

Guideline for the Management of ACUTE HYPOCALCAEMIA in Adults

Definition(s)

- LOW serum adjusted calcium level
- MILD to MODERATE acute asymptomatic hypocalcaemia – adjusted serum calcium 1.90 to 2.19mmol/L
- SEVERE acute hypocalcaemia – adjusted serum calcium less than 1.90mmol/L

Note that patients with an adjusted calcium of 1.90 to 2.19mmol/L WITH symptoms of hypocalcaemia are managed as SEVERE.

The usual range adjusted for albumin is 2.2 to 2.6mmol/L

The Intravenous product of choice for management of HYPOCALCAEMIA is **CALCIUM GLUCONATE 10% ampoules**. If this is unavailable **CALCIUM CHLORIDE 10% Pre-filled Syringes** can be used.

Potential Causes

Note that this list is NOT exhaustive

The most common cause of acute symptomatic hypocalcaemia in hospital practice is disruption of parathyroid gland function due to total thyroidectomy.
Hypocalcaemia may be temporary or permanent

Other causes include:

- Following selective parathyroidectomy (hypocalcaemia is usually transient and mild)
- Severe vitamin D deficiency
- Magnesium deficiency (consider PPI-associated hypomagnesaemia)
- Drug-induced hypocalcaemia
 - Cytotoxic drugs
 - Calcitonin
 - Phosphate therapy
 - Bisphosphates
 - Loop Diuretics (e.g. furosemide)
- Chronic Kidney Disease
- Severe hypomagnesaemia
- Osteomalacia
- Acute pancreatitis

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Signs and Symptoms

Symptoms of hypocalcaemia typically develop when adjusted serum calcium levels fall below 1.9mmol/L.

However this threshold varies greatly and is dependent on the rate of fall.

Signs & symptoms may include:

- Peri-oral and digital paraesthesia
- Positive Trousseau's and Chvostek's signs
- Tetany and carpopedal spasm
- Laryngospasm
- ECG changes (prolonged QT interval) and arrhythmia
- Seizures.

Initial Actions

- Identify and manage underlying cause if possible.
- Stop any offending drugs
- Determine adjusted calcium level and use flow diagram below to determine management option
- Measure:
 - Urea
 - Creatinine
 - Magnesium
 - Phosphate
 - Parathyroid Hormone (PTH)
 - Serum 25-hydroxyvitamin D level
- Correct magnesium first; or any increase in calcium will be transient.

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MANAGEMENT OF ACUTE HYPOCALCAEMIA

Identify cause of hypocalcaemia and treat underlying condition

Serum Adjusted Calcium 1.9 to 2.19mmol/L **and** asymptomatic

- Serum Adjusted Calcium 1.9 to 2.19mmol/L **and** symptomatic **or**
- Serum Adjusted Calcium less than 1.9mmol/L

THIS IS A MEDICAL EMERGENCY

INITIAL MANAGEMENT Doses of approximately 2.26 to 4.52mmol calcium required **The product of choice is calcium gluconate 10%**

Drug, Dose and administration:

- **Calcium Gluconate 10%** 10mL to 20mL. Dilute with at least FOUR times the volume (40 to 80mL) of glucose 5% or sodium chloride 0.9%

IF UNAVAILABLE,

- **Calcium Chloride 10%** Pre-filled syringes can be used. 3mL to 7mL diluted with at least FOUR times the volume (12 to 25mL) of glucose 5% or sodium chloride 0.9%

Route and rate of administration -The diluted solution should be administered via SLOW Intravenous injection over 10 minutes.

Repeat dosing: This can be repeated until patient is asymptomatic

***** In the case of an emergency e.g. Tetany the dose indicated above can be administered undiluted over a rate not exceeding 2mL per minute WITH ECG monitoring *****

Consider starting to prevent recurrence

MAINTENANCE Doses of approximately 22.6 to 45.2mmol calcium required **The product of choice is calcium gluconate 10% ampoules**

Drug, Dose and administration:

- **Calcium Gluconate 10%** ampoules - Add the contents of TEN x 10mL ampoules (100mL calcium gluconate 10%) to 1000mL of glucose 5% or sodium chloride 0.9% (remove 100mL from the bag prior to addition of the calcium gluconate 10%)

IF UNAVAILABLE,

- **Calcium Chloride 10%** Pre-filled syringes can be used. 30mL (contents of THREE pre-filled syringes) added to 1000mL of glucose 5% or sodium chloride 0.9%

Route and rate of administration –
The diluted solution should be administered via SLOW Intravenous injection at an initial rate of 50mL per hour – adjust according to response (Maximum 100mL per hour)

CONSIDER ORAL AFTER IV SUPPLEMENTATION

Drug: Calcium carbonate with colecalciferol
Route: Oral
Dose: A daily dose of approximately 25 to 30mmol of Calcium is recommended
Administration: Dose can be achieved by giving:

- Adcal D3 tablets (15mmol of calcium per tablet) :ONE tablet TWICE a day
- Cacit D3 sachet (12.5mmol of calcium per sachet) : ONE sachet TWICE a day

Seek advice if peanut allergy or soya allergy

If calcium remains low

On the advice of an endocrinologist, the dose of calcium can be increased (daily dose 90 to 100mmol) using a preparation that does not contain colecalciferol. Examples include:

- Sandocal 1000 tablets (25mmol of calcium per tablet) : TWO tablets TWICE a day
- Adcal tablets (15mmol of calcium per tablet):THREE tablets TWICE a day
- Cacit effervescent tablets (12.5mmol of calcium per tablet): FOUR tablets TWICE a day
- Calcichew Forte tablets (25mmol of calcium per tablet) :TWO tablets TWICE a day

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Monitoring Requirements

- Regular serum calcium levels (daily if on IV therapy)
- Regular U&Es if renal failure
- ECG Monitoring:
 - In ALL patients **having initial intravenous (IV) loading ‘PUSH’ dose over 5 to 10 minutes UNDILUTED or 10 minutes if DILUTED**
 - Patients with cardiac arrhythmias or on digoxin therapy need continuous ECG monitoring during IV calcium replacement.

Adverse Drug Reactions

These are uncommon:

- Arrhythmias
- Fall in blood pressure
- Injection site reactions (local thrombophlebitis)
- Nausea and vomiting
- Flushing and sweating

Other Information

- Large volume calcium infusions should not be used in patients with end stage renal failure or who are on dialysis.
- Some causes of hypocalcaemia (usually post-operatively) and other cases of hypoparathyroidism may require treatment with alfacalcidol or calcitriol therapy. In addition patients where their adjusted calcium level is still under 2.1mmol/L after ONE week then consider this additional treatment after discussion with specialist. Starting doses should be approximately 250 to 500nanograms per day. Be aware that these 1-alpha hydroxylated vitamin D metabolites are potent causes of hypercalcaemia. Frequent blood tests are required in stabilisation phase of treatment. In rare instance, alfacalcidol can be administered (at equivalent doses) intravenously if there are concerns about absorption or difficulties with oral drug administration.
- If vitamin D deficiency is the cause – seek specialist advice as the following may be required
 - Load with 300,000 units of colecalciferol or ergocalciferol over 6-10 weeks. In addition to replacement of calcium
- If hypomagnesaemia is the cause refer to the separate guideline on management of hypomagnesaemia.

Course lengths should be based on the clinical indication for use and stop dates or review dates specified on ePMA If a patient is to be **discharged before a course is completed then the GP must be given explicit information regarding monitoring and future management via the discharge summary.**

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Summary of Product Characteristics <https://www.medicines.org.uk/emc/>

IV Guide <https://medusa.wales.nhs.uk/> (Username: **cddward** / Password: **ivguide**)

Society for Endocrinology Endocrine Emergency Guidance - Emergency Management of Acute Hypocalcaemia in Adult Patients (2016) <https://ec.bioscientifica.com/view/journals/ec/5/5/G7.xml>

Addendum to 2016 Document Society for Endocrinology Endocrine Emergency Guidance - Emergency Management of Acute Hypocalcaemia in Adult Patients (2019) <https://ec.bioscientifica.com/view/journals/ec/8/6/EC-16-0056a.xml>

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