered. As outlined in the document.	
Key words for intranet searching purposes	Hyperkalaemia.