MAGNESIUM SULPHATE FOR ECLAMPSIA OR ECLAMPSIA PROPHYLAXIS

This LOP is developed to guide clinical practice at the Royal Hospital for Women. Individual patient circumstances may mean that practice diverges from this LOP.

> Note: The additional LOP: Magnesium sulphate prior to preterm birth for fetal neuroprotection is available. Do not use both policies at the same time.

1. AIM

- To safely administer magnesium sulphate for eclampsia or eclampsia prophylaxis

2. PATIENT

- Pregnant or postpartum woman:
  - with eclampsia
  - who requires eclampsia prophylaxis

3. STAFF

- Medical, nursing and midwifery staff

4. EQUIPMENT

- Infusion Pump
- Giving set for infusion pump Set
- 16 or 18 - gauge Intravenous (IV) cannula
- IV starter kit
- Blood tubes
- Patella hammer

5. CLINICAL PRACTICE

Dosage and Administration:

- Check for any precautions or contraindications to use of magnesium sulphate as outlined below:-
  PRECAUTIONS:
  - Low blood pressure (secondary to vasodilation). The dose of any current antihypertensive medication may require adjustment
  - Tocolysis
  - Decreased fetal heart rate variability
  - Use with caution in the presence of calcium antagonists or other respiratory depressants (e.g. diazepam)
  - Enhances the effects of muscle relaxants

  CONTRAINDICATIONS:
  - Oliguria or renal failure, as magnesium elimination is predominantly renal
  - Hypocalcemia
  - Myasthenia gravis
  - Cardiac conditions, particularly conduction problems or myocardial damage
- Administer Magnesium Sulphate intravenously (IV) via either a central or peripheral line using an infusion pump and a premix bag of 4g/100mL. IV line **should NOT be used to inject any other drugs**
- Use the following dosage regime:
  - Loading Dose:
    - 4 g IV over 20 minutes if urine output (UO) > 20 mL/hour and creatinine < 200µmol/L
    - 2 g IV over 20 minutes if UO ≤ 20mL/hour or creatinine ≥ 200µmol/L
  - Maintenance Dose:
    - 1g/hour IV i.e. 25mL/hr of the premix bag if UO > 20 mL/hour and creatinine < 200µmol/L
    - Do not give if UO ≤ 20mL/hour or creatinine ≥ 200µmol/L. Check magnesium levels every four to six hours and if level < 3.5 mmol/L, give an additional 1g over an hour

- Consider additional 2gm dose of magnesium sulfate if second seizure occurs
- Beware of all potential adverse effects and signs of toxicity as outlined below:-
  ADVERSE EFFECTS:
  - **Mild:** Flushing of the skin (hands, face, and neck), sensation of pain or warmth in arm, and nausea (common)
  - **More Severe**: Respiratory depression, loss of reflexes, muscle paralysis, blurred or double vision, slurred speech/sleepy, cardiac conduction changes, cardiac arrest

  TOXICITY:
  - Clinical monitoring is the prime method of assessing for toxicity, blood levels are complimentary to clinical monitoring
- Use Royal Hospital for Women Magnesium Observation Chart (see appendix 1) to document blood levels and observations
- Check magnesium level **one** hour after loading dose has been commenced and then **six** hourly thereafter, and in the event of any signs or symptoms of toxicity. Do not collect blood for serum levels from the limb receiving the infusion. Normal therapeutic levels are 1.5-3.5mmol/L. Toxic range 4-8mmol/L
- Adjust dosage as per regular plasma magnesium levels:
  - Increase dose by 12.5 mL/hour (0.5g/hour) if level is sub therapeutic i.e. <1.5 mmol/L
  - Cease infusion if level above 4.0mmol/L and contact medical team for review

- **Treat significant toxicity with calcium gluconate 10mL (2.2mmol of calcium in 10mL vial), or calcium chloride 1g by slow IV injection** (via large bore canulae in peripheral vein over three minutes)

- Review continuation of magnesium sulphate infusion in the early postpartum period as there is no conclusive evidence to guide its continuation[9,10]. The obstetric physician or obstetrician should be consulted and a plan made for either continuing the infusion for 24 hours or ceasing it at birth

OBSERVATIONS
- Ensure close observation and assessment (maternal and fetal) is required for the duration of the infusion. When the woman's condition is unstable, the frequency of the observations will need to be increased. Perform:-
  - Initial observations, done at '0' hour include blood pressure, respiration rate, pulse, oxygen saturation, temperature and reflexes.
    - **Hourly blood pressure**: cease infusion if blood pressure <110/70mmHg
    - **Hourly respirations**: cease infusion if respiratory rate <10 breaths per minute
    - **Hourly oxygen saturation and pulse**
    - **Hourly tendon reflexes usually knee reflexes but upper limbs if epidural or spinal anaesthetic in place**: cease infusion if unable to elicit reflexes
    - **Hourly urine output:** cease infusion if urine output < 30 mL per hour for three consecutive hours
    - Continuous fetal heart rate monitoring as clinically indicated
    - Measure temperature every four hours
    - Magnesium level one hour after loading dose and then six hourly thereafter
    - Check magnesium level and perform electrocardiogram (ECG) if there are any signs or symptoms of toxicity
    - Record all observations on attached chart (see appendix 1)

6. DOCUMENTATION
- Medical record

7. EDUCATIONAL NOTES
- If calcium gluconate is available it is the preferred treatment for significant toxicity, as calcium chloride can causes significant local irritation. Calcium gluconate is available on the antenatal ward, acute care and birth unit. Calcium chloride vials are available in the cardiac arrest trolley in all areas
- Eclampsia is defined as the occurrence of de-novo convulsions in pregnancy. An Australian study demonstrated that eclampsia remains rare in Australia with an incidence of 8.6 per 10,000 pregnancies (equivalent to 0.1% of all births)[7]
- Magnesium sulphate acts at the cellular level competing with calcium for entry into the cell at time of depolarization, therefore possibly reducing the excitability of cells and vasospasm of vessels. Its mode of action in eclampsia and pre-eclampsia is poorly understood [2,4,7]
- Magnesium sulphate is excreted by the kidneys; therefore, the therapeutic level will depend on the woman's renal function [2,4,7]
- The MAGPIE Trial demonstrated that magnesium sulphate compared to a placebo reduced the risk of fitting by half, among 10,000 women in 33 countries worldwide[5]

- There is no conclusive evidence to guide whether magnesium sulphate should be continued postpartum in women who have not been eclamptic. The clinical team could decide to stop magnesium sulphate with delivery, or to continue the maintenance infusion for 24 hours. A shortened postpartum magnesium protocol is associated with shorter time with an indwelling catheter, shorter duration to ambulation, and shorter time to start lactation[9]. Within the MAGPIE trial, the protocol was to continue magnesium sulphate for 24 hours, and this protocol led to a significant reduction in eclampsia [5]. However, a subset of women within the MAGPIE trial who had been commenced after birth showed no statistically significant difference in eclampsia rates. This may be due to a small sample size and the rarity of eclampsia, but it also may be that magnesium sulphate in the postpartum period has minimal effect in reducing eclampsia rates. A meta-analysis looking at duration of postpartum magnesium sulphate concluded that due to the rarity of eclampsia, a sample size of 9000 women would be required to study postpartum magnesium sulphate protocols [10]. There have been multiple studies on this topic, but none have had adequate sample size.
- Although fetal surveillance is recommended and performed in women with hypertensive disease in pregnancy there is no established consensus on how this should be performed. Frequency, intensity, and modality of fetal evaluation will depend on individual pregnancy (maternal and fetal) characteristics
- A significant number of women who develop eclampsia may have normal blood pressure or mild-moderate hypertension immediately prior to the seizure[8]

8. RELATED POLICIES/ PROCEDURES

- Hypertension – Management in Pregnancy
- Severe and/or Urgent Hypertension in Pregnancy
- Eclampsia management
- NSW Ministry of Health, Maternity – Management of threatened Preterm Labour (Appendix 7 - Magnesium sulphate prior for fetal neuroprotection)
- NSW Ministry of Health, Fetal heart Rate Monitoring GL2018_025
- NSW Ministry of Health Maternity-Management of Hypertensive Disorders of Pregnancy PD2011_064
- Australian Commission on Safety and Quality in Health Care – Clinical Care Standard – Management of Peripheral Intravenous Catheters

9. RISK RATING

- High

10. NATIONAL STANDARD

- Standard 4 - Medication Safety
- Standard 5 – Comprehensive Care

11. REFERENCES

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5. The Magpie Trial Collaboration Group. Do women with pre-eclampsia, and their babies, benefit from magnesium sulphate? The Magpie Trial: a randomised placebo-controlled trial. *Lancet* 2002; 359(9321): 1877-90.
6. Australian Injectable Drugs Handbook, 8th Edition, Society of Hospital Pharmacists of Australia 2020.
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10. Sullivan M, Cunningham K, Angras K, Mackeen AD. Duration of postpartum magnesium sulfate for seizure prophylaxis in women with preeclampsia: a systematic review and meta-analysis. The Journal of Maternal-Fetal & Neonatal Medicine. 2021 Jun 29:1-6

REVISION & APPROVAL HISTORY

Reviewed and endorsed Therapeutic & Drug Utilisation Committee February 2022
Approved Quality & Patient Care Committee February 2022
Reviewed and endorsed Therapeutic & Drug Utilisation Committee 11/4/18
Approved Quality & Patient Care Committee 4/2/16
Reviewed and endorsed Therapeutic & Drug Utilisation Committee 8/12/15
Approved Quality & Patient Safety Committee 20/6/13
Reviewed and endorsed Therapeutic & Drug Utilisation Committee 11/6/13
Previously two policies –
Magnesium Sulphate:
Approved Quality Council 16/10/06
Reviewed Therapeutic & Drug Utilisation Committee 15/8/06 (amended October 2009)
Amended July 2006
Amended October 2000 / Approved RHW Council 27/11/00
Approved RHW Council 28/2/00
Eclampsia Prophylaxis with Magnesium Sulphate:
Approved Quality Council 17/11/03
Endorsed Maternity Services Clinical Committee 11/11/03

FOR REVIEW: FEBRUARY 2024

Appendix 1

ROYAL HOSPITAL FOR WOMEN
MAGNESIUM OBSERVATION CHART

MRN
NAME
DOB
Affix addressograph label

Therapeutic range: 1.5 – 3.5 mmol/L **Toxic range: 4.0 – 8.0 mmol/L**	**Toxicity may lead to:** • Suppression of tendon reflexes • Respiratory depression • Neuromuscular paralysis • Cardiac arrest

Date and time Loading Dose given: _____

Time Infusion Commenced: _____

B = Blood to be taken for Mg level

HOUR	TIME	INFUSION RATE	URINE OUTPUT	BP Hourly	RESP RATE Hourly	PULSE Hourly	TEMP 4 Hourly	REFLEXES	Comments /Mg LEVEL/ FHR
0									
1 **B**									
2									
3									
4									
5									
6									
7 **B**									
8									
9									
10									
11									
12									
13 **B**									
14									
15									
16									
17									
18									
19 **B**									