

Paediatrics/NICU: Magnesium Sulfate

Presentation:	Magnesium sulfate injection 50% (equivalent to 500mg Magnesium sulfate heptahydrate per 1 mL) (= 2mmol Mg ²⁺ per 1 mL), 2 mL ampoules																																									
Indication:	<ul style="list-style-type: none"> Treatment of acute severe asthma in children over 2 years Replacement in hypomagnesaemia 																																									
Dose:	<p>PLEASE PRESCRIBE IN MILLIGRAMS</p> <p>Acute severe asthma [Child ≥ 2 years]:</p> <table border="1"> <thead> <tr> <th>Age</th> <th>Dose (mg)</th> <th>Dose (mL)</th> <th>Dose (mmol)</th> <th>Frequency – as required</th> <th>Administration time</th> </tr> </thead> <tbody> <tr> <td>Child ≥ 2 years</td> <td>40mg/kg</td> <td>0.08ml/kg</td> <td>0.16mmol/kg</td> <td rowspan="2">STAT – repeated every 6-8 hours if required*</td> <td rowspan="2">To be given over at least 20 minutes [see below for more information]</td> </tr> <tr> <td>Maximum dose:</td> <td>2000mg</td> <td>4mL</td> <td>8mmol</td> </tr> </tbody> </table> <p><i>*The safety and efficacy of repeated intravenous doses have not been assessed. Repeated doses could cause hypermagnesaemia with muscle weakness and respiratory failure.</i></p> <p>Hypomagnesaemia:</p> <table border="1"> <thead> <tr> <th rowspan="2">Age</th> <th colspan="3">Equivalents when using magnesium sulfate injection 50%</th> <th rowspan="2">Frequency – as required</th> <th rowspan="2">Administration time</th> </tr> <tr> <th>Dose (in mg)</th> <th>Dose (in mL)</th> <th>Dose (in mmol)</th> </tr> </thead> <tbody> <tr> <td>Neonate (<0.7 mmol/L)</td> <td>100mg/kg</td> <td>0.2ml/kg</td> <td>0.4mmol/kg</td> <td>6 - 12 hourly</td> <td rowspan="3">At a rate <u>not</u> exceeding 10mg/kg/min [see below for more information]</td> </tr> <tr> <td>Child 1 month – 11 years</td> <td>50mg/kg</td> <td>0.1ml/kg</td> <td>0.2mmol/kg</td> <td>12 hourly</td> </tr> <tr> <td>Child 12 years – 17 years</td> <td>1000mg</td> <td>2mL</td> <td>4mmol</td> <td>12 hourly</td> </tr> </tbody> </table>	Age	Dose (mg)	Dose (mL)	Dose (mmol)	Frequency – as required	Administration time	Child ≥ 2 years	40mg/kg	0.08ml/kg	0.16mmol/kg	STAT – repeated every 6-8 hours if required*	To be given over at least 20 minutes [see below for more information]	Maximum dose:	2000mg	4mL	8mmol	Age	Equivalents when using magnesium sulfate injection 50%			Frequency – as required	Administration time	Dose (in mg)	Dose (in mL)	Dose (in mmol)	Neonate (<0.7 mmol/L)	100mg/kg	0.2ml/kg	0.4mmol/kg	6 - 12 hourly	At a rate <u>not</u> exceeding 10mg/kg/min [see below for more information]	Child 1 month – 11 years	50mg/kg	0.1ml/kg	0.2mmol/kg	12 hourly	Child 12 years – 17 years	1000mg	2mL	4mmol	12 hourly
Age	Dose (mg)	Dose (mL)	Dose (mmol)	Frequency – as required	Administration time																																					
Child ≥ 2 years	40mg/kg	0.08ml/kg	0.16mmol/kg	STAT – repeated every 6-8 hours if required*	To be given over at least 20 minutes [see below for more information]																																					
Maximum dose:	2000mg	4mL	8mmol																																							
Age	Equivalents when using magnesium sulfate injection 50%			Frequency – as required	Administration time																																					
	Dose (in mg)	Dose (in mL)	Dose (in mmol)																																							
Neonate (<0.7 mmol/L)	100mg/kg	0.2ml/kg	0.4mmol/kg	6 - 12 hourly	At a rate <u>not</u> exceeding 10mg/kg/min [see below for more information]																																					
Child 1 month – 11 years	50mg/kg	0.1ml/kg	0.2mmol/kg	12 hourly																																						
Child 12 years – 17 years	1000mg	2mL	4mmol	12 hourly																																						
Route of administration:	<p>Magnesium sulfate 50% must ALWAYS be diluted before use.</p> <p>Acute severe asthma: IV Infusion over 20 minutes. (Rate should not exceed 10mg/kg/min)</p> <p>Hypomagnesaemia: Administration over longer periods (e.g. 3-6 hours) will optimise magnesium retention and prevent hypotension.</p>																																									
Instructions for preparation:	<p>Preparation for NICU</p> <p>Prepare a 10% Solution (100mg/ml). Dilute 2 ml vial of magnesium sulfate 50% to a total of 10 ml with diluent. Discard overage.</p> <p>Calculation Example: Baby weighing 1.2 kg Dose required = 100 mg x 1.2 kg = 120 mg, 120mg/100 = 1.2 ml VTBI made up of 0.24 ml magnesium sulfate and 0.96 ml Diluent. Discard overage.</p> <p>Preparation for Paediatrics</p> <p>Prepare a 10% Solution (100mg/ml) by diluting each 1 ml of Magnesium Sulfate 50% to a total of 5 ml with diluent.</p> <p>Calculation Example: Child weighing 10 kg being treated for hypomagnesaemia, Dose required = 50 mg x 10 kg = 500 mg</p>																																									

	<p>500 mg/100 = 5 ml VTBI made up of 1 ml magnesium sulfate 50% + 4ml Diluent.</p> <p><i>Up to 20% (200mg in 1 mL) solution may be given in fluid restriction, if needed, dilute each 1mL of magnesium sulfate 50% <u>to a total</u> of 2.5mL with diluent.</i></p> <p>To calculate concentration of infusion for SMART pumps divide total mg in infusion by total volume of infusion (mls) e.g. 1600mg in 16mls = $\frac{1600}{16} = 100\text{mg/ml}$</p> <p>Suitable diluents include glucose 5%, glucose 10%, sodium chloride 0.45%, sodium chloride 0.9% and glucose/sodium chloride mixtures. Flush with sodium chloride 0.9%</p>
Prescribing	Prescribe on Lorenzo, Meditech or paper chart as per Trust Medicines Code
SMART pump directions	<p>The program for Magnesium Sulphate is found in the "Children" folders</p> <p>Load Syringe, prime line using the pump for accurate dosing</p> <ul style="list-style-type: none"> • Open 'Children' folder then open 'Magnesium Sulphate 50% for asthma' programme. • Using DATA chevrons enter the total VTBI in mls and confirm • Enter the Total Time to infuse in hours and/or minutes then confirm • Visually confirm the rate (ml/h) • Perform STOP moment with medical team (Pump against prescription) • Connect to Child • Press start button
Known compatibility issues	See compatibility chart
Additional Comments:	<p>Monitoring: ECG, blood pressure, respiratory rate, urinary output and for signs of overdose: nausea, vomiting, flushing, thirst, hypotension, weakness, , confusion, reflexes absent (due to neuromuscular blockade), respiratory depression, speech slurred, diplopia, muscle weakness, arrhythmias, coma, and cardiac arrest.</p> <p>Serum calcium levels should be routinely monitored in patients receiving magnesium sulfate. If giving regular Magnesium sulfate, consider checking magnesium levels daily as a minimum.</p> <p>Magnesium sulfate is contraindicated in patients with heart block and myocardial damage.</p> <p>Caution in renal impairment (increased risk of toxicity) and contraindicated in severe impairment</p>

References

British National Formulary for Children accessed online via: www.medicinescomplete.com (Last accessed 06/12/23)

Medusa Injectable Medicines Guide (Paediatric Intravenous Drugs) – Magnesium sulfate. Accessed via: <https://medusa.wales.nhs.uk> (Last accessed 06/12/23)

Summary of Product Characteristics, Magnesium sulphate 50% w/v Solution for Injection or Infusion, , last updated October 2019. Accessed via www.medicines.org.uk (Last accessed 06/12/23)

Micromedex Solutions (Magnesium sulfate) Accessed via: <https://www.micromedexsolutions.com> (Last accessed 06/12/23)

Document control sheet

GUIDELINE NUMBER	CH PH D 17 version 2
AREA IN WHICH THIS MONOGRAPH APPLIES	Paediatrics

DIVISIONAL AUTHORISATION	
GROUP	DATE
Paediatric monograph review group	12.12.2023

AUTHORS		
Author	Position	Date
Written by: Rebecca Devaney	Paediatric Registrar	January 2017
Checked by: Lisa Taylor	Paediatric Pharmacist	January 2017

If review:

	Position	Date
Transferred to new monograph template and reviewed by: Maya Daas	Specialist Clinical Pharmacist Rotational	06/12/19
Checked by:	Ellie Cheale Specialist Women's and Children's Pharmacist	December 2023

Change history:

Changes Reference	Change details	Date
1	Transferred to new template and minor changes made	2/1/20
2	To refer to Medusa for compatibility information, added flushing information. Removed table for max dosing for 1-11 years in line with BNFC	06/12/2023