NHS Grampian Staff Guidance For The Management Of Hypomagnesaemia In Adults

Co-ordinators: 
Senior Medicines Information Pharmacist

Consultation Group: 
See Page 4

Approver: 
Medicine Guidelines and Policies Group

Signature: 

Identifier: 
NHSG/Hypomag/MGPG961

Review Date: 
June 2021

Date Approved: 
June 2018

Uncontrolled when printed

Version 4.1 (Amended August 2018)

Executive Sign-Off

This document has been endorsed by the Director of Pharmacy and Medicines Management

Signature: _______________________________
Title: NHS Grampian Staff Guidance For The Management Of Hypomagnesaemia In Adults

Unique Identifier: NHSG/Hypomag/MGPG961

Replaces: NHSG/Hypomag/MGPG961, Version 4

Across NHS Boards | Organisation Wide | Directorate | Clinical Service | Sub Department Area
--- | --- | --- | --- | ---
Yes | | | | 

This controlled document shall not be copied in part or whole without the express permission of the author or the author’s representative.

Lead Author/Co-ordinator: Medicines Information Pharmacist

Subject (as per document registration categories): Prescribing and Prescription

Key word(s): Policy management acute hypomagnesaemia adults symptoms signs hypomagnesaemia side magnesium intravenous supplementation oral IV Infusion

Process Document: Policy, Protocol, Procedure or Guideline

Document application: NHS Grampian

Purpose/description: Instruction on how to correct hypomagnesaemia in adults in NHS Grampian.

Responsibilities for implementation:

Organisational: Chief Executive and Management Teams
Corporate: Senior Managers
Departmental: Heads of Service/Clinical Leads
Area: Line Managers
Hospital/Interface services: Assistant General Managers and Group Clinical Directors
Operational Management Unit: Unit Operational Managers

Policy statement: It is the responsibility of all staff to ensure that they are working to the most up to date and relevant policies, protocols procedures.

Review: This policy will be reviewed in three years or sooner if current treatment recommendations change.
Responsibilities for review of this document: Medicines Information Pharmacist

Responsibilities for ensuring registration of this document on the NHS Grampian Information/ Document Silo: Pharmacy and Medicines Directorate

Physical location of the original of this document: Pharmacy and Medicines Directorate

Job/group title of those who have control over this document: Medicines Information Pharmacist

Responsibilities for disseminating document as per distribution list: Medicines Information Pharmacist

Revision History:

<table>
<thead>
<tr>
<th>Revision Date</th>
<th>Previous Revision Date</th>
<th>Summary of Changes (Descriptive summary of the changes made)</th>
<th>Changes Marked* (Identify page numbers and section heading)</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 2018</td>
<td>February 2016</td>
<td>Addition of licensed magnesium glycerophosphate, adjustment of 1\textsuperscript{st} and 2\textsuperscript{nd} line options, adjustment of Maalox formulation, removal of unlicensed magnesium glycerophosphate preparations, adjustment of summary paragraph to reflect changes.</td>
<td>P2 - Oral magnesium supplementation</td>
</tr>
<tr>
<td>June 2018</td>
<td>February 2016</td>
<td>Additional monitoring added as per Medusa.</td>
<td>P3 - intravenous supplementation</td>
</tr>
<tr>
<td>June 2018</td>
<td>February 2016</td>
<td>Updated references.</td>
<td>P4 - references</td>
</tr>
<tr>
<td>August 2018</td>
<td>February 2016</td>
<td>Mucogel added.</td>
<td>P3 - 2\textsuperscript{nd} line oral options</td>
</tr>
<tr>
<td>August 2018</td>
<td>February 2016</td>
<td>Oral options simplified.</td>
<td>P2 - Oral magnesium supplementation</td>
</tr>
</tbody>
</table>

* Changes marked should detail the section(s) of the document that have been amended, i.e. page number and section heading.
NHS Grampian Staff Guidance For The Management Of Hypomagnesaemia In Adults

This guidance is for use within primary or secondary care in NHS Grampian.

Intravenous magnesium replacement should only be used in an acute setting, as outlined below. This guidance is for the use of intravenous magnesium 50%w/v and does not include information on the administration of intravenous magnesium 10%w/v, used in specialist areas only (e.g. ITU, HDU, theatres).

The NHS Grampian reference range for magnesium in plasma is 0.70 – 1.0 mmol/L.

Causes of Magnesium Depletion:

Please note, this list is not exhaustive

- Inadequate dietary intake\textsuperscript{1, 2, 3}
- Severe chronic diarrhoea or vomiting\textsuperscript{1, 2, 3}
- Malabsorption syndromes\textsuperscript{2, 3}, including short bowel syndrome and other causes of intestinal failure
- Refeeding syndrome
- Prolonged administration of magnesium-free intravenous fluids
- Renal disease\textsuperscript{1, 2, 3}, e.g. acute tubular necrosis
- Endocrine disorders, e.g. primary hyperaldosteronism\textsuperscript{1, 2, 3}, diabetic acidosis\textsuperscript{2, 3}, parathyroid disorders\textsuperscript{1}
- Hypercalcaemia\textsuperscript{3}
- Hypokalaemia
- Chronic alcoholism\textsuperscript{1, 3}
- Acute pancreatitis\textsuperscript{1, 3}
- Lactation\textsuperscript{2}
- Drugs (e.g. proton pump inhibitors\textsuperscript{1, 3}, aminoglycosides\textsuperscript{3, 4}, amphotericin B\textsuperscript{3, 4}, ciclosporin\textsuperscript{3, 4}, pentamidine\textsuperscript{3, 4}, cisplatin\textsuperscript{2, 3, 4}, carboplatin, loop and thiazide diuretics\textsuperscript{2, 3}).

Dosage and Administration

The specific regimen for magnesium supplementation is dependent upon the magnesium level and the clinical presentation of the patient. See over for guidance.
Symptoms and Signs of Hypomagnesaemia

- Anorexia, vomiting
- Tremor and choreiform movements
- Weakness, lethargy
- Tetany
- Depression, confusion, agitation
- Seizures
- Cardiac arrhythmias and ECG changes
- Hypertension
- Hypomagnesaemia is often accompanied by hypokalaemia and hypocalcaemia, which may be responsible for many clinical features.

<table>
<thead>
<tr>
<th>Magnesium Level (mmol/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;0.40</td>
</tr>
<tr>
<td>0.40-0.49</td>
</tr>
<tr>
<td>0.50-0.70</td>
</tr>
<tr>
<td>&gt;0.70</td>
</tr>
</tbody>
</table>

Oral Magnesium Supplementation

**Normal Dose:** 15-24 mmol/day in divided doses. Magnaspartate or Neomag are the preferred choices for oral treatment and prevention of magnesium deficiency. Co-magaldrox can be used as a 2nd line option (unlicensed).

1st Line

1. **Magnesium aspartate dihydrate** (Magnaspartate®) - 10 mmol (243mg)/sachet
   - Dose: 1-2 sachets per day.
   - Licensed for administration via gastric, duodenal, and nasal feeding tubes.

   OR

2. **Magnesium glycerophosphate** (Neomag®) - 4mmol (97mg)/tablet
   - Dose: 1-2 tablets administered 3 times per day.
Magnesium hydroxide and aluminium hydroxide mixture as follows:

**Co-magaldrox 195/220** (Mucogel®) – 3.34 mmol magnesium / 5mL

**Co-magaldrox 200/175** (Maalox®) – 3.43 mmol magnesium / 5mL

Initial dose for both Mucogel® or Maalox®: 40mL/day in divided doses (unlicensed use). Shake before use.

Dose should be adjusted to tolerability and response. Diarrhoea may limit the maximum tolerated dose. The aluminium component of co-magaldrox is constipating, and may counteract the diarrhoea to some extent.

Magnesium levels should be monitored, and therapy should be reviewed on a weekly basis. Discontinue treatment if levels are stable and within the normal therapeutic range.

**Intravenous Magnesium Supplementation**
(Only To Be Used In Acute Setting).

**Magnesium sulphate injection 50% w/v** (50% w/v = 500 mg/mL = 2 mmol/mL)\(^\text{10}\).

1 mmol magnesium is contained in approximately 250mg magnesium sulphate (0.5mL of 50% w/v injection).

ECG monitoring is recommended, especially in the elderly. Use with extreme caution in heart block. Monitor blood pressure, respiratory rate, heart rate, urinary output, monitor for signs of hypermagnesaemia, and monitor magnesium, calcium and other electrolyte plasma levels\(^\text{10}\). Extravasation may cause tissue damage\(^\text{10}\).

**N.B. Reduce the dose in renal impairment. It has been suggested to give 25-50% of the normal dose.**

**IV Infusion**\(^\text{10}\)

**Dose: 1st 24 hours:**

Dilute 18mL of 50% solution (9g; 36 mmol) in at least 250mL 0.9% sodium chloride for infusion or 5% glucose, and administer as an intravenous infusion over 10 hours. This dose may be repeated once during the first 24 hours, guided by serum magnesium levels.

**Dose: 24 hours onward:**

Dilute up to 12mL of 50% solution (6g; 24 mmol) in at least 100mL 0.9% sodium chloride for infusion or 5% glucose, and administer as an intravenous infusion over 6 hours.

Mix thoroughly, inverting the bag at least 5 times to avoid 'layering'.
**Maximum concentration**: 200mg/mL (20%; 0.8 mmol/1mL)\textsuperscript{10}.

**Maximum rate**: 150mg/minute (0.6 mmol/minute)\textsuperscript{10}.

Repeat daily with daily monitoring until magnesium is normal. A total of 5 days therapy may be required\textsuperscript{6, 11}.

Infusion is incompatible with alkaline agents. Do not infuse with any other agents unless discussed with a pharmacist.

**N.B.** Alternative intravenous preparations (e.g. magnesium 10\%w/v) are available and may be used in some specialist areas only (e.g. ITU, HDU, theatres) and are not covered in this guidance.

*For further information on managing hypomagnesaemia and Y-siting with other drugs, check Medusa or contact Medicines Information on 01224 552316 (internal extension 52316).*

**Side Effects of Magnesium Administration**\textsuperscript{10, 11}

Generally associated with hypermagnesaemia

- Flushing
- Respiratory depression
- Nausea
- Vomiting
- Thirst
- Hypotension
- Drowsiness
- Muscle weakness
- Cardiac arrhythmias
- Confusion
- Slurred speech
- Double vision
- Diarrhoea following oral administration.

**Consultation Group:**

Endocrinology specialists  
Gastroenterology specialists  
Intensive care specialist

**References:**

10) Magnesium sulphate monograph. Medusa Injectable Medicines Guide. Published 26/03/18. Accessed 30/05/2018