Guideline for the Management of Hypomagnesaemia in Adults

This guideline is only for use in hypomagnesaemia, not for other therapeutic indications.

Overview
Magnesium is an essential constituent of many enzyme systems, particularly those involved in energy generation; the largest stores are in the skeleton. Hypomagnesaemia may cause secondary hypocalcaemia and hypokalaemia.

Signs and symptoms of hypomagnesaemia
(2-4) (More likely if levels <0.5mmol/L)
Anorexia, nausea, confusion, weakness, ataxia, paraesthesia, tetany, tremor, muscle fasciculations. Cardiac arrhythmias may occur. Digitalis toxicity may be exacerbated. With very low levels seizures, drowsiness and coma.

Causes of hypomagnesaemia
(1-4,9)
Reduced intake, anorexia, malabsorption due to short bowel, coeliac disease, Crohn’s disease. Excessive losses e.g. in diarrhoea, stoma or fistula output, NG losses, renal losses. Chronic alcoholism, uncontrolled diabetes, ketoacidosis, disorders of the parathyroid gland, low vitamin D levels, acute pancreatitis, re-feeding syndrome, severe burns, genetic causes. Drugs e.g. aminoglycosides, amphotericin B, ciclosporin, cisplatin, theophylline, proton pump inhibitors, digoxin and diuretics.

Precautions to treatment
(2,5)
Parenteral magnesium should be avoided in patients with heart block or myocardial damage. Renal impairment increases the risk of hypermagnesaemia developing, consider dose reduction. Myasthenia gravis (may worsen symptoms), hepatic failure. Laxative effect of oral salts – caution if pre-existing diarrhoea or high output stoma or fistula.

Side effects of treatment
(2,6)
Oral magnesium salts cause diarrhoea so give with food if possible to reduce this. Hypermagnesaemia – more common with IV treatment or in renal impairment – see symptoms below. Hypocalcaemia, phlebitis. Rapid IV administration may cause hypotension and flushing.

Interactions
(1)
Oral magnesium salts reduce absorption of oral bisphosphonates – see BNF individual entries.

Monitoring
(2,6,8)
With IV administration monitor blood pressure, heart rate, respiratory rate. Consider ECG monitoring with administration rates >8mmol/hr. Urine output (if low then magnesium may accumulate). Signs of hypermagnesaemia (may begin at levels >2mmol/L) - important symptoms are respiratory depression and loss of tendon reflexes due to neuromuscular blockade. Other symptoms of hypermagnesaemia include flushing, thirst, nausea and vomiting, drowsiness, confusion, weakness, double vision, slurred speech, hypotension, bradycardia and coma. Complete heart block or cardiac arrest at levels >6.0-7.5 mmol/L.

Choice of oral/enteral treatment (see BNF for details)
1st line Magnesium hydroxide mixture 8% (7mmol/5ml) (not licensed for hypomagnesaemia). Alternative – magnesium aspartate 10mmol sachets, one twice a day - preferred in pre-existing diarrhoea or high output stoma. (Not licensed with GFR < 30 ml/min) For jejunal administration use magnesium aspartate sachets. Magnesium oxide capsules and magnesium glycerophosphate tablets reserved for specialist use only.
**What is patient’s magnesium level?**
(Reference range 0.7-1.0 mmol/l)

- **<0.5 mmol/l*:**
  - Prescribe 20mmol magnesium in 100ml or 250ml of compatible fluid IV over 3 to 4 hours.
  - If having IV fluids can add 20mmol magnesium to 500ml or 1L bag of compatible fluid and give IV over 3 to 24 hours.
  - If patient also has hypokalaemia generally give magnesium first; do not combine magnesium and potassium in the same bag.

- **≥0.5 - <0.7 mmol/l*:**
  - Symptoms of hypomagnesaemia?
    - Yes
      - Prescribe 8mmol magnesium in 100ml compatible fluid IV over 2 hours.
      - Monitor magnesium level daily. Restart assessment at top of chart.
    - No
      - Is oral access available? (Including enteral feeding tubes terminating in the stomach)
        - Yes
          - Prescribe regular magnesium hydroxide mixture 7mmol/5ml at 5ml TDS with or after food (see ‘choice of oral treatment’) May increase to 10ml TDS if necessary. Diarrhoea/stoma output may be dose limiting.
          - Monitor magnesium level closely and continue accordingly.
        - No
          - See page 1 for jejunal feeding tubes

**Intravenous administration**
Compatible infusion fluids:
- sodium chloride 0.9%
- glucose 5%
Magnesium sulphate 50% is used for making IV solution.
- 1g (4mmol) in 2ml amps
- 5g (20mmol) in 10ml amp

**Notes**
- Higher doses may be given if necessary e.g. 40mmol may be given in 100ml of compatible fluid over 2 hours via a central line with appropriate monitoring.
- Concentrations over 20mmol/100ml should ideally be given via a central line – see Medusa
- With rates above 8mmol/hr close monitoring including ECG is recommended. Maximum rate 36mmol/hr
- See Medusa for further details.
- For TPN patients: please liaise with pharmacy manufacturing or dietetics.

For further advice please contact Medicines Information.
☎ GRH: 6108 ☎ CGH: 3030
References

5. Torbay & South Devon NHS Foundation Trust. Summary of Product Characteristics for Magnesium sulphate inj 50%. Last updated on the eMC 10.10.18 Accessed online via: www.emc.medicines.org.uk on 20.5.20