Guideline for the Administration of Potassium in the Intensive Care Setting

For implementation on:
General intensive care unit (GICU)
High dependency unit (HDU)
Intensive overnight recovery (Holdsworth ward) (IOR)
Neuro intensive care unit (NICU)
Cardio-thoracic intensive care unit (CTICU)

Related policies/guidelines

- Medicines Management Policy – Safe Prescribing of Medicines (section 6.3) and Standards for Intravenous Medicines administration (section 6.12)
- Storage and Prescribing of Strong Potassium Chloride Injection
- Adult Critical Care Preparation Guide

Targets for serum/plasma potassium levels

- Patients with any acute cardiac pathology (including post cardiac surgery) and/or any significant chronic cardiac pathology (e.g. ischaemic heart disease, cardiomyopathy, atrial fibrillation):
  4.5 - 5.2 mmol/L
- The target serum potassium for all other patients:
  4 - 5.2mmol/L

Hypokalaemia:

- Has many causes - principally diuretics and GI losses. Whenever detected, the underlying cause should be sought and treated **IN ADDITION** to the administration of potassium supplements.
- Is precipitated by continuous IV insulin, nebulised salbutamol and IV sodium bicarbonate therapy.
- Predisposes to **AND** potentiates cardiac dysrhythmias, in particular, atrial fibrillation and ventricular tachycardia. It is also associated with diastolic dysfunction and failure of endothelial relaxation.
- Is commonly associated with hypomagnesaemia **HENCE ALWAYS** give magnesium supplements intravenously **IF** IV potassium supplementation is required. (2)
- Functional hyperaldosteronism (common in heart failure and hypotension of any cause) will potentiate hypokalaemia AND hypomagnesaemia - **TREAT** with spironolactone

Potassium Prescriptions
Nurses MUST ensure the prescription for potassium supplementation has been signed and dated by a doctor before drug administration is initiated.

First Line Potassium Supplementation – EXCEPT in ACUTE cardiac dysrhythmias
Sando K (12mmol K^+/tablet) should be used in clinically stable patients where enteral administration is possible AND NOT contra-indicated.
The usual dose is 40 - 120 mmol/day (3 - 10 tablets/day), but up to a maximum of 300 mmol/day (25 tablets/day) can be given.

Second Line Potassium Supplementation
Potassium containing fluids

- Use crystalloid with 40mmol/l KCl in any patient who is either unresponsive to **OR** has contra-indications to Sando K **UNLESS** they are fluid restricted **OR** have cardiac arrhythmias associated with haemodynamic compromise.

Third Line Potassium Supplementation
Concentrated potassium 40mmol/40ml pre-filled syringes should be administered via a **central intravenous line ONLY**, in patients that are:

- Unresponsive to **OR** have contra-indications to Sando K **AND** are fluid restricted
- Have cardiac arrhythmias associated with haemodynamic compromise
- **Each syringe costs £4.90 - PLEASE only use them as THIRD line therapy**

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Never give potassium as a fast 'stat' bolus dose.

Parenteral access to patient	Maximum Concentration	What options are available?	Indication	Maximum rate / Additional comments
Via peripheral or central intravenous line	40mmol/L	Dextrose 5% + 20mmol KCl or Dextrose 5% + 40mmol KCl NaCl 0.9% + 20mmol KCl or NaCl 0.9% + 40mmol KCl	Fluid replacement and hypokalaemia. Management of diabetic ketoacidosis Variable rate intravenous insulin infusion protocol	20mmol/hr **but only exceeding 10mmol/hr with direct instruction from prescriber.** Monitor patient for fluid overload at higher infusion rates.
		Compound sodium lactate solution – Hartmann's (containing Na^+ 131 mmol, K^+ 5 mmol, Ca^{2+} 2 mmol, HCO_3^- (as lactate) 29 mmol, Cl^- 111 mmol per litre)	Fluid replacement	
		20ml Addiphos (40mmol phosphate and 30mmol potassium) diluted to 500ml with NaCl 0.9% or Dextrose 5%	Hypophosphat-aemia	Infuse 500ml over 4-6 hours. Maximum rate 10mmol phosphate/hr.
Via a central intravenous line ONLY	1mmol/ml	Concentrated potassium 40mmol/40ml pre-filled syringes	Hypokalaemia	40mmol/hr **but only exceeding 20mmol/hr with direct instruction from prescriber.**
		20ml Addiphos (40mmol phosphate and 30mmol potassium) diluted to 40ml with NaCl 0.9% or Dextrose 5%	Hypophosphat-aemia	Infuse 40ml over 4-6 hours. Maximum rate 10mmol phosphate/hr.

Monitoring requirements

- All patients receiving potassium should have serum potassium measured at least once a day, together with urea and creatinine, magnesium and phosphate.
- If rapid administration is being undertaken (greater than 10mmol per hour) monitor hourly using the blood gas analyzers. **IN ADDITION**, continuous ECG monitoring and **heart rate and rhythm observation** is required.

Cautions and contra-indications

- If the patient is oligo / anuric **AND / OR** has proven acute kidney injury (AKI) **OR** end stage renal failure **ONLY** give potassium supplements under the direct supervision of the prescriber and monitor more frequently.
- Potassium replacement should be used with caution in patients receiving thiopentone infusion **OR** being actively cooled, due to rebound hyperkalaemia.

Adverse effects

Concentrated solutions of potassium are intensely irritant to peripheral veins and can cause tissue necrosis if they extravasate. This is why it should be given via a central line. Excess potassium, especially when **given too rapidly**, can be **fatal**. It can cause cardiac arrhythmias, heart block and **cardiac arrest**.

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