NICE advice

# Preventing recurrent hypomagnesaemia: oral magnesium glycerophosphate

Evidence summary
Published: 29 January 2013

www.nice.org.uk/guidance/esuom4

## Key points from the evidence

The content of this evidence summary was up-to-date in January 2013. See summaries of product characteristics (SPCs), British national formulary (BNF) or the MHRA or NICE websites for up-to-date information.

Magnesium glycerophosphate is a magnesium salt that is available as a tablet, capsule, liquid solution or liquid suspension for oral use.

The British national formulary (BNF) states that oral magnesium glycerophosphate is a suitable preparation to prevent recurrence of symptomatic hypomagnesaemia in people who have already been treated for this condition. This evidence summary looks at the use of oral magnesium glycerophosphate in patients who have previously been treated with an intravenous infusion of magnesium. Oral magnesium glycerophosphate does not have UK marketing authorisation for this or any other indication, and therefore it is an unlicensed

medicine in the UK.

No published clinical trials comparing the efficacy of oral magnesium glycerophosphate with placebo or any form of active treatment for preventing recurrent hypomagnesaemia after treatment with intravenous magnesium were identified. The only evidence found was from 3 case reports describing the use of oral magnesium glycerophosphate for preventing recurrent hypomagnesaemia in adults after intravenous treatment.

Two of the 3 case reports concerned patients who had short bowel syndrome due to surgical resection. In both these patients, oral magnesium glycerophosphate was not sufficient to maintain serum magnesium levels after initial intravenous treatment. In 1 patient, switching from oral magnesium glycerophosphate to oral magnesium oxide resulted in maintenance of serum magnesium levels, but in the other patient this was still not sufficient and intravenous magnesium top ups were needed every 3–6 months. The third case report was of a patient with hypomagnesaemia associated with proton pump inhibitor use. In this patient, magnesium levels remained low after oral supplementation with magnesium glycerophosphate but reverted to normal after the proton pump inhibitor was discontinued, even after the magnesium supplement was stopped.

No studies of oral magnesium glycerophosphate for preventing recurrent hypomagnesaemia in children after intravenous treatment were identified.

The most frequently cited side effect of magnesium salts is diarrhoea.

# About this evidence summary

'Evidence summaries: unlicensed or off-label medicines' summarise the published evidence for selected unlicensed or off-label medicines that are considered to be of significance to the NHS, where there are no clinically appropriate licensed alternatives. The summaries provide information for clinicians and patients to inform their decision-making and support the construction and updating of local formularies.

The summaries support decision-making on the use of an unlicensed or off-label medicine for an individual patient, where there are good clinical reasons for its use, usually when there is no licensed medicine for the condition requiring treatment, or the licensed medicine is not appropriate for that individual.

The strengths and weaknesses of the relevant evidence are critically reviewed within this

summary, **but this summary is not NICE guidance**.

# Update

The following information has become available since this ESUOM was produced.

**July 2015: Availability of a licensed magnesium salt**

A licensed magnesium product has now been launched in the UK. Magnaspartate is indicated for treating and preventing magnesium deficiency. The cost of Magnaspartate (excluding VAT) is £8.95 for 10 sachets. Cost taken from MIMS, July 2015.

In line with the guidance from the General Medical Council (GMC), unlicensed or off-label medicines should be used only where there is no suitably licensed medicine that will meet the patient's need.

# Overview for healthcare professionals

Oral magnesium glycerophosphate is used to prevent recurrence of symptomatic hypomagnesaemia in people who have already been treated for this condition, generally by intravenous infusion, which is the indication being assessed in this evidence summary.

## Regulatory status of oral magnesium glycerophosphate

Oral magnesium glycerophosphate does not have marketing authorisation in the UK for preventing recurrent hypomagnesaemia, or for any other indications. Therefore it is an unlicensed medicine in the UK.

In line with the guidance from the General Medical Council (GMC), it is the responsibility of the prescriber to determine the clinical need of the patient and the suitability of using oral magnesium glycerophosphate.

No other oral magnesium supplements have marketing authorisation in the UK for preventing recurrent hypomagnesaemia.

# Evidence statements

- Oral magnesium glycerophosphate is an option described in the British national formulary (BNF) and BNF for children for preventing recurrent hypomagnesaemia.
- No clinical trials were found. Only 3 individual case reports on oral magnesium glycerophosphate for preventing recurrent hypomagnesaemia after treatment with an intravenous infusion in adults were identified.
- Two reports described patients with short bowel syndrome[1],[2] and the third was in a patient taking a proton pump inhibitor[3]. In these 3 patients, oral magnesium glycerophosphate was not sufficient to maintain normal serum magnesium levels.
- No evidence to support the use of oral magnesium glycerophosphate for preventing recurrent hypomagnesaemia in children after intravenous treatment was identified.

# Summary of the evidence

This section gives a brief summary of the main evidence. A more thorough analysis is given in the Evidence review section.

## Efficacy

No published clinical trials comparing the efficacy of oral magnesium glycerophosphate with any active comparator or placebo for preventing recurrent hypomagnesaemia after treatment with intravenous magnesium were identified.

Three case reports described the use of oral magnesium glycerophosphate for preventing recurrent hypomagnesaemia in adults after intravenous treatment. Two of the reports were in patients with short bowels due to surgical resection[1],[2]. In both patients, oral magnesium glycerophosphate was not sufficient to maintain serum magnesium levels. In 1 patient, switching to oral magnesium oxide resulted in maintenance of serum magnesium levels, but in the other patient this was still not sufficient and intravenous magnesium top ups were needed every 3–6 months. In the third report, hypomagnesaemia was associated with proton pump inhibitor use[3]. In this patient, magnesium levels remained low after oral magnesium glycerophosphate supplementation, but reverted to normal after the proton pump inhibitor was stopped.

No studies in children were identified.

## Safety

Oral magnesium salts may cause diarrhoea[4],[5]. In patients with renal impairment, magnesium should be avoided or the dose reduced because there is an increased risk of toxicity[4],[6].

## Cost effectiveness and cost

No studies on the cost effectiveness of oral magnesium glycerophosphate for preventing recurrent hypomagnesaemia after intravenous treatment were identified.

The BNF states that 24 mmol $Mg^{2+}$ daily may be given to prevent recurrence of magnesium deficit in adults. Estimated costs for this daily dose are £21.18 for the oral solution, £23.62 for the oral suspension (Drug Tariff, December 2012), between £2.52 and £8.28 per day for tablets, and between £12.24 and £32.40 for capsules (Prescription Cost Analysis, England 2011).

In England in 2011, 25,900 prescriptions for oral magnesium glycerophosphate were dispensed in the community by the NHS, costing around £3.8 million (Prescription Cost Analysis, England 2011).

[1] Ross JR, Dargan PI, Jones AL (2001) A case of hypomagnesaemia due to malabsorption, unresponsive to oral administration of magnesium glycerophosphate, but responsive to oral magnesium oxide supplementation. Gut 48: 857–8

[2] Arasaradnam RP, Bolton RP (2002) Hypomagnesaemia due to malabsorption is not always responsive to oral magnesium oxide supplementation alone. Gut 50: 897

[3] Shabajee N, Lamb EJ, Sturgess I et al. (2008) Lesson of the week: omeprazole and refractory hypomagnesaemia. BMJ 337: 173–5

[4] British national formulary for children (2012)

[5] Merck Manual (2009) Disorders of magnesium concentration

[6] British national formulary (2012)

# Relevance to NICE guidance programmes

No NICE guidance on preventing or treating recurrence of hypomagnesaemia was identified.

# Intervention and alternatives

Magnesium glycerophosphate is a magnesium salt which is available as a tablet, capsule, liquid solution or liquid suspension for oral use.

This evidence summary considers the use of oral magnesium glycerophosphate for preventing recurrent hypomagnesaemia after intravenous treatment.

The BNF states that to prevent recurrence of hypomagnesaemia in adults, oral magnesium may be given in a dose of 24 mmol $Mg^{2+}$ daily in divided doses. It states that magnesium glycerophosphate tablets or liquid are suitable (unlicensed) preparations for this indication, and that they are available from special-order manufacturers or specialist importing companies.

In children aged 1 month to 12 years, the BNF for children recommends that the initial dose of oral magnesium for hypomagnesaemia is 0.2 mmol/kg $Mg^{2+}$ 3 times daily, with the dose adjusted as needed. In children aged 12 to 18 years, it recommends that the initial dose is 4 to 8 mmol $Mg^{2+}$ 3 times daily, adjusted as needed.

## Condition

Hypomagnesaemia is the presence of abnormally low levels of serum magnesium. It is relatively common, being estimated to affect 2.5% to 15% of the general population and up to 65% of patients in intensive care settings. However, most patients with hypomagnesaemia are asymptomatic; symptoms are not usually seen until serum magnesium concentration falls below 0.5 mmol/litre[7].

Causes of hypomagnesaemia include inadequate dietary intake, reduced intestinal absorption and increased renal excretion[7],[8]. Magnesium salts are not well absorbed from

the gastrointestinal tract, with most being absorbed in the small intestine[7],[9]. Excessive losses in diarrhoea, stomata or fistulae are reportedly the most common causes of hypomagnesaemia[9]. Small bowel bypass surgery and diseases that cause malabsorption can also lead to hypomagnesaemia[7].

Magnesium is primarily excreted by the kidneys[9]. Inherited renal tubular reabsorption defects that result in increased excretion of magnesium, such as Gitelman's syndrome, are associated with hypomagnesaemia[7]. Other conditions associated with hypomagnesaemia include malnutrition, anorexia nervosa, chronic alcoholism, total parenteral nutrition, acute pancreatitis, diabetic ketoacidosis, hypersecretion of aldosterone and lactation[7],[8].

Certain drug treatments including diuretics, antibiotics (such as amphotericin B and aminoglycosides), immunosuppressants and chemotherapy drugs (particularly cisplatin) have been associated with hypomagnesaemia[7],[8]. The number of cases of hypomagnesaemia associated with proton pump inhibitors reported in the literature is increasing[7].

The signs and symptoms of hypomagnesaemia include neuromuscular, cardiovascular and metabolic features. Neuromuscular effects include muscle weakness, ataxia, tremor and spasms of the feet and hands. Severe hypomagnesaemia can cause seizures (especially in children) and coma. Cardiovascular effects include arrhythmias and electrocardiogram (ECG) abnormalities[7],[8].

Hypomagnesaemia is often associated with other biochemical and electrolyte abnormalities, such as hypocalcaemia, hypokalaemia, hyponatraemia and metabolic acidosis[7],[9]. Some of the symptoms seen in hypomagnesaemia may relate to these associated abnormalities[7],[8].

There are no national UK guidelines for treating and preventing hypomagnesaemia. The BNF suggests that, for symptomatic hypomagnesaemia, intravenous infusion of magnesium sulfate is initially used and oral magnesium supplements can be given subsequently to prevent recurrence. Intramuscular injection of magnesium sulfate is another option for initial treatment but is painful.

Other sources advise that oral magnesium may be used as first-line treatment, the selection of route of administration being influenced by severity and oral tolerability[8],[10]. Practice varies between hospital trusts[11].

The BNF states that magnesium glycerophosphate tablets or liquid are suitable (unlicensed) preparations for preventing recurrent hypomagnesaemia.

# Alternative treatment options

There are no licensed oral medicines for treating and preventing hypomagnesaemia in the UK. Many unlicensed oral magnesium salts are available in the UK, such as magnesium aspartate, magnesium carbonate, magnesium citrate, magnesium lactate, magnesium orotate, magnesium oxide and magnesium pidolate. Magnesium hydroxide is licensed for use as an antacid, so its use for hypomagnesaemia is off-label. A Medicines Q&A written by UK Medicines Information in 2010 provides a table of examples of oral magnesium preparations available at that time in the UK[12].

Several small studies in healthy volunteers have compared the bioavailability of magnesium preparations. The results are inconclusive but suggest that bioavailability may differ between magnesium salts[13],[14],[15],[16].

The BNF for children lists magnesium-L-aspartate as an option alongside magnesium glycerophosphate for preventing recurrent hypomagnesaemia in children.

[7] Ayuk J, Gittoes NJ (2011) How should hypomagnesaemia be investigated and treated? Clinical Endocrinology 75: 743–6

[8] Merck Manual (2009) Disorders of magnesium concentration

[9] British national formulary (2012)

[10] Agus ZS (1999) Hypomagnesemia. Journal of the American Society of Nephrology 10: 1616–22

[11] UK Medicines Information (2010) How is acute hypomagnesaemia treated in adults?

[12] UK Medicines Information (2010) What oral magnesium preparations are available in the UK and which preparation is preferred for the treatment and prevention of hypomagnesaemia?

[13] Firoz M, Graber M (2001) Bioavailability of US commercial magnesium preparations.

Magnesium Research 14: 257–62

[14] Walker A, Marakis G, Christie S et al. (2003) Mg citrate found more bioavailable than other Mg preparations in a randomised double-blind study. Magnesium Research 16: 183–91

[15] Lindberg J, Zobitz M, Poindexter J et al. (1990) Magnesium bioavailability from magnesium citrate and magnesium oxide. Journal of the American College of Nutrition 9: 48–55

[16] Muhlbauer B, Schwenk M, Coran WM et al. (1991) Magnesium-L-aspartate-HCL and magnesium-oxide: bioavailability in healthy volunteers. European Journal of Clinical Pharmacology 40: 437–8

# Evidence review: efficacy

No published clinical trials comparing magnesium glycerophosphate with placebo or active comparator for preventing recurrent hypomagnesaemia after treatment with intravenous magnesium were identified.

Three case reports on the use of oral magnesium glycerophosphate in adults for preventing recurrent hypomagnesaemia after intravenous treatment were identified[17],[18],[19].

The first patient was a 39-year-old woman who presented with paraesthesia and cramps in the hands and feet for the previous 3 days (Ross et al. 2001). She was also passing increased volumes of fluid secretions into her ileostomy (up to 4–8 litres a day). Fifteen months previously she had extensive resection of the small and large bowel, ileostomy, left nephrectomy, and a hysterectomy as a result of a septic abortion.

She was found to be clinically dehydrated, with low magnesium (0.13 mmol/litre), corrected calcium and albumin, and abnormal renal function. She was rehydrated, given intravenous magnesium at a dose of 60 mmol/day initially, and oral calcium supplements. Her serum calcium normalised and her renal function returned to a stable baseline. Treatment was also given to reduce her ileostomy output.

Oral magnesium glycerophosphate was given in increasing doses to a maximum of 108 mmol/day of magnesium (285 mg, 9 times a day). However, this did not maintain adequate serum magnesium concentrations, and intravenous top ups were needed as a

result of repeat symptomatic episodes of hypomagnesaemia.

An alternative magnesium preparation, magnesium oxide was then substituted. When the patient was taking 67.5 mmol of magnesium per day (300 mg magnesium oxide, 9 times a day), her serum magnesium levels stabilised at 0.58 mmol/litre. She remained asymptomatic after discharge from hospital, with serum magnesium levels between 0.58 and 0.62 mmol/litre with continued magnesium oxide supplementation. Her serum magnesium levels fell to 0.42 mmol/litre when she reduced the dose to 200 mg, 4 times a day, but responded quickly after this was returned to the original dose of 300 mg, 9 times a day.

The patient's hypomagnesaemia was attributed to her extensive bowel resection, because the small intestine is thought to be the area of maximum absorption of magnesium. In this case, absorption appeared to be dependent on the preparation used, but the reason for this was not known.

The second patient was a 65-year-old woman with short bowel syndrome as a result of surgery for colorectal cancer and subsequent abscess formation (Arasaradnam and Bolton 2002). She had high ileostomy output and clinical signs of hypomagnesaemia and hypocalcaemia. Oral magnesium glycerophosphate was not sufficient to maintain her serum magnesium level, and frequent intravenous top ups were needed. The magnesium glycerophosphate was switched to oral magnesium oxide but this did not reduce the need for intravenous top ups. Her condition was managed with ongoing magnesium oxide supplementation plus intravenous magnesium top ups through a peripheral line every 3–6 months.

The third patient was a 78-year-old woman hospitalised after an exacerbation of chronic obstructive pulmonary disease, as well as diarrhoea and vomiting (Shabajee et al. 2008). She had been diagnosed 7 years previously with non-erosive duodenitis, diverticular disease and a hiatus hernia after experiencing postprandial pain, early satiety, nausea and weight loss. She was prescribed omeprazole (40 mg/day) and these symptoms improved slightly.

On admission, the patient was found to be hypokalaemic but her condition did not respond to withdrawal of diuretics and administration of intravenous and oral potassium. She developed hallucinations and agitation on day 4, and had muscle excitability. She was found to be hypokalaemic, hypomagnesaemic, hypocalcaemic and hypophosphataemic.

After administration of intravenous magnesium sulfate, calcium gluconate and continued potassium the patient's symptoms resolved. Her magnesium levels were normal while she was receiving intravenous magnesium, but fell once this stopped. After 10 days she was discharged taking oral magnesium glycerophosphate and a phosphate supplement.

On outpatient follow-up, the patient's serum magnesium and calcium were still low, although tests suggested that her kidney conservation of magnesium was normal, and she no longer had diarrhoea and denied using laxatives or alcohol.

The patient's omeprazole was discontinued because of previous case reports of hypomagnesaemic hypoparathyroidism associated with this drug, and ranitidine was prescribed instead. The patient's electrolyte levels subsequently improved dramatically and were maintained even after the magnesium glycerophosphate was stopped.

No studies of oral magnesium glycerophosphate for preventing recurrent hypomagnesaemia after intravenous infusion in children were identified.

[17] Ross JR, Dargan PI, Jones AL (2001) A case of hypomagnesaemia due to malabsorption, unresponsive to oral administration of magnesium glycerophosphate, but responsive to oral magnesium oxide supplementation. Gut 48: 857–8

[18] Arasaradnam RP, Bolton RP (2002) Hypomagnesaemia due to malabsorption is not always responsive to oral magnesium oxide supplementation alone. Gut 50: 897

[19] Shabajee N, Lamb EJ, Sturgess I et al. (2008) Lesson of the week: omeprazole and refractory hypomagnesaemia. BMJ 337: 173–5

# Evidence: safety

No evidence on the safety of magnesium glycerophosphate was provided in the case reports[20],[21],[22].

The most commonly cited adverse effect of oral magnesium salts is diarrhoea, which may limit treatment[23],[24]. Hypermagnesaemia is reported to be unlikely to occur with oral magnesium supplementation, except in patients with kidney failure[25]. The BNF for children suggests that in patients with renal impairment magnesium glycerophosphate and magnesium-L-aspartate should be avoided or the dose reduced as there is an increased

risk of toxicity.

[20] Ross JR, Dargan PI, Jones AL (2001) A case of hypomagnesaemia due to malabsorption, unresponsive to oral administration of magnesium glycerophosphate, but responsive to oral magnesium oxide supplementation. Gut 48: 857–8

[21] Arasaradnam RP, Bolton RP (2002) Hypomagnesaemia due to malabsorption is not always responsive to oral magnesium oxide supplementation alone. Gut 50: 897

[22] Shabajee N, Lamb EJ, Sturgess I et al. (2008) Lesson of the week: omeprazole and refractory hypomagnesaemia. BMJ 337: 173–5

[23] British national formulary (2012)

[24] Merck Manual (2009) Disorders of magnesium concentration

[25] UK Medicines Information (2010) How is acute hypomagnesaemia treated in adults?

# Evidence: economic issues

## Cost effectiveness

No studies on the cost effectiveness of oral magnesium glycerophosphate for preventing recurrent hypomagnesaemia after intravenous infusion were identified.

## Cost

According to the Drug Tariff, December 2012:

- magnesium glycerophosphate oral solution (magnesium 24.25 mg/ml, equivalent to 1 mmol/ml) costs £176.48 for 200 ml
- magnesium glycerophosphate oral suspension (magnesium 24.25 mg/ml equivalent to 1 mmol/ml) costs £147.61 for 150 ml.

For an adult, the BNF states that 24 mmol $Mg^{2+}$ daily can be given to prevent recurrence of

magnesium deficit. This daily dose would cost £21.18 for the oral solution or £23.62 for the oral suspension based on the Drug Tariff.

The Prescription Cost Analysis for the NHS in England reported that the cost of magnesium glycerophosphate 97.2 mg tablets (equivalent to 4 mmol magnesium) ranged between £0.42 and £1.38 per tablet. Capsules were more expensive, costing £2.04 per 97.2 mg capsule and £2.70 per 48.6 mg capsule.

To provide a dosage of 24 mmol $Mg^{2+}$ daily, 6 tablets or capsules of magnesium glycerophosphate 97.2 mg, or 12 capsules of magnesium glycerophosphate 48.6 mg, would be needed. Based on the costs above, this would cost between £2.52 and £8.28 per day for tablets and between £12.24 and £32.40 per day for capsules (excluding VAT, dispensing costs and fees).

## Current drug usage

The Prescription Cost Analysis for the NHS in England reported that 25,900 community prescriptions for oral magnesium glycerophosphate were dispensed in 2011, costing £3,795,200 (net ingredient cost [NIC]). Information on the indications for which these prescriptions were being used is not available from the Prescription Cost Analysis report.

The most commonly prescribed magnesium glycerophosphate preparations were chewable 97.2 mg tablets (10,000 prescription items prescribed and dispensed by proprietary brand name), followed by non-chewable 97.2 mg tablets (9300 items prescribed and dispensed generically).

# Evidence strengths and limitations

The evidence identified was of low quality. The results in these 3 patients may not be representative of what would occur in most patients with hypomagnesaemia or in patients with hypomagnesaemia resulting from other conditions. The lack of a control group means that it is not possible to compare outcomes across different oral magnesium preparations, different routes of administration, or without magnesium supplementation.

# Summary for patients

A summary written for patients is available on the NICE website.

# References

Agus ZS (1999) Hypomagnesemia. Journal of the American Society of Nephrology 10: 1616–22

Arasaradnam RP, Bolton RP (2002) Hypomagnesaemia due to malabsorption is not always responsive to oral magnesium oxide supplementation alone. Gut 50: 897

Ayuk J, Gittoes NJ (2011) How should hypomagnesaemia be investigated and treated? Clinical Endocrinology 75: 743–6

British national formulary [online; accessed 17 December 2012]

British national formulary for children [online; accessed 17 December 2012]

Firoz M, Graber M (2001) Bioavailability of US commercial magnesium preparations. Magnesium Research 14: 257–62

Lindberg J, Zobitz M, Poindexter J et al. (1990) Magnesium bioavailability from magnesium citrate and magnesium oxide. Journal of the American College of Nutrition 9: 48–55

Merck Manual (2009) Disorders of magnesium concentration [online; accessed 17 December 2012]

Muhlbauer B, Schwenk M, Coran WM et al. (1991) Magnesium-L-aspartate-HCL and magnesium-oxide: bioavailability in healthy volunteers. European Journal of Clinical Pharmacology 40: 437–8

National Health Service Drug Tariff for England and Wales [online; accessed 17 December 2012]

NHS Information Centre, Prescribing and Primary Care (2012) Prescription Cost Analysis England 2011 [online; accessed 17 December 2012]

Ross JR, Dargan PI, Jones AL et al. (2001) A case of hypomagnesaemia due to malabsorption, unresponsive to oral administration of magnesium glycerophosphate, but responsive to oral magnesium oxide supplementation. Gut 48: 857–8

Shabajee N, Lamb EJ, Sturgess I et al. (2008) Lesson of the week: omeprazole and refractory hypomagnesaemia. BMJ 337: 173–5

UK Medicines Information (2010) How is acute hypomagnesaemia treated in adults? [online; accessed 17 December 2012]

UK Medicines Information (2010) What oral magnesium preparations are available in the UK and which preparation is preferred for the treatment and prevention of hypomagnesaemia? [online; accessed 17 December 2012]

Walker A, Marakis G, Christie S et al. (2003) Mg citrate found more bioavailable than other Mg preparations in a randomised double-blind study. Magnesium Research 16: 183–91

# Changes after publication

**July 2015:** Minor maintenance.

# Development of this evidence summary

This evidence summary was developed for NICE by Bazian Ltd. The interim process statement sets out the process NICE uses to select topics for the evidence summaries for unlicensed/off-label medicines and how the summaries are developed, quality assured and approved for publication.

## Project team

Bazian Ltd

Louisa Crossley, Medicines and Prescribing Centre, NICE

# Peer reviewers and contributors

Teresina Pinnington, ARJUN Products Ltd

Victoria Thomas, Patient and Public Involvement Programme, NICE

# Expert advisers

Dr John Ayuk, Department of Endocrinology, Queen Elizabeth Hospital, Birmingham

# Declarations of interest

No relevant interests declared.

# Appendix: Search strategy and evidence selection

## Search strategy

The sources are:

1. NHS Evidence (including guidelines)
2. NICE
3. Broad internet search: Google, for example, magnesium AND glycerophosphate AND (hypomagnesaemia OR hypomagnesemia OR deficit OR deficiency)

### Medline & Embase (via Ovid)

1. (Magnesium adj8 glycerophosphate).mp.
2. Magnesium Deficiency/dh, dt, ep, th
3. (hypomagnesaemia or hypomagnesemia).ti.

4. (review or guideline).mp.
5. (2 or 3) and 4
6. limit 5 to (english language and yr="2002 -Current")
7. 1 or 6

## CRD HTA, DARE and EED database

Magnesium glycerophosphate OR (magnesium AND (Hypomagnesaemia or Hypomagnesemia or defici*))

## Cochrane Central

Magnesium glycerophosphate

## Euroscan

Magnesium glycerophosphate

## Grey literature and ongoing trials

1. FDA
2. EMA
3. MHRA
4. Scottish Medicines Consortium
5. All Wales Medicine Strategy Group
6. Manufacturers' websites as applicable
7. metaRegister of Controlled Trials (mRCT)
8. ClinicalTrials.gov

### Manufacturers' websites

Mitovie Group Ltd

Special Products Limited

Martindale Pharma

Idis

ARJUN Products Ltd

## Evidence selection

Studies were included based on predetermined criteria for relevance to the question set at scoping. The highest quality research was selected as the basis for answering the questions set on efficacy, safety and cost. The only research evidence identified on the use of oral magnesium glycerophosphate to prevent recurrence of hypomagnesaemia was from case reports.

# About 'Evidence summaries: unlicensed or off-label medicines'

NICE evidence summaries for off-label or unlicensed medicines summarise the published evidence for selected unlicensed or off-label medicines that are considered to be of significance to the NHS, where there are no clinically appropriate licensed alternatives. They support decision-making on the use of an unlicensed or off-label medicine for an individual patient, where there are good clinical reasons for its use, usually when there is no licensed medicine for the condition requiring treatment, or the licensed medicine is not appropriate for that individual.

This document provides a summary of the published evidence. The strengths and weaknesses of the identified evidence are critically reviewed within this summary, but this summary is not NICE guidance and does not provide formal practice recommendations.