Worcestershire Acute Hospitals NHS Trust

GUIDELINES FOR THE ACUTE TREATMENT OF HYPOMAGNESAEMIA

This guidance does not override the individual responsibility of health professionals to make appropriate decision according to the circumstances of the individual patient in consultation with the patient and / or carer. Health care professionals must be prepared to justify any deviation from this guidance.

INTRODUCTION

This guideline covers the treatment of hypomagnesaemia for adult inpatients.

THIS GUIDELINE IS FOR USE BY THE FOLLOWING STAFF GROUPS:
All qualified healthcare professionals involved in prescribing or administering magnesium supplements for adult patients.

Lead Clinician(s)

Keith Hinton	Clinical Team Lead Pharmacist Critical Care and Surgery WAHT
Approved by MOC:	3rd February 2016
Approved by the Key document Approval Group on:	23rd March 2016
Reviewed:	30th May 2018
Review Date:	30th December 2020
This is the most current document and is to be used until a revised version is available	

Key amendments to this Document:

Date	Amendment	By:
October 2010	Addition oral therapy guidance. Replaces WAHT-CRI-012 as applies to all patients not just ITU	See list
December 2012	No changes – Approved by Nick Hubbard	Keith Hinton
January 2014	Additional monitoring information Updated serum range as per biochemistry	Keith Hinton
December 2015	Addition of magnesium aspartate dehydrate (licensed oral preparation)	Natalie Messer
December 2017	Sentence added in at the request of the Coroner	
March 2018	Document extended for 3 months as approved by TLG	TLG
May 2018	Minor change in formatting to improve clarity of magnesium sulfate dose. No change to clinical content required based on literature review	Ruth Buczko

June 2020	Document extended for 6 months during Covid-19 period	

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INTRODUCTION

This guideline covers the treatment of hypomagnesaemia for adult inpatients.

DETAILS OF GUIDELINE

Classification	Magnesium serum range (mmol/l)
Normal	0.7-1.1
Mild hypomagnesaemia	0.50-0.69
Moderate/severe hypomagnesaemia	< 0.5

NB: Magnesium is mainly an intracellular ion and the serum level may be normal despite significant deficiency.

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Signs and symptoms of hypomagnesaemia (Most commonly occur <0.5mmol/L)	
Musculoskeletal	Muscle twitching, tremor, tetany, cramps, seizures
CNS	Apathy, depression, hallucinations, agitation, confusion
Cardiovascular	Tachycardia, hypertension, arrhythmias, increased digoxin toxicity
Biochemical*	Hypokalaemia, hypocalcaemia, hypophosphataemia, hyponatraemia

* All signs and symptoms are generally non specific and could be attributed to other electrolyte abnormalities. Hypomagnesaemia rarely occurs alone and other electrolyte levels must be checked. In any hypokalaemia not responding to supplementation a decreased magnesium level should be suspected.

Causes of hypomagnesaemia:
Common causes include:

- Vomiting and diarrhea
- Small bowel resection
- Malabsorption states
- Alcoholism
- Chronic renal failure
- Drainage from fistula
- Refeeding syndrome
- Drugs (see below)

Drug induced hypomagnesaemia:
This is not an exhaustive list. Contact your ward pharmacist or Medicines Information (ext 30235) for more details.

- Aminoglycosides
- Amphotericin
- Carboplatin
- Ciclosporin
- Cisplatin
- Diuretics (Loop & Thiazides)
- Foscarnet
- Proton pump inhibitors (PPIs)
- Salbutamol
- Tacrolimus

NB: Potassium sparing diuretics are considered to be magnesium sparing.

TREATMENT:

In acute, severe or symptomatic hypomagnesaemia, cardiac monitoring is advised and magnesium should be given parenterally. Oral magnesium supplementation should be reserved to prevent recurrence of the deficit or to treat non-symptomatic hypomagnesaemia. Oral magnesium supplements can cause diarrhoea and therefore parenteral therapy may be preferred in patients with poor gastrointestinal absorption of magnesium or who are unable to tolerate oral supplements.

For patients at risk of refeeding syndrome, please refer to Trust guideline WAHT-NUT-006. For patients receiving parenteral nutrition please liaise with pharmacy to review the magnesium supplementation within the feed regimen.

IV Administration

- Up to 160mmol magnesium over 5 days may be required to replace the deficit in acute or severe hypomagnesaemia
- Magnesium is given by IV infusion of **magnesium sulfate**.
- Patients should be treated according to symptoms and serum levels. A reduced dosage and additional monitoring should be considered in renal impairment.
- **Infusion fluid:** Sodium chloride 0.9% or glucose 5%.

Dosing is largely empirical and depends on severity.

Mild (plasma level 0.5 – 0.69mmol/L) or asymptomatic
Magnesium sulfate 5g (20mmol Magnesium) in 100ml infusion fluid over 2 to 4 hours intravenously

Moderate/Severe hypomagnesaemia (plasma level <0.5mmol/L) or Symptomatic
Magnesium sulfate 10g (40mmol Magnesium) in 250ml infusion fluid over 2 to 4 hours intravenously For patients with renal impairment, consider reducing the dose to 20mmol and repeating as necessary 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 ideally be given centrally due to high osmolarity and risk of phlebitis
- Maximum rate is 150mg/min (20mmol over 33mins)

Oral Administration

- To prevent recurrence of the deficit or to treat non-symptomatic hypomagnesaemia, magnesium may be given orally as a dose of 10-20mmol magnesium daily (10mmol once daily or 10mmol twice daily).
- This can be given as **1 sachet once daily or 1 sachet twice daily of magnesium L-Aspartate as Magnaspartate® sachets** depending on severity of deficiency.
- Magnaspartate® sachets contain 243mg (10mmol) of magnesium.
- The contents of the sachet should be reconstituted and given immediately. (It can be reconstituted in 50-200mls of water, orange juice or tea).
- If this is insufficient in maintaining serum magnesium level within normal range, switching to an alternative magnesium salt may be possible and appropriate e.g. magnesium hydroxide 5mls three times daily. Please contact your ward pharmacist or medicines information (extension 30235) for more information.
- In prolonged deficiency states e.g. short bowel syndrome, high ileostomy output please refer the patient to the dietitian for assessment and optimisation of dietary intake.
- Contact your ward pharmacist or medicines information (extension 30235) for more information on the use of magnaspartate in pregnancy, breastfeeding and patients with feeding tubes.

MONITORING:

Magnesium levels should be checked daily as plasma levels may be artificially high whilst magnesium equilibrates with the intracellular compartment. Monitor calcium and other electrolyte plasma levels in patients with hypomagnesaemia.

However if toxicity is suspected treatment should be discontinued.
Patients at risk of hypermagnesaemia include the elderly and patients with renal insufficiency.
Clinical signs include:

- Hypotension
- Bradycardia
- Respiratory depression

- Depressed mental state
- Nausea and vomiting
- ECG abnormalities

During intravenous magnesium supplementation, monitor blood pressure, respiratory rate, heart rate, signs of hypermagnesaemia.

Monitoring Tool

Page/ Section of Key Document	Key control:	Checks to be carried out to confirm compliance with the policy:	How often the check will be carried out:	Responsible for carrying out the check:	Results of check reported to: *(Responsible for also ensuring actions are developed to address any areas of non-compliance)*	Frequency of reporting:
Page 4	All patients identified as acute hypomagnesaemia will have their plasma levels monitored daily until plasma concentration is in range and stable	Audit	Every 12 months	Nutrition and hydration committee	To directorates as appropriate	Annually

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CONTRIBUTION LIST

Key individuals involved in developing the document

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Circulated to the chair of the following committee's / groups for comments

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Supporting Document 1 - Equality Impact Assessment Tool

To be completed by the key document author and attached to key document when submitted to the appropriate committee for consideration and approval.

		Yes/No	Comments
1.	**Does the policy/guidance affect one group less or more favourably than another on the basis of:**		
	Race	No	
	Ethnic origins (including gypsies and travellers)	No	
	Nationality	No	
	Gender	No	
	Culture	No	
	Religion or belief	No	
	Sexual orientation including lesbian, gay and bisexual people	No	
	Age	No	
2.	**Is there any evidence that some groups are affected differently?**	No	
3.	**If you have identified potential discrimination, are any exceptions valid, legal and/or justifiable?**	No	
4.	**Is the impact of the policy/guidance likely to be negative?**	No	
5.	**If so can the impact be avoided?**	N/A	
6.	**What alternatives are there to achieving the policy/guidance without the impact?**	N/A	
7.	**Can we reduce the impact by taking different action?**	N/A	

If you have identified a potential discriminatory impact of this key document, please refer it to Human Resources, together with any suggestions as to the action required to avoid/reduce this impact.

For advice in respect of answering the above questions, please contact Human Resources.

Supporting Document 2 – Financial Impact Assessment

To be completed by the key document author and attached to key document when submitted to the appropriate committee for consideration and approval.

	Title of document:	Yes/No
1.	Does the implementation of this document require any additional Capital resources	No
2.	Does the implementation of this document require additional revenue	No
3.	Does the implementation of this document require additional manpower	No
4.	Does the implementation of this document release any manpower costs through a change in practice	No
5.	Are there additional staff training costs associated with implementing this document which cannot be delivered through current training programmes or allocated training times for staff	No
	Other comments:	

If the response to any of the above is yes, please complete a business case and which is signed by your Finance Manager and Directorate Manager for consideration by the Accountable Director before progressing to the relevant committee for approval