Introduction / Background

Hyperkalaemia is a life-threatening condition that can be particularly difficult to manage in patients who have co-existing kidney failure. Failure to identify and manage such patients appropriately and in a timely fashion can and will increase the risk to the patient, including the risk of death.

Management of patients with hyperkalaemia without renal/kidney failure does not fall under the guidance of this document.

ONLY IF A PATIENT HAS RENAL FAILURE (AS DEMONSTRATED BY SERUM UREA AND CREATININE LEVELS) AND HAS HYPERKALAEMIA SHOULD THESE GUIDELINES BE FOLLOWED

(FOR PATIENTS WITH HYPERKALAEMIA AND NORMAL KIDNEY FUNCTION – FOLLOW THE GUIDELINES ON SEVERE METABOLIC EMERGENCIES ON THE INTRANET)
Guidelines for the Management of Hyperkalaemia in Patients with Kidney Failure

50% dextrose and 10% calcium solutions are hypertonic and will result in severe phlebitis if extravasation occurs: If either of these agents is required, then consider placing a central venous catheter (ideally an internal jugular line) where time and the patient’s clinical condition allows:

Patient has Renal Failure and serum potassium >6 mmol/L (excluding artefacts)

Perform 12 lead ECG. Are any of the following present:
bradycardia and/or acute widening of the QRS complex and/or sine wave pattern?

NO

Is patient a known dialysis patient?

YES

Contact on-call Nephrology Consultant urgently as dialysis is likely to be needed

Is the serum potassium <6.5 mmol/L, and previous results indicate that the K is often in this range?

NO

Is patient euvoalaemic or fluid overloaded?

NO

If patient is hypovolaemic then do not give iv furosemide until fluid status is normalised.
1. If serum bicarbonate <20mmol/L, give iv isotonic sodium bicarbonate (1.26% or 1.4%) 500ml over 4hrs
2. Continue rehydration with 1L 0.9% sodium chloride alternating with 1L 5% dextrose. Infuse at rate relevant to degree of hypovolaemia and BP

YES

1. Give 10ml of 10% calcium gluconate or chloride by iv bolus
2. Give 50mls of 50% dextrose with 10 units of soluble insulin (usually actrapid) by iv bolus (give 8units if patient <50kg, or 12units if patient >100kg)
3. Give salbutamol nebuliser 5mg

1. Give 50% dextrose at a rate of 21ml/hr via a central line. If central access not possible, then discuss with Medical SpR/Registrar
2. Give furosemide 80mg iv bolus over 20minutes (DO NOT GIVE IF SYSTOLIC BP<100mmHg).

1. Start an infusion of soluble insulin (usually actrapid), 50units in 50ml 0.9% sodium chloride, starting at 1ml/hr. If patient has diabetes, start infusion rate at 2ml/hr. Check Capillary Blood Glucose (CBG) hourly and adjust as per table on page 3.
2. Give calcium resonium 30g orally stat and three times per day with laxative cover (see notes on page 3 if patient cannot take orally)
3. Contact on-call Nephrology Consultant urgently

Recheck serum potassium every 2hrs, and continue dextrose and insulin infusions until potassium<5.5mmol/L and >4mmol/L for at least 4hrs. Ensure a low potassium diet is prescribed and refer to Renal Dietician; stop all potentially nephrotoxic drugs; oral sodium bicarbonate used where appropriate, and bloods to be re-checked after a further 12hrs.

Discuss case with Medical SpR and/or Nephrologist on-call to determine if treatment is needed/indicated.
Duties and Responsibilities

The attending doctor must either implement the management plan themselves and review the patient regularly (at least every 15 minutes for the first hour), or ensure that the appropriate handover has taken place to provide safe continuity of care for the patient.

The attending doctor must ensure that the nursing staff are aware of the management plan, and any trigger factors that they must make someone aware of (e.g. what level of blood pressure should be a cause of concern for any specific patient).

The attending doctor should seek advice from the Medical SpR on-call, who in turn should consider discussing the case with the on-call Consultant Nephrologist. The attending doctor may contact the on-call Consultant Nephrologist directly if they are unable to contact the SpR. All anuric patients with renal failure must be discussed with the Consultant Nephrologist on-call.

The nursing staff must ensure that they are aware of the management plan for the patient, frequency of relevant observations, and escalation plan for management.

Calcium Resonium

This takes at least 3-hours to start having any affect, and can take up to 6-hours. It is most effective when taken orally, usually prescribed 15g three times a day, but is normally prescribed with laxatives because of the tendency for it to cause severe constipation. An initial dose of 30g should be prescribed as tolerated by the patient.

If the patient cannot take the medication orally, then calcium resonium can be given rectally. However, apart from the obvious reduced patient acceptance of a rectal vs. an oral preparation, it is less effective rectally compared to orally. It can be given as a 30g enema, and should remain in place for at least 6-hours to have its maximum effect. It can be repeated after 6-hours, but only if the first enema has been excreted/removed: DO NOT GIVE A REPEAT CALCIUM RESONIUM ENEMA IF THE FIRST ONE IS STILL IN PLACE.

Insulin Regimen

<table>
<thead>
<tr>
<th>CBG (mmol/L)</th>
<th>Rate of insulin infusion (mL/hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;4</td>
<td>Reduce rate by 0.5 mL/hour. Recheck CBG after 30 minutes. <strong>DO NOT STOP INSULIN IF PATIENT HAS TYPE I DIABETES – CONSULT DIABETES SPECIALIST ON-CALL</strong></td>
</tr>
<tr>
<td>4-11</td>
<td>Continue at the same rate. Recheck CBG after 1 hour.</td>
</tr>
<tr>
<td>&gt;11</td>
<td>Increase rate by 0.5 mL/hour. Recheck CBG after 30 minutes. If CBGs persist at &gt;11 mmol/L discuss with on-call diabetes specialist</td>
</tr>
</tbody>
</table>

*CBG=Capillary Blood Glucose

Monitoring Effectiveness

Episodes of hyperkalaemia are inevitable in some patients with Acute Kidney Injury. This guideline will not prevent such episodes, but should facilitate timely management of such episodes.

Annual audits of the management of AKI will be undertaken as part of the response to the NCEPOD report on AKI. We will include in these audits the duration of hyperkalaemia post-diagnosis of AKI, and record from the notes any indication of the use of the guideline.

References

