Drug Therapy Protocols: Calcium gluconate

Policy code	DTP_CAG_0223
Date	February, 2023
Purpose	To ensure a consistent procedural approach to calcium gluconate administration.
Scope	Applies to Queensland Ambulance Service (QAS) clinical staff.
Health care setting	Pre-hospital assessment and treatment.
Population	Applies to all ages unless stated otherwise.
Source of funding	Internal – 100%
Author	Clinical Quality & Patient Safety Unit, QAS
Review date	February, 2025
Information security	UNCLASSIFIED – Queensland Government Information Security Classification Framework.
URL	https://ambulance.qld.gov.au/clinical.html

While the QAS has attempted to contact all copyright owners, this has not always been possible. The QAS would welcome notification from any copyright holder who has been omitted or incorrectly acknowledged.

All feedback and suggestions are welcome. Please forward to: Clinical.Guidelines@ambulance.qld.gov.au

Disclaimer

The Digital Clinical Practice Manual is expressly intended for use by appropriately qualified QAS clinicians when performing duties and delivering ambulance services for, and on behalf of, the QAS.

The QAS disclaims, to the maximum extent permitted by law, all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs incurred for any reason associated with the use of this manual, including the materials within or referred to throughout this document being in any way inaccurate, out of context, incomplete or unavailable.

Calcium gluconate

February, 2023

Drug class[1]

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 hydroflouric acid exposure.[1,2]

Metabolism

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

Indications[1–8]

- **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[1,2]

- 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) — CCP
- Intravenous injection (IV) — CCP, E CCP
- Intraosseous injection (IO) — CCP, E CCP

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 (e.g. amiodipine, nifedipine, felodipine etc) is not recommended.[4]

Special notes

- Calcium gluconate is highly irritant, extravasation may cause significant tissue damage. Monitor the injection site closely.[1–3]
- 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[1–8]

Suspected hyperkalaemic cardiac arrest

CCP — IV/IO — **2.2 mmol**
Repeat once at **10 minutes** if required.

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 — **2.2 mmol**
Slow push over 2–3 minutes.
Repeat once at **10 minutes** if required.

Verapamil AND/OR diltiazem toxicity

CCP — IV/IO — **6.6 mmol**
Slow push over 2–3 minutes.
Repeat once at **10 minutes** if required.

Adult dosages *(cont.)*

Hydrofluoric acid inhalation

CCP | NEB

2 mL of 2.5% concentration
Repeat 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)

E CCP | IV/IO

2.2 mmol
Slow push over 2–3 minutes.
Repeat with every unit transfused.
Total maximum dose 6.6 mmol.

Paediatric dosages[1–5,7]

Suspected hyperkalaemic cardiac arrest

CCP | IV/IO

0.1 mmol/kg
Single dose not to exceed 2.2 mmol.
Repeat once at **10 minutes** if required.

- **Severe hyperkalaemia** (with haemodynamic compromise AND/OR significant cardiac rhythm disturbance)
- **Verapamil** AND/OR **diltiazem toxicity**
- **Hypotension associated with a magnesium infusion administration** (that fails to respond to IV fluid therapy)

CCP | IV/IO

0.1 mmol/kg
Single dose not to exceed 2.2 mmol.
Slow push over 2–3 minutes.
Repeat once at **10 minutes** if required.

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

E CCP | IV/IO

0.1 mmol/kg
Single dose not to exceed 2.2 mmol.
Slow push over 2–3 minutes.
Repeat with every unit transfused.
Total maximum dose 6.6 mmol.