



## Drug Therapy Protocols: Calcium gluconate

<b>Policy code</b>	DTP_CAG_0924
<b>Date</b>	October, 2024
<b>Purpose</b>	To ensure a consistent procedural approach to calcium gluconate administration.
<b>Scope</b>	Applies to Queensland Ambulance Service (QAS) clinical staff.
<b>Health care setting</b>	Pre-hospital assessment and treatment.
<b>Population</b>	Applies to all ages unless stated otherwise.
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# Calcium gluconate

October, 2024

## Drug class<sup>[1]</sup>

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.<sup>[1,2]</sup>

## Metabolism

Most of the parenterally administered calcium filtered by the renal glomeruli is reabsorbed; the remainder is excreted in urine.<sup>[1]</sup>

## Indications<sup>[3-8]</sup>

- **Suspected hyperkalaemic cardiac arrest**
- **Severe hyperkalaemia** (with haemodynamic compromise AND/OR significant cardiac rhythm disturbance)
- **Verapamil AND/OR diltiazem toxicity**
- **Hypotension** associated with a **magnesium infusion** (that fails to respond to IV fluid therapy)
- **Hydrofluoric acid inhalation**
- **Following pre-hospital blood product transfusion** (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<sup>[3,2]</sup>

- Syncope
- Hypotension
- Bradycardia
- Cardiac dysrhythmias
- Cardiac arrest

## Presentation

- Vial, 2.2 mmol/10 mL *calcium gluconate monohydrate 10%*
- Injection (pre-filled 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 Consultation and Advice Line*.
- The solution may precipitate, check all vials and discard if cloudy or contains particles.
- Adverse events may be prevented/minimised by reducing the rate of medication delivery.
- The routine administration of calcium for the treatment of vasoselective dihydropyridine channel blockers overdose (e.g. amlodipine, nifedipine, felodipine etc) is not recommended.<sup>[4]</sup>

## Special notes

- Calcium gluconate is highly irritant, extravasation may cause significant tissue damage. Monitor the injection site closely.<sup>[1–3]</sup>
- 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 an appropriate antimicrobial swab and allowed to dry prior to piercing.

## Adult dosages<sup>[1–8]</sup>

### Suspected hyperkalaemic cardiac arrest

CCP	IV/IO	<b>4.4 mmol</b> Repeated at <b>10 minutes</b> intervals. <b>Total maximum dose 13.2 mmol (60 mL)</b>
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- **Severe hyperkalaemia** (with haemodynamic compromise AND/OR significant cardiac rhythm disturbance)
- **Hypotension associated with a magnesium infusion administration** (that fails to respond to IV fluid therapy)

CCP	IV/IO	<b>2.2 mmol</b> Slow push over 2–3 minutes. Repeat once at <b>10 minutes</b> if required.
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### Verapamil AND/OR diltiazem toxicity

CCP	IV/IO	<b>6.6 mmol</b> Slow push over 2–3 minutes. Repeat once at <b>10 minutes</b> if required.
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Adult dosages (cont.)

Hydrofluoric acid inhalation		
CCP	NEB	<p><b>2 mL of 2.5% concentration</b> Repeat PRN. <b>No maximum dose.</b></p> <p><i>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.</i></p>
Following pre-hospital blood product transfusion (every unit)		
ECCP	IV/IO	<p><b>2.2 mmol</b> Slow push over 2–3 minutes. Repeat with every unit transfused. <b>Total maximum dose 6.6 mmol.</b></p>

Paediatric dosages<sup>[1-5,7]</sup>

Suspected hyperkalaemic cardiac arrest		
CCP	IV/IO	<p><b>0.1 mmol/kg</b> Single dose not to exceed 2.2 mmol. Repeat once at <b>10 minutes</b> if required.</p>
<ul style="list-style-type: none"> <li>• <b>Severe hyperkalaemia</b> (with haemodynamic compromise AND/OR significant cardiac rhythm disturbance)</li> <li>• <b>Verapamil AND/OR diltiazem toxicity</b></li> <li>• <b>Hypotension associated with a magnesium infusion administration</b> (that fails to respond to IV fluid therapy)</li> </ul>		
CCP	IV/IO	<p><b>0.1 mmol/kg</b> Single dose not to exceed 2.2 mmol. Slow push over 2–3 minutes. Repeat once at <b>10 minutes</b> if required.</p>
Following pre-hospital blood product transfusion (every 10 mL/kg OR unit)		
ECCP	IV/IO	<p><b>0.1 mmol/kg</b> Single dose not to exceed 2.2 mmol. Slow push over 2–3 minutes. Repeat with every unit transfused. <b>Total maximum dose 6.6 mmol.</b></p>