Alert

Multiple forms of calcium exist with varying amounts of elemental calcium expressed in varying units. Therefore careful attention is required in prescription and administration of calcium to avoid over- or under-dosing.

Conversion factor for elemental Ca: 1 mg = 0.02 mmol = 0.05 mEq.
Prescribe calcium in mmol/kg/dose (not in mL/kg/dose)

Calcium can slow the heart rate and precipitate arrhythmias. In cardiac arrest, calcium may be given by rapid intravenous injection. In the presence of a spontaneous circulation give it slowly. Do not give calcium solutions and sodium bicarbonate simultaneously by the same route to avoid precipitation.

Calcium chloride 10% may be preferred over calcium gluconate 10% for rapid IV administration.

Indication

Asymptomatic or symptomatic hypocalcaemia.
Hyperkalaemia.
Exchange transfusion.
Magnesium toxicity.
Calcium channel blocker overdose.
Supplementation in parenteral nutrition (beyond the scope of this guideline).

Action

Calcium is essential for the functional integrity of the nervous, muscular, skeletal and cardiac systems and for clotting function. It antagonises the cardiotoxic effects (arrhythmias) of hyperkalaemia, hypermagnesaemia and calcium channel blockers.

Drug Type

Mineral.

Trade Name

Calcium Chloride Injection (Phebra) 10%

Maximum Dose

IV – 3 mmol/kg/day

Presentation

Calcium chloride 10% 10 mL vial (1 mL contains 100 mg calcium chloride equivalent to 0.68 mmol of elemental calcium).

Dosage/Interval

Hypocalcaemia, hyperkalaemia, magnesium toxicity, calcium channel blocker overdose

IV or IO: Elemental Calcium - 0.15 mmol/kg (= 0.2 mL/kg of UNDILUTED 10% calcium chloride). Repeat as necessary.

Maintenance IV calcium therapy – Titrate to serum calcium levels

IV bolus: Elemental Calcium – 0.15 mmol/kg/dose 4-6 hourly (maximum daily dose 3 mmol/kg/day)

Exchange transfusion: Administer if hypocalcaemia:

IV: Elemental calcium 0.23 mmol/kg (=0.3mL/kg of UNDILUTED 10% calcium chloride); repeat as necessary.

Route

IV (via a central line where possible), IO. Oral (see separate guideline ‘Calcium- ORAL’).

Preparation/Dilution

Calcium Chloride – IV intermittent

Draw up 1.5 mL (1.02 mmol of elemental calcium) and add 8.5 mL sodium chloride 0.9%, glucose 5% or glucose 10% to make a final volume of 10 mL with a concentration of 0.1 mmol/mL. Infuse dose over 10–60 minutes via a central line (if possible).

Calcium Chloride – cardiac arrest(secondary to hyperkalaemia, hypocalcaemia, hypermagnesaemia or calcium channel blocker)

Infuse undiluted over 5 – 10 minutes via a central line (if possible).

Administration

Calcium chloride – IV intermittent

In cardiac arrest, calcium may be given by rapid intravenous injection. In the presence of a spontaneous circulation give it slowly. Infuse dose over 10–60 minutes (5-10 minutes in cardiac arrest) via a central line (if possible and compatibilities permit). If NO central access is available, consult the Neonatologist on service before administering via peripheral route. If administering peripherally give via a large vein. In poorly perfused patients, consider diluting the infusion further (two-fold) and infuse over at least TWO hours.

MUST NOT be injected intra-arterially, intramuscularly or subcutaneously.

Monitoring

Continuous ECG monitoring to monitor heart rate and rhythm (stop infusion if HR < 100 bpm).
Calcium chloride 10%
Newborn Use only

Measurement of ionised calcium preferred over total or corrected calcium concentration. Blood gas machines measure ionised calcium directly and are more accurate than the main pathology laboratory which calculates the ionised calcium from a complex formula. Observe IV tubing for precipitates. Observe IV insertion site for extravasation. Correct hypomagnesaemia if present.

Contraindications
Caution in patients with renal or cardiac impairment.

Precautions
Do not give calcium solutions and sodium bicarbonate simultaneously by the same route to avoid precipitation. Ensure IV calcium is administered at a different time to phosphates, carbonates, sulfates or tartrates (precipitates can occur).

Drug Interactions
Ceftriaxone (may cause insoluble precipitates and can be fatal), digoxin (serious risk of arrhythmia and cardiovascular collapse), thiazide diuretics (increased risk of hypercalcaemia), ketoconazole (decreased ketoconazole effect).

Adverse Reactions
Rapid administration is associated with bradycardia or asystole. Rash, pain, burning at injection site, cutaneous necrosis with extravasation (give via central line unless otherwise instructed by a neonatologist) Nephrolithiasis with long term use. Gastric irritation, diarrhoea and NEC have occurred during oral therapy with hyperosmolar preparations (must be diluted if used orally. See separate guideline Calcium – ORAL)

Compatibility
Fluids: Glucose 5%, glucose 10%, sodium chloride 0.9%
Y-site: Amiodarone, ceftaroline fosamil, esmolol, sodium nitroprusside.

Incompatibility
Fluids: Lipid emulsion
Y-site Adrenaline (epinephrine) hydrochloride, azathioprine, ceftazidime, ceftriaxone, cefazolin, dexamethasone, folic acid, foscarinet, haloperidol lactate, hydrocortisone sodium succinate, indomethacin, ketorolac, magnesium sulfate, methyprednisolone sodium succinate, phosphate salts, propofol, sodium bicarbonate, thiopentone.

Do not mix with any medication that contains phosphates, carbonates, sulfates or tartrates.

Stability
IV diluted solution: Do not use if discoloured, cloudy, turbid or if a precipitate is present. Discard remaining solution after use.

Storage
Ampoule: Store below 25°C.

Special Comments
Refer to full version.

Evidence summary
Refer to full version.

References
Refer to full version.

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