Adj Ca^{2+} (mmol/L)	Interpretation	Action
2.00-2.19	Mild	Repeat calcium level in 1 week with a paired EDTA sample for PTH
1.80-1.99	Moderate	Repeat calcium level with paired EDTA sample for PTH urgently, if severe symptoms consider urgent assessment at secondary care/medical urgent care unit
<1.80	Severe	Urgent assessment at secondary care/medical urgent care unit

Critical results

Critical results will be communicated urgently by laboratory staff. Telephone limits are available at:https://www.uhnm.nhs.uk/our-services/pathology/departments/biochemistry/

Hypocalcaemia (<1.80 mmol/L) can potentiate cardiac arrythmias and can be a medical emergency.

Consider assessment at secondary care if a patient has severe symptoms regardless of level of hypocalcaemia.

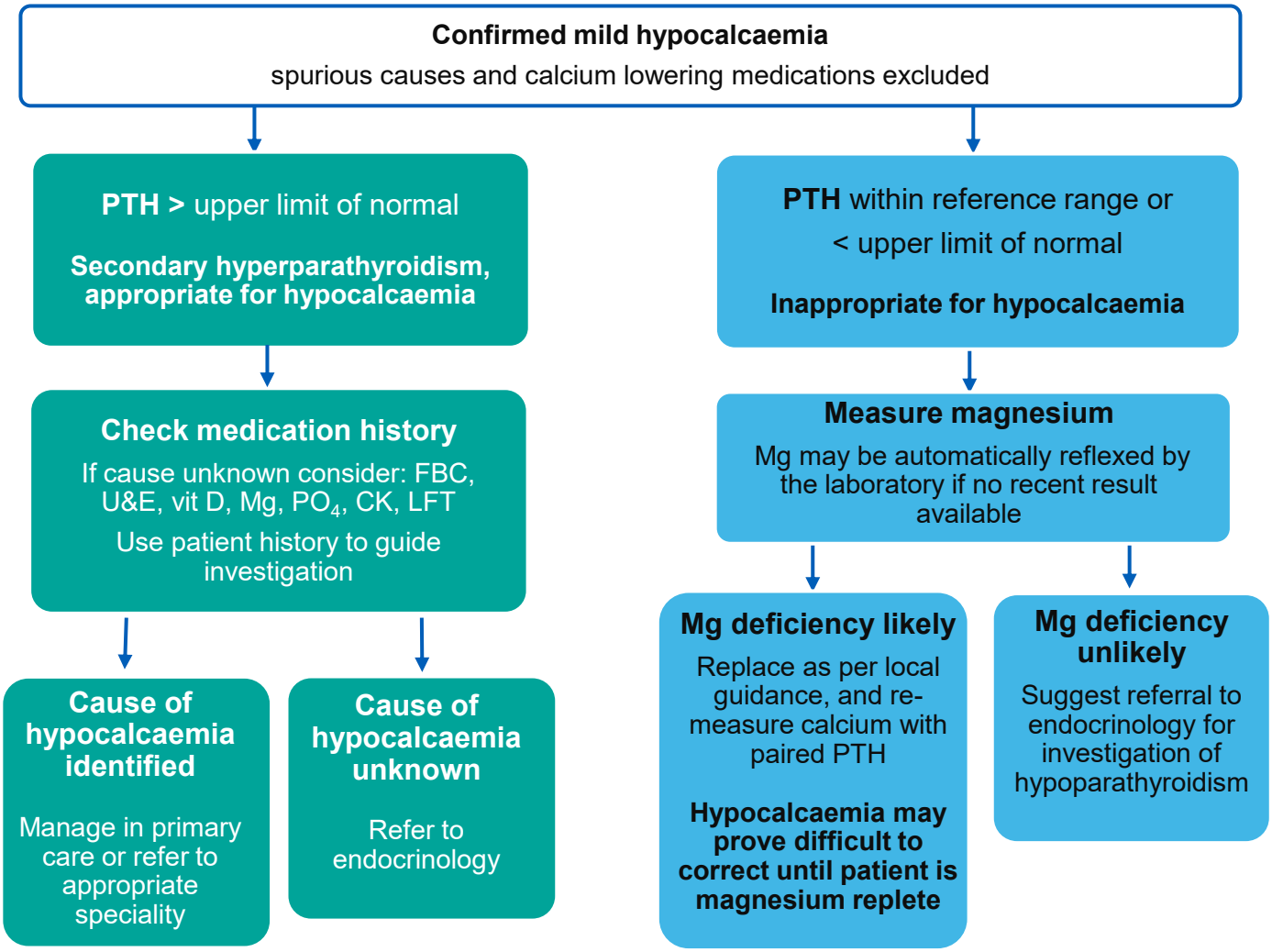
Symptoms

Paraesthesia, tetany, muscle twitching, weakness, hypotension, seizures, arrythmia, papilloedema, cataracts, skin and dental changes, dementia, anxiety, depression. Trousseau's sign and/or Chovstek's sign may be present.

Note: mild to moderate hypocalcaemia is usually asymptomatic, acute onset is more likely to be symptomatic than chronic.

Causes

- **Factitious** hypocalcaemia - results will be removed if detected by laboratory
  - EDTA contamination (typical pattern of low calcium, magnesium and ALP with raised potassium)
  - Sodium citrate contamination (typical pattern of low calcium and magnesium with raised sodium without a similar increase in chloride)
  - Hypoproteinemia – will cause low total calcium, adjusted calcium is not valid if albumin <20 g/L
- **Vitamin D deficiency - the most common cause**
- **Hypoparathyroidism**
  - Primary due to genetic defects
  - Acquired due to hypomagnesaemia, autoimmune, radiation, infiltrative (Haemochromatosis, Wilsons, tumour), post parathyroidectomy, idiopathic
- **Chronic kidney disease** due to functional vitamin D deficiency, and/or hyperphosphataemia
- **Medications** e.g. (not exhaustive): bisphosphonates, denosumab, foscarnet, cinacalcet, PPIs, anti-convulsant
- **Low dietary intake** e.g. alcoholism – usually coexists with other nutritional deficiencies
- **Malabsorption** e.g. IBD, gastric-bypass
- **Acute severe illness**
  - Pancreatitis, rhabdomyolysis, post significant blood transfusion, sepsis
- **Malignancy**
  - Osteoblastic metastases (prostate, breast), tumour lysis syndrome
- **Hungry bone syndrome** can occur post parathyroidectomy or thyroidectomy



Further investigations

Investigation	Rationale
FBC	To investigate for haematological malignancy
U&E, eGFR	To investigate for AKI and CKD
Vitamin D	To exclude vitamin D deficiency, may be normal in vitamin D resistance or receptor mutations
LFT	ALP may be raised in osteoblastic metastases, ALT may be raised in IBD or pancreatitis
Magnesium	To exclude hypomagnesaemia, causes include PPIs, bisphosphonates, diuretics, cytotoxic drugs, aminoglycosides and loop diuretics, severe diarrhoea, malnutrition, alcoholism
	To exclude hypermagnesemia, causes include tumour lysis syndrome, rhabdomyolysis
Phosphate	To exclude hyperphosphataemia, causes include renal impairment, hypoparathyroidism, excessive intake of parenteral phosphate, tumour lysis syndrome and severe haemolysis
CK	To exclude rhabdomyolysis
Urate*	Hyperuricaemia is a finding in tumour lysis syndrome
Amylase*	To exclude acute pancreatitis

** Typically only appropriate for selected patients in secondary care, not routinely indicated in primary care.*