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Hyperkalaemia

The gradient between intracellular potassium (98%) and extracellular potassium (2%) plays a vital role in generating action potentials. In hyperkalaemia, extracellular potassium increases, interfering with normal action potential generation, having a detrimental effect in both skeletal muscle function, and profoundly affecting normal cardiac function.[1]

Hyperkalaemia is defined as a serum potassium greater than 5.5 mEq/L.[3] Hyperkalaemia can occur from any condition that causes an increase in extracellular potassium. The most common causes are:[3]

**Medical**
- Renal impairment
- DKA
- Addison’s disease
- Metabolic acidosis.

**Medications**
- Potassium-sparing diuretics
- ACE inhibitors (primary used to treat hypertension)
- Nonsteroidal anti-inflammatory drugs (NSAIDs).

**NOTE:** Medication-induced hyperkalaemia usually occurs concurrently in patients with some degree of renal impairment.

The 12-Lead ECG is one of the most important diagnostic tests in hyperkalaemia. Figure 1 shows the classically predictive changes seen on the 12-lead in hyperkalaemia, although not all patients will progress through this pattern.[1]

### Clinical features

**Figure 1: ECG findings in hyperkalaemia**

- **Peaked T-waves** (Potassium 5.5–6 mEq/L)
- **Flat/lost P-waves** (Potassium 7–8 mEq/L)
- **Wide QRS** (Potassium 7–7.5 mEq/L)
- **Fusion with T-wave forming sine wave** (Potassium > 9 mEq/L)

**Nonspecific clinical features may include:**
- General weakness, paraesthesia.
- Lethargy & confusion
- Nausea, vomiting, diarrhoea.
- Signs of underlying cause, e.g. renal impairment, burn, metabolic acidosis.
Risk Assessment

- Nil in this setting

Additional information

- Calcium gluconate provides immediate stabilisation of the myocardium, however it does not reduce serum potassium levels.[4]
- Sodium bicarbonate 8.4% will reduce serum potassium levels by 0.5 – 1 mmol/L and provide temporary effect whilst the underlying cause is treated.
- Continuous nebulised salbutamol reduces serum potassium levels by 0.5 – 1 mmol/L within 30 minutes.[5]

Cardiac arrest?

- Y
  - IV access
  - Calcium gluconate
  - Sodium bicarbonate 8.4%
  - Sodium chloride 0.9%
  - Salbutamol Neb

- N

12-Lead ECG evidence of hyperkalaemia?

- Y
  - Treat specific cause (e.g. crush injury)
    - IV access
    - Calcium gluconate
    - Sodium bicarbonate 8.4%
    - Sodium chloride 0.9%
    - Salbutamol Neb

- N

Transport to hospital
Pre-notify as appropriate

Note: Clinicians are only to perform procedures for which they have received specific training and authorisation by the QAS.