Formulary Guidance for the Prescribing and Administration of Magnesium

Magnesium is prescribed locally for the following indications:

1. Hypomagnesaemia
2. Treatment of Seizures and Prevention of Recurrent Seizures in Pre-eclampsia (see MSG 14)

Magnesium for Hypomagnesaemia

(see also SPS Article for a referenced version of this guidance, which has been adapted for local use):

Magnesium (Mg^{++}) replacement should be prescribed for patients with a serum Mg^{++} level of 0.4mmol/l or less. For patients with a serum Mg^{++} level of 0.4 to 0.7mmol/l, magnesium replacement should be considered if the patient presents with symptoms of hypomagnesaemia or following a clinical risk/benefit decision.

Magnesium is renally excreted and should be used with caution in patients with renal impairment as they are at a higher risk of adverse effects. Magnesium salts should be used with caution in patients with myasthenia gravis, patients with hepatic impairment at risk of developing renal impairment, and respiratory insufficiency.

Parenteral magnesium should be avoided in patients with heart block or myocardial damage. In patients with severe renal impairment, parenteral magnesium should be avoided if possible, or used with great caution, as they are at a higher risk of side effects.

Oral magnesium replacement

Oral magnesium replacement should be considered first, as a sudden rise in serum magnesium concentration (as seen following intravenous replacement) partially removes the stimulus for magnesium retention, and up to 50% of the infused magnesium is excreted in the urine.

The standard dose of oral magnesium for hypomagnesaemia is 20mmol daily in divided doses, ie. *Magnaspartate sachets (containing 10mmol Mg^{++}) 1 sachet BD*
The need for therapy should be reviewed on a daily basis and initially a three day course should be prescribed.

Oral magnesium salts commonly cause diarrhoea, which may be reduced by administration with or after food.

Adapted from SPS Article by Lee Wilson, Consultant Pharmacist
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Parenteral magnesium replacement

Oral magnesium replacement should be considered first (see above). If oral magnesium replacement is not appropriate, intravenous magnesium therapy may be considered, using magnesium sulfate injection 20%

Dosing is largely empirical and depends on severity.

For reference, 4mmol = 1g magnesium sulfate; and infusion fluid = sodium chloride 0.9% or glucose 5%

Mild hypomagnesaemia (plasma level 0.5 – 0.69mmol/L) and asymptomatic

Magnesium sulphate 16mmol (20ml x magnesium sulfate 20%) in 100ml infusion fluid over 4 hours intravenously

Moderate/Severe hypomagnesaemia (plasma level <0.5mmol/L) or symptomatic

Magnesium sulphate 40mmol (50ml x magnesium sulfate 20%) in 250ml infusion fluid over 4 hours intravenously.
For patients with renal impairment, consider reducing the dose to 20mmol.
Repeat as necessary (up to 160mmol magnesium over 5 days) depending on repeat plasma level and/or patient symptoms.

Volume of fluid is not critical but:

- Maximum peripheral concentration is 20% (20mmol in 25ml) although concentrations over 5% (20mmol in 100ml) should be given centrally due to high osmolarity and risk of phlebitis
- In patients with severe symptoms, following assessment of the risks and benefits, the above infusion (40mmol in 250ml) can be run at 4ml/min (over just over 1 hour rather than 4 hours).
- In surgical/dehydrated patients the volume of infusion fluid could be increased to 1 litre

Important points to consider for parenteral magnesium therapy:
Magnesium sulphate has a high osmolarity and may cause tissue damage if it extravasates into the surrounding tissue.
Parenteral magnesium therapy should be avoided in patients with heart block or myocardial damage.

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Monitor serum magnesium concentration regularly.
During administration of intravenous magnesium monitor:

- heart rate,
- blood pressure,
- respiratory rate,
- urine output and
- for signs and symptoms of hypermagnesaemia

Signs and symptoms of hypermagnesaemia include respiratory depression, loss of deep tendon reflexes, nausea, vomiting, flushing of the skin, thirst, hypotension due to peripheral vasodilatation, drowsiness, confusion, slurred speech, double vision, muscle weakness, bradycardia, coma, and cardiac arrest.

Adverse effects of magnesium therapy are rare, but include hypersensitivity, diarrhoea (following oral magnesium therapy) and hypermagnesaemia. Patients with renal impairment are at a higher risk of adverse effects.

Hypomagnesaemia may be a symptom of refeeding syndrome. If occurring in the presence of other electrolyte deficiencies, consider this diagnosis and do not attempt to reintroduce nutrition without first obtaining guidance from a dietitian. See 'A Practical Guide to Nutritional Support in Adults (PAT/T 43 v2)' for more information.

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