

## IV Magnesium Sulphate for Status Asthmaticus

**Preparation available in KKH Formulary:** 49.3% w/v MgSO<sub>4</sub> (equivalent to 10mmol/5ml)

Each milliliter contains 2 mmol Mg<sup>2+</sup> = 493mg MgSO<sub>4</sub>

**Target serum level:** 1.5-2.5 mmol/L

**Clinical goal:** Reversal of bronchospasm in the management of status asthmaticus

### Dosing regimen

Loading: 50mg/kg over 30 minutes (Max=2g/dose)

Maintenance infusion: start at 20mg/kg/hr (Range 10 mg/kg/hr – 40mg/kg/hr)

Recommended maximum daily dose= 40g/day

### Dilution:

#### Loading:

Load 50mg/kg MgSO<sub>4</sub> (≈0.1ml/kg of 49.3% w/v MgSO<sub>4</sub>) over 30 minutes (Maximum rate : 150mg/min)

Note: Every 1 ml of 49.3% MgSO<sub>4</sub> should be diluted with 2.5 ml 0.9%NaCl

#### Maintenance:

For MgSO<sub>4</sub> continuous maintenance infusion, select the correct order set in CLMM based on:

a) Whether patient has central or peripheral line

b) Patient's body weight (BW):

**For patients with central line and BW 0-49 kg OR with peripheral line and BW 0-20 kg**

# Dilute **500mg Mg**(= 1ml 49.3% w/v MgSO<sub>4</sub>) X **Body Weight** with 0.9% NaCl to a total volume of 50ml

**For patients with central line and BW 50-99 kg OR with peripheral line and BW 21-40 kg**

# Dilute **250mg Mg** (= 0.5ml 49.3% w/v MgSO<sub>4</sub>) X **Body Weight** with 0.9% NaCl to a total volume of 50ml

**For patients with central line and BW >100 kg OR with peripheral line and BW 41-80 kg**

# Dilute **125mg Mg** (= 0.25ml 49.3% w/v MgSO<sub>4</sub>) X **Body Weight** with 0.9% NaCl to a total volume of 50ml

**For patients with peripheral line and BW ≥ 81 kg**

# Dilute **65mg Mg** (= 0.13ml 49.3% w/v MgSO<sub>4</sub>) X **Body Weight** with 0.9% NaCl to a total volume of 50ml

### Prescribing in CLMM:

1) Check to make sure the weight of the patient is most current weight.

2) Search for the MgSO<sub>4</sub> infusion options under RES.Asthma.KKH -> look under Intravenous

MgSO4 Inj - Loading - 1 item(s)													
<input type="checkbox"/>	Magnesium Sulfate 49.3%...	Loading Dose:...	IV Intermittent	mg	Once	Routine	T	Sodium Chloride 0.9%...	30	minute			
Central : BW 0 - 49 kg - 1 item(s)													
<input type="checkbox"/>	Magnesium Sulfate 49.3%...	Maintenance Dose:...	IV Continuous	mg	<Continuo...	Routine	T	Sodium Chloride 0.9%...	24	hour	20	40	mg/kg/hr
Central : BW 50 - 99 kg - 1 item(s)													
<input type="checkbox"/>	Magnesium Sulfate 49.3%...	Maintenance Dose:...	IV Continuous	mg	<Continuo...	Routine	T	Sodium Chloride 0.9%...	24	hour	20	40	mg/kg/hr
Central : BW ≥ 100 kg - 1 item(s)													
<input type="checkbox"/>	Magnesium Sulfate 49.3%...	Maintenance Dose:...	IV Continuous	mg	<Continuo...	Routine	T	Sodium Chloride 0.9%...	24	hour	20	40	mg/kg/hr
Peripheral : BW 0 - 20 kg - 1 item(s)													
<input type="checkbox"/>	Magnesium Sulfate 49.3%...	Maintenance Dose:...	IV Continuous	mg	<Continuo...	Routine	T	Sodium Chloride 0.9%...	24	hour	20	40	mg/kg/hr
Peripheral : BW 21 - 40 kg - 1 item(s)													
<input type="checkbox"/>	Magnesium Sulfate 49.3%...	Maintenance Dose:...	IV Continuous	mg	<Continuo...	Routine	T	Sodium Chloride 0.9%...	24	hour	20	40	mg/kg/hr
Peripheral : BW 41 - 80 kg - 1 item(s)													
<input type="checkbox"/>	Magnesium Sulfate 49.3%...	Maintenance Dose:...	IV Continuous	mg	<Continuo...	Routine	T	Sodium Chloride 0.9%...	24	hour	20	40	mg/kg/hr
Peripheral : BW ≥ 81 kg - 1 item(s)													
<input type="checkbox"/>	Magnesium Sulfate 49.3%...	Maintenance Dose:...	IV Continuous	mg	<Continuo...	Routine	T	Sodium Chloride 0.9%...	24	hour	20	40	mg/kg/hr

3) Select the desired MgSO<sub>4</sub> infusion option by ticking the box next to it.

4) The order set will auto-calculate the dose of drug based on the current weight of the child.

5) Countercheck the auto-calculated MgSO<sub>4</sub> dose using the formula provided:

E.g.# Dilute **500mg Mg**(= 1ml 49.3% w/v MgSO<sub>4</sub>) X **Body Weight** (central & BW 0-49kg OR peripheral & BW 0-20kg)

E.g.# Dilute **250mg Mg** (= 0.5ml 49.3% w/v MgSO<sub>4</sub>) X **Body Weight** (central & BW 50-99kg OR peripheral & BW 21-40kg)

E.g.# Dilute **125mg Mg** (=0.25ml 49.3% w/v MgSO<sub>4</sub>) X **Body Weight** (central & BW >100kg OR peripheral & BW 40-80kg)

E.g.# Dilute **65mg Mg** (=0.13 ml 49.3% w/v MgSO<sub>4</sub>) X **Body Weight** (peripheral & BW≥ 81kg)

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6) Submit the order set.

**Points to take note during prescribing:**

- 1) Do **NOT** exceed the maximum MgSO<sub>4</sub> loading dose of 2grams, especially for children weighing > 40kg
- 2) For ALL central lines order sets, do **NOT** click on the “Fluid Restricted” option as it will limit the maximum concentration to 20% and may result in a more diluted concentration than desired
- 3) If you change your mind about the “Fluid Restricted” option after clicking, cancel the order and reselect the order set. Unclicking the “Fluid Restricted” option in the order does not reverse the computation and can lead to a more diluted concentration.

**Clinical parameters monitoring:**

- 1) Heart Rate, Blood Pressure, Respiratory Rate every 15 minutes
- 2) SpO<sub>2</sub> continuous
- 3) GCS every 15 minutes for 1<sup>st</sup> hour, then hourly thereafter
- 4) Patellar reflexes/ Deep tendon reflexes hourly
- 5) Urine output hourly

**Suggested timing for Serum Mg Level Monitoring**

- 1) **At 0 minute:** Mg levels (together with measurement of baseline urea, electrolytes & creatinine)
- 2) **At 1 hour** after end of Mg loading dose
- 3) Then **every 4 hourly** during Mg infusion titration OR
- 4) **Every 6 hourly** when serum levels reaches therapeutic range (1.5 –2.5mmol/L) and infusion rate is stable
- 5) **Repeat serum Mg level promptly if:**
  - ❖ Decreased urine output < 1ml/kg/hr
  - ❖ Depressed deep tendon reflex (if previously deep tendon reflex intact)
  - ❖ Hypotension
  - ❖ Arrhythmia

**Clinical management of Mg toxicity**

Range	Serum Mg level (mmol/L)	Physical Signs & Symptoms	Follow-up actions
<b>Therapeutic</b>	<b>1.5- 2.5</b>	Peripheral vasodilation with facial flushing, nausea and vomiting & warm sensation. These signs and symptoms may also occur with overly rapid MgSO <sub>4</sub> administration	For intravenous injection, concentration of MgSO <sub>4</sub> should <b>NOT exceed 20%</b> . Dilute 1 part of 49.5% with at least 2 parts of water for injection and administer the infusion over at least 20mins
	<b>2.5- 3.5</b>	Hypotension	1) Infusion rate/dosage should be decreased 2) Repeat Mg levels
<b>Toxic</b>	<b>3.5- 4.0</b>	Deep Tendon Reflexes depressed	1) Infusion rate/dosage should be decreased 2) Repeat Mg levels
	<b>4-5</b>	Deep Tendon Reflexes depressed	1) Discontinue Magnesium 2) Repeat Mg levels urgently
	<b>5-6</b>	Respiratory function depressed	1) Discontinue Magnesium 2) Repeat Mg levels urgently
	<b>6-7.5</b>	Respiratory function arrested	1) Discontinue Magnesium 2) Infuse 0.5 -1 ml /kg/dose calcium gluconate 10% over 10 mins (Max=20 ml/dose or 4.5 mmol/L) 3) Repeat Mg levels urgently 4) Standby for intubation if patient is not intubated
	<b>7.5-10</b>	Cardiac depression: Arrhythmia, bradycardia, heart block	1) Discontinue Magnesium 2) Infuse 0.5 -1 ml /kg/dose calcium gluconate 10% over 10 mins (Max=20 ml/dose or 4.5 mmol/L) 3) Repeat Mg levels urgently 4) Standby resuscitation equipment

<b>Toxic</b>	<b>&gt; 10</b>	Cardiac Arrest	1) Discontinue Magnesium 2) Infuse 0.5 -1 ml /kg/dose calcium gluconate 10% over 10 mins (Max=20 ml/dose or 4.5 mmol/L) 3) Repeat Mg levels urgently 4) Standby resuscitation equipment
<b><u>MgSO<sub>4</sub> infusion titration</u></b>  If Mg level > 4 mmol/L: Stop maintenance and repeat Mg level 1 hour later If Mg level is between 2.5 - 4 mmol/L : Half the maintenance dose and repeat level 1 hour later If Mg level < 1.5 mmol/L: Increase maintenance infusion by 5mg/kg/hr (max infusion is 40mg/kg/hr)			
<b><u>Antidote dosing:</u></b>  Give 0.5ml/kg (max 20ml) 10% Calcium gluconate over 10 minutes ( 1mL= 94mg Calcium Gluconate = 0.23 mmol/mL Ca <sup>2+</sup> )			
<b><u>Disclaimer:</u></b> The above suggested MgSO <sub>4</sub> continuous infusion protocol for the management of status asthmaticus is for informative purpose, it is not a substitute for good clinical judgment.			