# Drug Therapy Protocols: Calcium gluconate

<table>
<thead>
<tr>
<th><strong>Policy code</strong></th>
<th>DTP_CAG_1219</th>
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<tbody>
<tr>
<td><strong>Date</strong></td>
<td>December, 2019</td>
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<tr>
<td><strong>Purpose</strong></td>
<td>To ensure a consistent procedural approach to calcium gluconate administration.</td>
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<tr>
<td><strong>Scope</strong></td>
<td>Applies to Queensland Ambulance Service (QAS) clinical staff.</td>
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<tr>
<td><strong>Health care setting</strong></td>
<td>Pre-hospital assessment and treatment.</td>
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<tr>
<td><strong>Population</strong></td>
<td>Applies to all ages unless stated otherwise.</td>
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<tr>
<td><strong>Source of funding</strong></td>
<td>Internal – 100%</td>
</tr>
<tr>
<td><strong>Author</strong></td>
<td>Clinical Quality &amp; Patient Safety Unit, QAS</td>
</tr>
<tr>
<td><strong>Review date</strong></td>
<td>December, 2022</td>
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Calcium gluconate

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 second 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 urine.[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\(^\text{[a]}\) (adults – every unit / paediatrics – every 10 mL/kg OR unit)

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

Precautions
- Respiratory acidosis

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

Presentation
- Vial, 2.2 mmol/10 mL calcium gluconate monohydrate 10%
- Injection (prefilled syringe with graduated markings), 4.4 mmol/25 mL calcium gluconate 8%
## Calcium gluconate

### Onset (IV) | Duration (IV) | Half-life
--- | --- | ---
1–3 minutes | 30–60 minutes (in hyperkalaemia) | Not applicable

### Schedule
- Unscheduled.

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

### Special notes
- Ambulance officers 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
- 2.2 mmol (10 mL calcium gluconate 10%) Slow push over 2–5 minutes. Repeated once at 10 minutes.

#### 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)

#### Hydrofluoric acid inhalation
- 2 mL of 2.5% concentration Repeated PRN. No maximum dose.

**Nebulised solution preparation:** Mix 2.5 mL of calcium gluconate 10% with 7.5% 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.

#### Following pre-hospital blood product transfusion (every unit)
- 4.4 mmol (25 mL calcium gluconate 8%) Slow push over 2–5 minutes. Repeated with every unit transfused. Total maximum dose 13.2 mmol.
## 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)

<table>
<thead>
<tr>
<th>Calcium gluconate</th>
<th>Paediatric dosages</th>
<th>IV/IO</th>
<th>0.1 mmol/kg (0.5 mL/kg (calcium gluconate 10%))</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCP</td>
<td>Single dose not to exceed 2.2 mmol</td>
<td></td>
<td></td>
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<tr>
<td>CCP</td>
<td>Slow push over 2–5 minutes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCP</td>
<td>Repeated once at <strong>10 minutes</strong>.</td>
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**Following pre-hospital blood product transfusion** (every 10 mL/kg OR unit)

<table>
<thead>
<tr>
<th>Calcium gluconate</th>
<th>Paediatric dosages</th>
<th>IV/IO</th>
<th>0.1 mmol/kg (0.6 mL/kg (calcium gluconate 8%))</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCP</td>
<td>Single dose not to exceed 25 mL.</td>
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<tr>
<td>CCP</td>
<td>Slow push over 2–5 minutes.</td>
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</tr>
<tr>
<td>CCP</td>
<td>Repeated with every unit transfused.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCP</td>
<td><strong>Total maximum dose 13.2 mmol.</strong></td>
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