Emergency management of hyperkalaemia in adults

Incidence between 1 and 10% in hospitalised patients. Majority of cases are related to pre-existing or new renal failure, potassium supplementation or diuretics/drugs with potassium-sparing properties. Classified as mild (serum potassium 5.5 – 5.9 mmol/L), moderate (serum potassium 6.0 - 6.4 mmol/L), severe (serum potassium ≥6.5 mmol/L). Consult senior colleagues in clinical team if moderate or severe hyperkalaemia present i.e. serum potassium ≥6.0 mmol/L.

### COMMON CAUSES OF HYPERKALEMIA IN ADULTS

#### RENAL CAUSES
- Acute Kidney Injury or Chronic kidney disease*
- Drugs inhibiting R-A-A system (ACE inhibitors, ARBs, NSAIDs, heparin)*
- Drug induced inhibition of potassium excretion (e.g. amiloride, spironolactone, eplerenone, trimethaprim)*
- Hyperkalaemic Renal Tubular Acidosis (RTA Type IV)*

#### TRANSCELLULAR SHIFT OF POTASSIUM
- Acidosis (including Diabetic Ketoadacidosis)*
- Drugs (digoxin poisoning, suxamethonium)

#### INCREASED CIRCULATING POTASSIUM
- Exogenous potassium (potassium supplements in drugs)
- Endogenous (burns, trauma, rhabdomyolysis)

* = MOST COMMON CAUSES

### STEP 1: COMPREHENSIVE HISTORY AND EXAMINATION

**to determine and treat reversible causes of hyperkalaemia:**

**ALWAYS TREAT THE UNDERLYING CAUSE.**

- Non-specific symptoms include fatigue, weakness, paraesthesia, palpitations (may be absent even with severe hyperkalaemia).
- Focus on past history of renal problems and medication usage: Stop potassium containing fluids / foods and drugs inhibiting potassium excretion.
- Exclude urinary tract obstruction (examine for bladder distension). Catheterise if appropriate.

### STEP 2: QUESTIONS AND INITIAL INVESTIGATIONS

**Q: Is hyperkalaemia really present?**
Pseudohyperkalaemia (e.g. haemolysed sample). Repeat potassium urgently but do not delay treatment if acute kidney injury present or if hyperkalaemic ECG changes.

**Q: Is Emergency Treatment needed?**
Yes if ECG changes present (Peaked T waves, PR prolongation, decreased or absent P waves, QRS widening, AV block, sine wave QRST)
A normal ECG does not mean there is no need for therapy - the ECG can be normal in severe hyperkalaemia.
Yes if severe hyperkalaemia. Acute changes in potassium are more likely to cause cardiac arrhythmias.
A 12-lead ECG with repeated assessment of glucose (BM testing) and urea and electrolytes is mandatory. Creatinine kinase/blood gas analysis (if indicated).

### STEP 3: MANAGEMENT **Use a hyperkalaemia kit**

1. **Protect the Cardiac Membrane:**
   - Perform 10ml calcium gluconate 10% solution IV over 2 minutes. Effects noted 1 to 3 minutes and last approximately 30-60 minutes. Caution if patient taking digoxin.

2. **Shift Potassium into Cells:**
   - **(a) Insulin**
     - Withdraw 10 units of Actrapid® insulin using an INSULIN syringe.
     - Always obtain a check of volume from a senior nurse before proceeding.
     - Add to 50ml glucose 50% and administer by slow IV injection over 5 minutes. Effects observed in 1.5 minutes and last 4-6 hours.
     - Monitoring – blood glucose should be measured after 1.5 and 30 minutes and then hourly for six hours.
     - Check U&Es 30 minutes, one, two, four and six hours after each administration of insulin/glucose.

   - **(b) Beta 2 Adrenergic Therapy**
     - Administer 10 mg nebulised salbutamol. Effect observed 15-30 minutes. May not always reduce serum potassium and not used as a single agent. Synergistic serum potassium lowering effect when used with insulin/glucose above.

   Calcium gluconate, insulin and Beta-2 agonists buy time and can be repeated multiple times while definitive measures are pursued.

3. **Stop potassium intake:**
   - Stop potassium supplements and potassium containing drugs. Avoid potassium rich fluids or foodstuffs in diet.

4. **Remove potassium from the body:**
   - **(a) Use dialysis**
     - Only required in exceptional circumstances when severe hyperkalaemia persists despite appropriate management. Ask senior colleague to consult with renal team.