# Drug Therapy Protocols: Calcium gluconate 10%

<table>
<thead>
<tr>
<th>Policy code</th>
<th>DTP_CAG_1118</th>
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</thead>
<tbody>
<tr>
<td>Date</td>
<td>November, 2018</td>
</tr>
<tr>
<td>Purpose</td>
<td>To ensure a consistent procedural approach to Calcium gluconate 10% administration.</td>
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<tr>
<td>Scope</td>
<td>Applies to Queensland Ambulance Service (QAS) clinical staff.</td>
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<tr>
<td>Health care setting</td>
<td>Pre-hospital assessment and treatment.</td>
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<tr>
<td>Population</td>
<td>Applies to all ages unless stated otherwise.</td>
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<tr>
<td>Source of funding</td>
<td>Internal – 100%</td>
</tr>
<tr>
<td>Author</td>
<td>Clinical Quality &amp; Patient Safety Unit, QAS</td>
</tr>
<tr>
<td>Review date</td>
<td>November, 2021</td>
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</table>

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Calcium gluconate 10%

Drug class
Electrolyte

Pharmacology
Calcium plays an integral role in the muscular and neural systems. It is involved in skeletal muscle contraction, excitation coupling in cardiac and smooth muscle and acts as an intracellular 2nd messenger. These effects combine to exert a positive inotropic effect in the post cardiac arrest patient. It additionally has a role in cardiac membrane stabilisation in hyperkalaemia and as an effective treatment of pain and systemic symptoms associated with hydrofluoric acid exposure.[1–3]

Metabolism
Most of the parenterally administered calcium filtered by the renal glomeruli is reabsorbed; the remainder is excreted in faeces.[1]

Indications
- Suspected hyperkalaemic cardiac arrest
- Severe hyperkalaemia (with haemodynamic compromise AND/OR significant cardiac rhythm disturbance)
- Calcium channel blocker toxicity
- Hypotension associated with a magnesium infusion (that fails to respond to IV fluid therapy)
- Hydrofluoric acid inhalation
- Following pre-hospital blood product transfusion[4] (adults – every unit / paediatrics – every 10 mL/kg OR unit)

Precautions
- Respiratory acidosis

Contraindications
- Allergy and/or Adverse Drug Reaction
- Digoxin (digitalis) overdose

Side effects
- Suspected hyperkalaemic cardiac arrest:
  - nil
- For all other QAS indications, IV administration may cause:
  - syncope
  - hypotension
  - bradycardia
  - cardiac dysrrhythmias
  - cardiac arrest

Presentation
- Ampoule, ≈ 1 g/10 mL calcium gluconate 10%
Calcium gluconate 10%

<table>
<thead>
<tr>
<th>Onset (IV)</th>
<th>Duration (IV)</th>
<th>Half-life</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–3 minutes</td>
<td>30–60 minutes (in hyperkalaemia)</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

**Schedule**
- Unscheduled.

**Routes of administration**
- Nebuliser (NEB)
- Intravenous injection (IV)
- Intraosseous injection (IO)

**Special notes**
- Ambulance offers must only administer medications for the listed indications and dosing range. Any consideration for treatment outside the listed scope of practice requires mandatory approval via the QAS Clinical Consult and Advice Line.
- All cannulae and IV lines must be flushed thoroughly with sodium chloride 0.9% following each medication administration.
- All parenteral medications must be prepared in an aseptic manner. The rubber stopper of all vials must be disinfected with a 2% Chlorhexidine /70% Isopropyl Alcohol swab and allowed to dry prior to piercing.

**Adult dosages**
- **Suspected hyperkalaemic cardiac arrest**
- **Severe hyperkalaemia** (with haemodynamic compromise AND/OR significant cardiac rhythm disturbance)
- **Calcium channel blocker toxicity**
- **Hypotension associated with a magnesium infusion administration** (that fails to respond to IV fluid therapy)

**Routes of administration**
- **Nebuliser (NEB)**
  - 2 mL of 2.5% concentration
    (0.5 mL calcium gluconate 10% with 1.5 mL sodium chloride 0.9%)
    Repeated PRN.
    **No maximum dose.**
    *Nebulised solution preparation: Mix 2.5 mL of calcium gluconate 10% with 75% mL of sodium chloride 0.9% in a 10 mL syringe to achieve a final concentration of calcium gluconate 2.5%. Ensure all syringes are appropriately labelled.*

**Intravenous injection (IV)**
- 10 mL (~1 g)
  - Slow push over 2–5 minutes.
  - Repeated once at **10 minutes**.

**Intraosseous injection (IO)**
- 10 mL (~1 g)
  - Slow push over 2–5 minutes.
  - Repeated once at **10 minutes**.
## Paediatric dosages (cont.)

### Following pre-hospital blood product transfusion (every 10 mL/kg OR unit)

<table>
<thead>
<tr>
<th>Mode</th>
<th>Dose</th>
<th>Administration</th>
<th>Total Maximum Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IV</strong></td>
<td>0.5 mL/kg ($\approx 50$ mg/kg)</td>
<td>Single dose not to exceed 20 mL. Slow push over 2–5 minutes. Repeated once at 10 minutes.</td>
<td>60 mL ($\approx 6$ g).</td>
</tr>
<tr>
<td><strong>IO</strong></td>
<td>0.5 mL/kg ($\approx 50$ mg/kg)</td>
<td>Single dose not to exceed 20 mL. Slow push over 2–5 minutes. Repeated once at 10 minutes.</td>
<td>60 mL ($\approx 6$ g).</td>
</tr>
</tbody>
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### Note:
In all other instances QAS officers are **NOT** authorised to administer calcium gluconate 10% to paediatric patients.

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## Adult dosages (cont.)

### Paediatric dosages

- **Suspected hyperkalaemic cardiac arrest**
- **Severe hyperkalaemia** (with haemodynamic compromise AND/OR significant cardiac rhythm disturbance)
- **Calcium channel blocker toxicity**
- **Hypotension associated with a magnesium infusion administration** (that fails to respond to IV fluid therapy)

### Following pre-hospital blood product transfusion (every unit)

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<th>Dose</th>
<th>Administration</th>
<th>Total Maximum Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IV</strong></td>
<td>20 mL ($\approx 2$ g)</td>
<td>Slow push over 2–5 minutes. Repeated with every unit transfused. Total maximum dose 60 mL ($\approx 6$ g).</td>
<td></td>
</tr>
<tr>
<td><strong>IO</strong></td>
<td>20 mL ($\approx 2$ g)</td>
<td>Slow push over 2–5 minutes. Repeated with every unit transfused. Total maximum dose 60 mL ($\approx 6$ g).</td>
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