Prescribing and Administration of Potassium Binders during Renal Contingency Plan on Critical Care Guideline

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Consultation: Pharmacy, critical care units on both Aintree and RLUH sites

1. Introduction
During the COVID pandemic there has been a breakdown in the supply chain for continuous renal replacement (RRT) consumables. In a setting where resources for providing RRT may be stretched the potassium binders (patiromer [Veltassa®] and sodium zirconium [Lokelma®]) have a role in delaying or preventing the need for RRT. In the emergency management of acute life-threatening hyperkalaemia these agents can be used alongside the standard care. Whilst both agents have been approved by NICE in emergency care for acute-life threatening hyperkalaemia alongside standard of care; sodium zirconium [Lokelma] should be considered as the first line potassium binder within the critical care setting. Patiromer [Veltassa] can be considered second line if Lokelma is not tolerated/not available. Lokelma is preferred over Patiromer as it can be stored at room temperature and has a faster onset of action than patiromer.

2. When to start potassium binders
Potassium binders should be used in conjunction with standard care for hyperkalaemia. See below for when to initiate:

- **Mild hyperkalaemia 5.5-5.9 mmol/L**
  - Start potassium binder
- **Moderate hyperkalaemia 6-6.4 mmol/L**
  - See hyperkalaemia guide for moving potassium rapidly into cells and requirement for stabilizing the cardiac membrane if ECG changes
  - Start potassium binder
- **Severe hyperkalaemia > 6.5mmol/L**
  - See hyperkalaemia guide for moving potassium rapidly into cells and requirement for stabilizing the cardiac membrane
  - Start potassium binder

As per hyperkalemia standard care serum potassium should be measured 1 hour, 2 hour, 4 hours, 6 hours and 24 hours after starting treatment. If potassium is continuing to climb or uncontrolled then please ask for consultant review and consider discussing with the renal team regarding initiation of RRT.
See appropriate sections below for dosing and administration instructions of potassium binding agents.

Once potassium has dropped below 5.0mmol/L please review the need for ongoing potassium binding agents. Consider continuing at a maintenance dose if there is ongoing consideration for RRT but review daily.

Maintenance dosing can also be considered for those patients who have anticipated delays to providing their long term RRT. Please discuss with renal team.

3. Sodium zirconium (Lokelma®)

3.1. Mechanism of action
Lokelma® is a non-absorbed, non-polymer inorganic powder that captures potassium. Lokelma® starts reducing serum potassium concentrations as soon as 1 hour after ingestion. It does not affect serum calcium or magnesium concentrations or urinary sodium excretion.

3.2. Dosing
Lokelma has two dosing schedules depending on whether the patient needs correction of high potassium or needs to maintain potassium once corrected.

Correction phase dosing:
10g TDS. Maximum 72 hours.
Consultant should be informed if potassium has not dropped below 5.5mmol/L after 72 hours.

Maintenance phase dosing when potassium drops <5.5mmol/L:
Initially 5g OD, this can be titrated up to 10g OD or titrated down to 5g on alternate days.
- If potassium 5.5-5.9mmol/L titrate dose up.
- If potassium <5.5mmol/L and consultant deems it appropriate to continue, titrate down.
- If potassium >5.9mmol/L follow additional steps for hyperkalaemia, consider escalating to correction phase dosing and ask for consultant review.
Maximum 10g OD for maintenance therapy.

3.3. Administration

Oral route
The contents of the sachet should be emptied into a glass containing approximately 45mL of water and stirred well. The powder will not dissolve. Advise patient to drink the tasteless liquid while still cloudy. If suspension settles it should be stirred again.

Nasogastric tube route
Lokelma® is not licensed for administration via NG tube, however, this has been done in an in vitro study and clinical practice with success. The below administration information is for 8 French tubes or larger:
- Suspend the required dose in approximately 25mL of water.
- Draw up the solution into a syringe. Keep the syringe constantly moving and tilted back to prevent the powder from settling on the syringe tip.
- Rinse the cup used to suspend the solution with approximately 15mL of water and draw up into the syringe, using the same method as above to give a total of approx. 40mL of solution for administration.
- After administration please flush with an additional 10mL of water.

3.4. Cautions
Lokelma® may be opaque to X-rays. If the patient is having abdominal X-rays, radiographers should keep this in mind.
Lokelma® should be administered at least 2 hours before or 2 hours after oral medications with clinically meaningful gastric pH dependent bioavailability. These include fluconazole and some HIV medications - please contact pharmacy for advice.
As intestinal perforation has been reported with polymers that act in the gastrointestinal tract, specific attention should be paid to signs and symptoms related to intestinal perforation.

3.5. Side Effect
Lokelma® has limited side effects as it is not systemically absorbed. The most common side effects are oedema and hypokalaemia. Please ensure patient is on laxatives as similar drugs are associated with constipation.

4. Patiromer (Veltassa)
4.1. Mechanism of action
Patiromer is a non-absorbed, cation exchange polymer that contains a calcium-sorbitol complex as a counterion. Patiromer increases faecal potassium excretion through binding of potassium in the lumen of the gastrointestinal tract. The onset of action of Patiromer occurs 4 – 7 hours after administration and can have a prolonged effect once discontinued.

4.2. Dosing
8.4g OD.
- If potassium 5.5-5.9mmol/L titrate dose up, adjust in steps of 8.4g daily as required.
  Max 25.2g per day.
- If potassium >5.9mmol/L follow additional steps for hyperkalaemia and ask for consultant review.

4.3. Administration
Oral route
The complete dose should be poured into a glass containing approximately 40 mL of water, then stirred. Another approximately 40 mL of water should be added, and the suspension stirred again thoroughly. The powder will not dissolve. More water may be added to the mixture as needed for desired consistency. The mixture should be taken within 1 hour of initial suspension. If powder remains in the glass after drinking, more water should be added and the suspension stirred and taken immediately. This may be repeated as needed to ensure the entire dose is administered.
Nasogastric tube route
Patiromer is not licensed for administration via NG tube, however, feasibility of administering patiromer through enteral feeding tubes has been evaluated in healthy volunteers. The below administration information is for 6.5 French tubes or larger:

- Suspend each 8.4g dose in 40mL of water.
- Draw up the solution in to a syringe. Keep the syringe constantly moving and tilted back to prevent the powder from settling on the syringe tip.
- Rinse the cup used to suspend the solution with 40mL of water and draw up into the syringe, using the same method as above to give a total of approx. 80mL of solution for administration.
- After administration please flush with an additional 10mL of water.

4.4.Cautions
Patiromer contains calcium as part of the counterion complex. Calcium is partially released some of which may be absorbed. The benefits and risks of administering this medicinal product should be carefully evaluated in patients at risk of hypercalcaemia.
As intestinal perforation has been reported with polymers that act in the gastrointestinal tract, specific attention should be paid to signs and symptoms related to intestinal perforation.
Patiromer can decrease serum magnesium, monitor during treatment course.
Administration of patiromer should be separated by 3 hours from other oral medicinal products.
Patiromer should be stored in the fridge. Reduce shelf life to 6 months once removed from fridge.

4.5.Side Effects
The most common side effects of patiromer are hypomagnesaemia and gastrointestinal disorders. Please ensure patient is on laxatives.

5. References