South Australian Perinatal Practice Guidelines

Magnesium sulphate infusion regimen

Magnesium sulphate

- The drug of choice for treating eclampsia and pre-eclampsia
- Magnesium sulphate readily crosses the placenta
- Magnesium is readily antagonised by IV calcium gluconate in the event of magnesium toxicity (calcium gluconate should be available where magnesium sulphate is used)

Indications

- Prophylaxis to minimise the risk of eclamptic seizures
- Treatment of eclamptic seizures

Relative contraindications

The use of this drug can be hazardous in association with:

- Dosing errors
- Renal failure or severe renal compromise
- Hypocalcaemic states
- Other drugs, especially vasoactive drugs
- Acute haemolytic states
- Some forms of neurological disease

Drug interactions

- Nifedipine increases the effects of magnesium sulphate and risk of hypotension; use cautiously, consider reducing magnesium sulphate dosage; monitor blood pressure, deep tendon reflexes and respiratory function (AMH 2004)

Dosage and administration

- Magnesium sulphate is best administered intravenously
- In some countries a pre-diluted magnesium sulphate 20 % solution is available
- In Australia, each ampoule of magnesium sulphate contains a 50 % solution (i.e. Either 2.5 g in each 5 mL or 5 g in each 10 mL)
- The product guidelines recommend that magnesium sulphate for intravenous use should be diluted with sodium chloride 0.9 % to a concentration of 20 % magnesium or less which implies that further dilution is necessary
- Intravenous administration of magnesium sulphate may be via a syringe driver or a volumetric infusion pump

Government of South Australia
SA Health

ISBN number: UNKNOWN
Endorsed by: SA Maternal & Neonatal Clinical Network
Contact: South Australian Perinatal Practice Guidelines workgroup at:
cywhs.perinatalprotocol@health.sa.gov.au

Magnesium sulphate infusion regimen

Magnesium sulphate syringe driver infusion regimen

- The total adult daily dose should not exceed 30 to 40 g of magnesium sulphate
- The undiluted syringe driver infusion may be connected into a mainline of sodium chloride 0.9 % or Hartmann's 1,000 mL; however, no other drugs may be administered into this line
- No more than 8 g of magnesium sulphate should be administered over 1 hour
- Continue for up to 24 hours after the last seizure activity and for 24 hours after birth

Magnesium sulphate undiluted 50 %

Loading dose set up

- Draw up 5 g (10 mL) magnesium sulphate
- Discard 2 mL magnesium sulphate to give 4 g in 8 mL
- Using medication added label write "magnesium sulphate 4 g in 8 mL" and attach label to syringe

Maintenance dose set up

- **NB: To avoid mixing up the syringes, do not draw up the maintenance dose until after the loading dose has been commenced**
- Draw up 10 g (20 mL) magnesium sulphate
- Using medication added label write "magnesium sulphate 10 g in 20 mL" and attach label to syringe

Prevent eclampsia (prophylaxis)

- Use loading dose syringe
- Set syringe driver at 24 mL / hour to infuse 4 g (8 mL) over 20 minutes
- After 20 minutes, use maintenance dose syringe to commence maintenance at 1 g / hour (2 mL / hour)

For eclamptic seizures

- Use loading dose syringe
- Set syringe driver at 48 mL / hour to infuse 4 g (8 mL) over 10 minutes
- After 10 minutes, use maintenance dose syringe to commence maintenance at 1 g / hour (2 mL / hour)
- **ECG monitoring and anaesthetist on site**

Recurrence of seizure during maintenance treatment

- Set syringe driver at 24 mL / hour to infuse 2 g (4 mL) IV over 10 minutes
- Once the condition is stable, reset syringe driver to maintenance dose of 1 g / hour (2 mL / hour)
- Alternatively, increase the maintenance infusion rate to 2 g / hour (4 mL / hour)
- Check for hyporeflexia and reduced respiration rate

Ensure calcium gluconate is available

SA Perinatal Practice Guidelines

Last reviewed 17/01/12

Magnesium sulphate volumetric infusion pump regimen

ISBN number: UNKNOWN
Endorsed by: SA Maternal & Neonatal Clinical Network
Contact: South Australian Perinatal Practice Guidelines workgroup at: cywhs.perinatalprotocol@health.sa.gov.au

Government of South Australia
SA Health

Magnesium sulphate infusion regimen

- **A volumetric infusion pump should only be utilised for the administration of magnesium sulphate where there is no access to a syringe driver**
- The total adult daily dose should not exceed 30 to 40 g of magnesium sulphate
- No more than 8 g of magnesium sulphate should be administered over 1 hour
- Continue for up to 24 hours after the last seizure activity and for 24 hours after birth

Magnesium sulphate diluted

Loading dose set up

- Draw up 5 g (10 mL) magnesium sulphate
- Discard 2 mL to give 4 g in 8 mL
- Withdraw 8 mL from a 100 mL bag of sodium chloride 0.9 % and discard
- Add the 8 mL magnesium sulphate (4 g) to the remaining 92 mL bag of sodium chloride 0.9 % to make 100 mL
- Using medication added label write “magnesium sulphate 4 g (8 mL) in sodium chloride 0.9 % to a total volume of 100 mL” and attach label to bag

Maintenance dose set up

- **NB: To avoid mixing up the infusion bags, do not draw up the maintenance dose until after the loading dose infusion has been commenced**
- Draw up 20 g (40 mL) magnesium sulphate - Withdraw 40 mL from a 100 mL bag of sodium chloride 0.9 % and discard
- Add the 40 mL magnesium sulphate (20 g) to the remaining 60 mL bag of sodium chloride 0.9 % to make 100 mL
- Using medication added label write “magnesium sulphate 20 g (40 mL) in sodium chloride 0.9 % to a total volume of 100 mL” and attach label to bag

Prevent eclampsia (prophylaxis)

- Use loading dose bag
- 4 g (set at 300 mL / hour) over 20 minutes
- After 20 minutes, use maintenance dose infusion bag to commence maintenance at 1 g / hour (5 mL / hour)

For eclamptic seizures

- Use loading dose bag
- 4 g (set at 600 mL / hour) over 10 minutes
- After 10 minutes, use maintenance dose infusion bag to commence maintenance at 1 g / hour (5 mL / hour)
- **ECG monitoring and anaesthetist on site**

Recurrence of seizure during maintenance treatment

- 2 g (set at 60 mL / hour) IV over 10 minutes
- Once the condition is stable, reset volumetric infusion pump to maintenance dose of 1 g / hour (5 mL / hour)
- Alternatively, increase the maintenance infusion rate to 2 g / hour (i.e. 10 mL / hour)
- Check for hyporeflexia and reduced respiration rate

Ensure calcium gluconate is available

SA Perinatal Practice Guidelines
Last reviewed 17/01/12

Government of South Australia
SA Health

ISBN number: UNKNOWN
Endorsed by: SA Maternal & Neonatal Clinical Network
Contact: South Australian Perinatal Practice Guidelines workgroup at: cywhs.perinatalprotocol@health.sa.gov.au

Magnesium sulphate infusion regimen

Administration precautions

- Administration may cause pain and phlebitis. ***Use a dedicated intravenous line for magnesium sulphate***
- ***Never inject other drugs into this line***

Care during intravenous infusion

- Collect baseline observations (pulse, BP, RR, SpO_2 and patellar reflexes)
- Ensure the woman is aware that a feeling of warm flushing may be evident during the infusion. Other side effects may include nausea, vomiting and headache
- Recheck observations including patellar reflexes ten minutes after the loading dose was started and at the end of the loading dose (20 minutes)
- ECG is warranted with high doses of magnesium sulphate (e.g. an infusion rate of 120 mL per hour)
- Continuous fetal monitoring from 26^{+0} weeks gestation until clinical review / discussion by medical staff. Between 24 to 26 weeks gestation, individualised management with regard to fetal monitoring will be considered

Maintenance

- Monitor blood pressure, respiratory rate, pulse oximeter (SpO_2), patellar reflexes and urine output 4 hourly (insert urine catheter)
- Patellar reflexes should be documented as one of the following:
  - A = Absent
  - N = Normal
  - B = Brisk
- Stop the infusion if:
  - patellar reflexes are absent
  - the respiratory rate is less than 12 per minute
  - the diastolic BP drops more than 15 mm Hg below baseline
  - or the urine output drops below 100 mL in 4 hours
- Monitoring magnesium levels is usually not necessary. Where serum creatinine is > 100 mmol / L or urine output is < 100 mL over 4 hours, check serum magnesium levels and adjust infusion levels. In these circumstances check serum magnesium levels every 6 hours after commencing infusion
  - Blood for magnesium estimation must NOT be taken from the arm receiving the infusion
  - The therapeutic level is 1.7 - 3.5 mmol / L (4 – 8 mg / 100 mL).
  - Levels will vary according to serum albumin concentrations
- If signs of toxicity occur (hypoventilation, arrhythmia, hypotonia):

ISBN number: UNKNOWN
Endorsed by: SA Maternal & Neonatal Clinical Network
Contact: South Australian Perinatal Practice Guidelines workgroup at: cywhs.perinatalprotocol@health.sa.gov.au

Magnesium sulphate infusion regimen

- Call for medical assistance
- Administer oxygen at 8-12 litres
- Stop infusion
- Monitor vital signs
- Administer calcium gluconate (10 % solution), 10 mL, slowly intravenously
- Check electrolytes, creatinine, magnesium sulphate levels

Intramuscular dose (suitable for retrieval and transfer)

- In situations where an infusion pump is not available, an intravenous bolus dose of magnesium sulphate 20 % in combination with intramuscular magnesium sulphate 50 % may be preferable for treating women in actual preterm labour before transferring to a tertiary centre
- The preferred regimen in such circumstances is:
  - Magnesium sulphate 20 % solution, 4 g by slow intravenous injection over a period of 5 minutes, followed by
  - Two deep intramuscular injections of 4 to 5 g magnesium sulphate 50 % solution into each buttock (the total dose of up to 10 g injected into one site is highly irritating)
  - If no infusion pumps are available, maintenance treatment is 5 g magnesium sulphate 50 %, given by deep intramuscular injection, every 4 hours. Alternate the buttocks in which the injection is administered (Duley et al. 2003)
  - A maintenance infusion (see above) can be commenced at any time after the initial bolus dose

Neonatal considerations

- For the neonate, hypermagnesaemia can lead to hyporeflexia, poor sucking, and, rarely, respiratory depression needing mechanical ventilation

Government of South Australia
SA Health

ISBN number: UNKNOWN
Endorsed by: SA Maternal & Neonatal Clinical Network
Contact: South Australian Perinatal Practice Guidelines workgroup at:
cywhs.perinatalprotocol@health.sa.gov.au

Magnesium sulphate infusion regimen

References

1. The Eclampsia Trial Collaborative Group. Which anticonvulsant for women with eclampsia. Evidence from the Collaborative Eclamptic Trial. Lancet 1995; 345: 1455-1463 (Level I).
2. The Magpie Trial Collaborative Group. Do women with pre-eclampsia, and their babies, benefit from magnesium sulphate? The Magpie trial: a randomised placebo-controlled trial. Lancet 2002; 359: 1877 – 91 (Level I).
3. Duley L, Gülmezoglu AM, Henderson-Smart DJ. Magnesium sulphate and other anticonvulsants for women with pre-eclampsia. *Cochrane Database of Systematic Reviews* 2003, Issue 2. Art. No.: CD000025. DOI: 10.1002/14651858.CD000025 (Level I). Available from URL: http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD000025/pdf_fs.html
4. Australian Medicines Handbook. Thebarton: Finsbury press 2004. Available at URL: www.amh.net.au
5. Royal College of Obstetricians and Gynaecologists (RCOG). The management of severe pre-eclampsia / eclampsia. RCOG green top guideline No. 10(A); March 2006. Available from URL: http://www.rcog.org.uk/resources/Public/pdf/management_pre_eclampsia_mar06.pdf
6. Grady K, Howell C, Cox C, editors. Managing Obstetric Emergencies and Trauma. The MOET Course Manual. 2nd edition. London: RCOG Press; 2007.

Abbreviations

IV	Intravenous
AMH	Australian Medicines Handbook
i.e.	That is
%	Percentage
g	Gram(s)
mL	Millilitre(s)
ECG	Electrocardiograph
SpO2	Pulse Oximetry Oxygen Saturation
BP	Blood pressure
mm	Millimetre(s)
Hg	Mercury
APH	Antepartum haemorrhage
<	Less than
mmol/L	Millimoles per litre
L	Litre(s)
RR	Respiratory rate
et al.	And others
URL	Uniform resource locator
RCOG	Royal College of Obstetricians and Gynaecologists

ISBN number: UNKNOWN
Endorsed by: SA Maternal & Neonatal Clinical Network
Contact: South Australian Perinatal Practice Guidelines workgroup at: cywhs.perinatalprotocol@health.sa.gov.au

Magnesium sulphate infusion regimen

Version control and change history

PDS reference: OCE use only

Version	Date from	Date to	Amendment
1.0	26 June 07	21 April 09	Original version
2.0	21 April 09	29 Sept 09	Review
3.0	29 Sept 09	26 Oct 10	Review
4.0	26 Oct 10	25 Jan 10	Review
5.0	25 Jan 10	27 Jan 10	Review
6.0	27 Jan 10	21 Sept 10	Review
7.0	21 Sept 10	17 Jan 12	Review
8.0	17 Jan 12	current	

ISBN number: UNKNOWN
Endorsed by: SA Maternal & Neonatal Clinical Network
Contact: South Australian Perinatal Practice Guidelines workgroup at: cywhs.perinatalprotocol@health.sa.gov.au

Government of South Australia
SA Health