Formulary Guidance for the Prescribing and Administration of Magnesium

Magnesium is prescribed locally for a number of indications:

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

**Magnesium for Hypomagnesaemia**
(see also [UKMi Q&A no. 350.2](#) 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++) i 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.

**For reference, 4mmol Mg++ = 1g Magnesium Sulphate**

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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 sulphate injection 20%.

Prepare a solution containing 16mmol – ie. one 20ml vial of magnesium sulphate 20% injection* – in 1 litre of sodium chloride 0.9% or glucose 5% and infuse over 6 hours. In an emergency situation, the period of infusion can be reduced to three hours, and where fluid restriction is needed, the magnesium can be given in 30ml of sodium chloride 0.9% (withdraw 20ml from a 50ml bag then add 20ml 20% injection). In severe deficiency, up to 160mmol magnesium may be required over 5 days to correct deficiency. After initial intravenous administration, it may be appropriate to give magnesium orally to replenish the magnesium stores.

*where unavailable, use 20mmol – one vial of magnesium sulphate 50% injection

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.

Monitor serum magnesium concentration regularly.

During administration of intravenous magnesium monitor:

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

Signs and symptoms of hypermagnesaemia include muscle weakness, ataxia, tremor, seizures, carpopedal spasm; ventricular arrhythmias, ECG abnormalities; depression, psychosis; vertigo; and hyperinsulinaemia.

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 dietician. See ‘A Practical Guide to Nutritional Support in Adults’ for more information.

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.


Please Note: The information contained in this site should only be used in the context of a Critical Care/Anaesthesia Environment or after discussion with a member of the Department of Critical Care. The Department of Anaesthetics and Critical Care takes no responsibility for use of this information outside these parameters.

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Appendix 1: Magnesium for Pre-Eclampsia

This is the anticonvulsant of choice for the treatment of Eclampsia. Magnesium appears to act primarily by relieving cerebral vasospasm.

The intravenous (IV) route is preferred (intramuscular injections are painful and are complicated by local abscess formation in 0.5% of cases).

**Magnesium Sulphate Regime**
The 20% solution is to be utilised (where available) given that the 50% solution would need diluting prior to administration.

Draw up 60ml of 20% solution, ie. 48mmol.

**Loading Dose:**
16mmol given by slow IV injection over 5 to 10 minutes (20ml of 20% solution)

**Maintenance dose:**
4mmol/hr for 24 hours (or 24 hours after the last seizure)
Infuse at 5mls/hr via syringe driver

**50% Solution=20mmol in 10ml**
*Only to be utilised when 20% solution is not available*

THIS STRENGTH MUST BE DILUTED
Draw up 10 x 10ml amps = 100ml 50% solution.
Remove 100ml from a 500ml bag of Sodium Chloride 0.9%.
Add 100ml Magnesium Sulphate 50% to the remaining 400ml of Sodium Chloride (making a 10% solution) = 4mmol in 10ml

**Loading Dose:**
16mmol given slowly over 5 to 10 minutes (40ml of the 10% solution).
Practically, this is achieved by withdrawing the 40ml into a labelled 50ml syringe. Once the loading dose has been administered, the remainder of the solution can be infused as a maintenance dose.

**Maintenance dose** is 4mmol/hour (an infusion rate of 10ml/hour).

**Caution:** If the woman has received prior Nifedipine this should be discontinued before commencement of Magnesium Sulphate. Prescribers should be aware of a potential interaction between Nifedipine and Magnesium Sulphate, which may result in hypotension and neuromuscular blockade.

**For reference, 4mmol Mg**\(^{++}\) = 1g Magnesium Sulphate