Guideline

Magnesium Sulfate - Management of Hypertensive Disorders of Pregnancy

Immediate actions

- Use as first-line treatment for any pregnant woman who suffers a seizure, including women with known epilepsy.
- Note that the equipment for IV infusion process is different for Parkville and Sandringham- refer to appropriate section.
- Caution should be taken with any additional intravenous fluid administration to manage hypotension because of the potential risk of pulmonary oedema
- **AVOID POLYPHARMACY to treat seizures as this will increase the risk of respiratory arrest**.

1. Purpose

This document outlines the guideline or procedure details for the indications, contraindications, administration and monitoring of Magnesium Sulfate (sulphate) use at the Women's.

Magnesium sulfate is the anticonvulsant of choice for pre-eclampsia prophylaxis and treatment and treatment of eclampsia. It is the first-line treatment for any pregnant woman who suffers a seizure, including women with known epilepsy.

Also refer to Procedures: Observations – Birth Centre – Adult Escalation Criteria and Response Framework and Seizures during Pregnancy- Assessment and Management.

Where processes differ between campuses, those that refer to the Sandringham campus are differentiated by *pink italic text* or have the heading **Sandringham campus.**

2. Definitions

Not applicable.

3. Responsibilities

Obstetric medical staff and students under supervision

Midwifery staff and students under supervision

Anaesthetic medical staff

4. Guideline

4.1 Indications for use

Magnesium Sulfate is used in pregnancy:

- for women with pre-eclampsia for whom there is concern about the risk of eclampsia
- first-line management of an eclamptic seizure
- first-line treatment of any seizure during pregnancy
- neuroprotection of preterm infants.

4.2 Presentation

10mL = 500mg/mL (50% solution) (*Magnesium Sulfate Heptahydrate*) and;

50mL vials = 493 mg/mL (49.3% treat as ~ 50% solution). *(Sandringham has 50mL vials)*

4.3 Route of administration

IV infusion:

Magnesium sulfate is delivered by controlled infusion via a syringe pump or *Alaris PC pump*. The infusion is connected via:

- a multi-flow adapter to a peripheral line of normal saline 0.9% and monitored by an infusion pump in order to reduce localised irritation and monitor fluid balance.
- a Vented Syringe Adapter Set connected to a peripheral line of normal saline 0.9% and monitored by Alaris PC infusion pump in order to reduce localised irritation and monitor fluid balance.
- The magnesium line should be labelled clearly and not used to inject other medicines.

Note: Magnesium Sulfate infusions should only be administered in Birth Centre, Theatre or Complex Care Unit

4.4 Dose

Prophylaxis of pre-eclampsia seizure

Note: preparation differs across Parkville and Sandringham campuses

Loading dose: using a 10mL vial of Magnesium Sulfate prepare 4 gram (i.e. **8mL**) of Magnesium Sulfate 50% in a 10mL syringe, configure the pump to accept the 10mL syringe and set the pump to 32mL an hour for 15 minutes.

Maintenance rate: once the loading dose has been completed, using the 50mL vial of Magnesium Sulfate, prepare 50mL of Magnesium Sulfate 50% in a 50mL syringe, re-set the pump to accept 50mL syringe and set the pump to administer the maintenance rate of 1g/hr (2mL/hour) or as ordered, until at least 24 hours post birth/delivery.

NB: Ensure magnesium sulphate is administered concurrently via a Y-site with a compatible IV fluid.

Sandringham Campus

Using the pharmacy-prepared 50mL '50% Magnesium Sulfate' syringe, the Alaris PC Infusion pump can be programmed to accept BOTH the loading dose (32mL/r for 15 minutes AND the maintenance dose (2mL/hr) as stated above. There is no need to change the syringe as the Alaris pump allows for both settings. Refer to appendix 1 for set up instructions.

4.5 Side effects:

- hypotension secondary to reductions in systemic vascular resistance
- facial flushing
- visual disturbances
- flushing at injection site
- chest pain
- nasal stuffiness.

NOTE: caution should be taken with any additional intravenous fluid administration to manage hypotension because of the potential risk of pulmonary oedema.

The following may also occur:

- ECG changes
- circulatory collapse
- gastro-intestinal upset

- urinary retention
- magnesium toxicity
- tissue necrosis at the injection site.

4.6 Contraindications and precautions

Magnesium Sulfate should be administered with caution in women being treated with cardiac glycosides/digitalis.

Concurrent use of Magnesium Sulfate and CNS depressants may result in an enhanced CNS depressant effect.

If Calcium Gluconate is required to treat Magnesium Sulfate toxicity, it should be delivered with caution as it may precipitate heart block.

As magnesium is excreted in urine, patients with impaired renal function or electrolyte imbalance should be managed cautiously and magnesium levels should be monitored closely because of the increased risk of magnesium toxicity.

4.7 Initial and subsequent management of eclamptic seizures

The priorities are to terminate the seizure and prevent maternal and fetal hypoxia.

The first line of treatment for a woman who is having an eclamptic seizure is supportive care which should follow the basic principles for maintaining the woman's airway, breathing and circulation.

Refer to: the procedure Eclampsia: Management.

- Call for help and initiate: Code Blue - Adult and Child.

SANDRINGHAM: Obstetric Emergency Code

- Do not leave the woman alone. Assess the situation in regards to safety of staff and patient.
- Aim to prevent maternal injury during the seizure.
- Position the woman into the left lateral position and administer oxygen by mask.
- Continue to assess AIRWAY, BREATHING, CIRCULATION
- Secure IV access.
- Check maternal pulse and blood pressure. Use pulse oximetry if available.

Magnesium Sulfate is the most effective medicine for the treatment of seizures when administered to women with eclampsia.

AVOID POLYPHARMACY to treat seizures as this will increase the risk of respiratory arrest.

Note: If a maintenance infusion is in progress, cease the infusion.

Give LOADING DOSE:

- draw up 4g (8mL) of Magnesium Sulfate 50% in 10mL syringe
- administer intravenously over ten (10) minutes – slow IV push
- SANDRINGHAM – re-program the Alaris pump to repeat loading dose

Commence/re-commence maintenance infusion.

REMEMBER to check ALL pump limits when recommencing the infusion.

Note: ECG monitoring should be available and anaesthetists are to be advised of the woman's medical condition.

Recurrent seizures should be treated with a further bolus dose of 4g (8mL) Magnesium Sulfate.

4.8 Monitoring

Magnesium level monitoring

The therapeutic level of magnesium: 1.7 to 3.5 mmol/L. Routine monitoring of magnesium levels is not required BUT as magnesium is excreted by the kidneys, monitoring of serum levels should be conducted in women with renal impairment (6 hourly or more frequently as indicated).

Request magnesium level and review management if:

- respiratory rate < 12 breaths/minute
- urine output < 100mLs in 4 hours
- loss of patellar reflexes
- further seizures occur.

Mg conc (mmol/L)	Effects
0.8 - 1.0	normal plasma level
1.7 - 3.5	therapeutic range
2.5 - 5.0	ECG changes (P-Q interval prolongation, widen QRS complex)
4.0 - 5.0	reduction in deep tendon reflexes
> 5.0	loss of deep tendon reflexes
> 7.5	sinoatrial and atrioventricular blockade. Respiratory paralysis and CNS depression
> 12	cardiac arrest

Note: If serum magnesium level is >3.5mmol/L, cease infusion and consult with obstetrician.

Clinical observations

During administration of the loading or bolus dose:

- 5 minutely blood pressure and pulse (x 4 readings)
- observe for the development of side effects
- check patellar reflexes after administration.

During administration of the maintenance infusion:

- ½ hourly blood pressure, pulse, and respiratory rate (pre-treatment respiratory rate should be ≥ 16per minute). These may be undertaken hourly post-birth.
- 1 hourly patellar reflexes
- 1 hourly urine measures, 4 hourly testing of urinary protein
- 2 hourly temperature
- continuous electronic fetal monitoring from 26 weeks gestation until clinical review/discussion by medical staff. Between 24- 26 weeks gestation, individualised management with regard to fetal monitoring will be considered
- maintain strict fluid balance chart.

Record patellar reflexes as:

A = Absent

N = Normal

B = Brisk

Response to magnesium toxicity

The following clinical signs of magnesium toxicity must be reviewed by a consultant obstetrician/anaesthetist:

- urine output <100mL in 4 hours
- absent patellar reflexes
- respiratory depression.

The antidote for magnesium toxicity is: 10mL calcium gluconate (available as 2.2mmol of calcium in 10mL vial- formerly known as 10% solution) over 10 minutes by slow intravenous injection. The patient requires ECG monitoring during and after administration because of the potential for cardiac arrhythmias.

Resuscitation and ventilator support should be available during and after dose administration of both magnesium sulfate and calcium gluconate.

CEASE Magnesium infusion in the following emergencies:

Respiratory arrest: call: Code Blue - Adult and Child (intranet-only)

Cardiac arrest: call: Code Blue - Adult and Child (intranet-only)

Ceasing a magnesium infusion

Magnesium infusion to continue for a minimum of 24 hours post birth/delivery (continue hourly clinical observation for 4 hours following the discontinuation of magnesium infusion). Cease according to medical orders.

Postpartum magnesium levels may be adequately assessed clinically (reflexes, respiratory rate) unless there is renal impairment/oliguria when serum levels should be continued 6 hourly.

Clinical practice note: taking blood pressure

The woman should be resting at an angle of greater than 45 degrees with her feet supported.

The blood pressure cuff should be of the appropriate size and should be placed at the level of the heart.

Standard cuff for arms <33cm circumference. Large cuff (15 x 33cm bladder) for larger arms.

Inflate cuff to 20-30mmHg above palpated systolic pressure. Deflate slowly.

Read and record blood pressure to nearest 2mmHg.

Korotkoff phase 5 sound (sound disappearance) is the appropriate measurement of diastolic blood pressure.

Multiple levels should be taken to confirm the diagnosis of hypertension/ pre-eclampsia due to natural variation.

Automated blood pressure readings should be used with caution in pre-eclampsia. They can systematically underestimate, more particularly, the systolic blood pressure.

It is recommended that a calibrated manual sphygmomanometer be used initially as a reference unless it is known that the automatic machine has been validated for pregnancy.

5. Evaluation, monitoring and reporting of compliance to this guideline

Compliance to this guideline will be monitored by review of incidents reported through VHIMS.

6. References

Refer to the learning package: Magnesium Sulfate Infusions.

Women's Policies, Guidelines and Procedures:

- Eclampsia Management
- Pre-Eclampsia: Management
- Observations – Birth Centre – Adult Escalation Criteria and Response Framework
- Seizures during Pregnancy- Assessment and Management.

7. Legislation/Regulations related to this guideline

Not applicable

8. Appendices

Appendix 1: Magnesium Sulphate preparation W@S

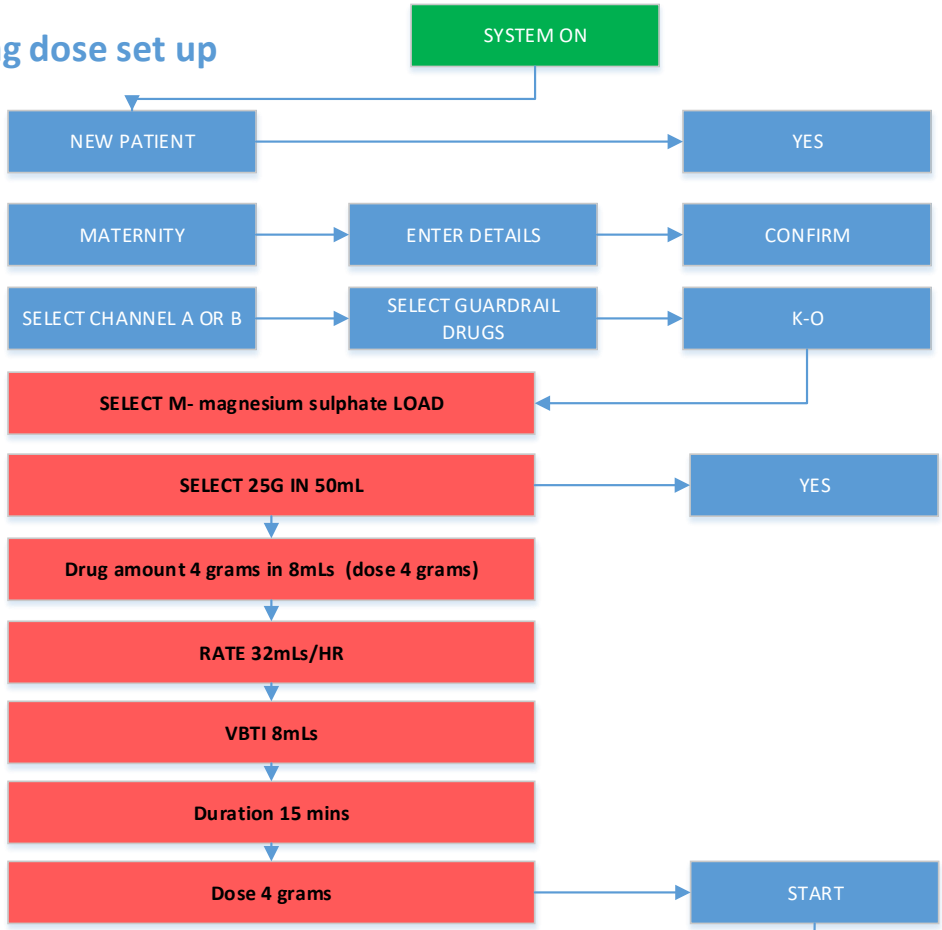
Please ensure that you adhere to the below disclaimer:

Appendix 1

Magnesium Sulfate preparation W@S

Alaris Pump set up instructions: W@S

Loading dose set up



An alarm will sound after 15 minutes. The pump will state 'Bolus dose completed'.

Continuous infusion set up