Freedom of Information Request: 0660 2019/20

IV MgSO4 for Pre-eclampsia -
IV MgSO4 for Pre term labour to prevent cerebral palsy

1. Does the hospital have a policy for the management of both of these conditions which includes the use of magnesium sulphate and when were the policies were written or last updated?

Yes -
Pre-eclampsia and Eclampsia Management: Guideline approved on October 2019, review date October 2022. Includes the use of magnesium sulphate.

Magnesium Sulfate (MgSO4) for Fetal Neuroprotection in Preterm Pregnancy (less than 34 weeks gestation): Guideline approved on June 2019, review date June 2022. Includes the use of magnesium sulphate.

1a. What dose is recommended in the policies and how is it administered?

Pre-eclampsia and Eclampsia Management:

Appendix 1 – Magnesium Sulphate (MgSO4) Regime

Indication:

- Eclampsia
- Severe pre-eclampsia **#** **or** Severe hypertension **or** woman of preclampsia in critical care setting who previously had eclamptic fit
- Consider giving IV MgSo4 for severe pre-eclampsia in critical care setting if birth is planned within 24 hours

 # Features of severe pre-eclampsia:
Consider the need for Magnesium Sulphate (MgSO4) if 1 or more of the following features of severe preclampsia is present:

- Ongoing or recurring severe headaches.
- Visual scotomata
- Nausea or vomiting
- Epigastric pain
- Oliguria and severe hypertension
- Progressive deterioration in blood tests such as rising creatinine or transaminases or falling platelet count

Use the Colloborative Eclampsia Trial regimen for administration of Magnesium Sulphate (MgSO4)

Loading dose of 4 grams should be given intravenously over 5-15 min, followed by maintenance infusion of 1 gm/hour maintained for 24 hrs or for 24 hrs after the last fit.

Loading dose: MgSO4 50%: 8mls (4g) + 12mls of 0.9% NaCl = 20mls total in syringe. Over 10 minutes (pump = 120mls/hour)
Maintainence dose: MgSO4 50%: 20mls (10g) + 30mls of 0.9% NaCl = 50mls total in syringe. Pump = 5mls/hour (total 24 hours infusion)

Recurrent seizures – bolus
2-4 gms of Magnesium sulphate given over 5-15 minutes
MgSO4 50%: 4mls for 2 grams + 16mls of 0.9% NaCl = 20mls total in syringe

Side effects:	**Monitoring:**	**MgSO4 Toxicity:**
Facial flushing	Tendon reflexes	Hypoxia
Nausea and vomiting	Pulse rate	Cardiac arrhythmia – prolonged PR interval, widened QRS
Sweating	Respiratory rate (should be greater than 8 / min)	Motor paralysis – loss of tendon reflexes
Hypotension	Fluid balance (urine output greater than 100 mls / 4 hours)	Reduced respiratory rate (respiratory paralysis), SA/AV node block
Tachycardia	MEOWS score	Cardiac arrest

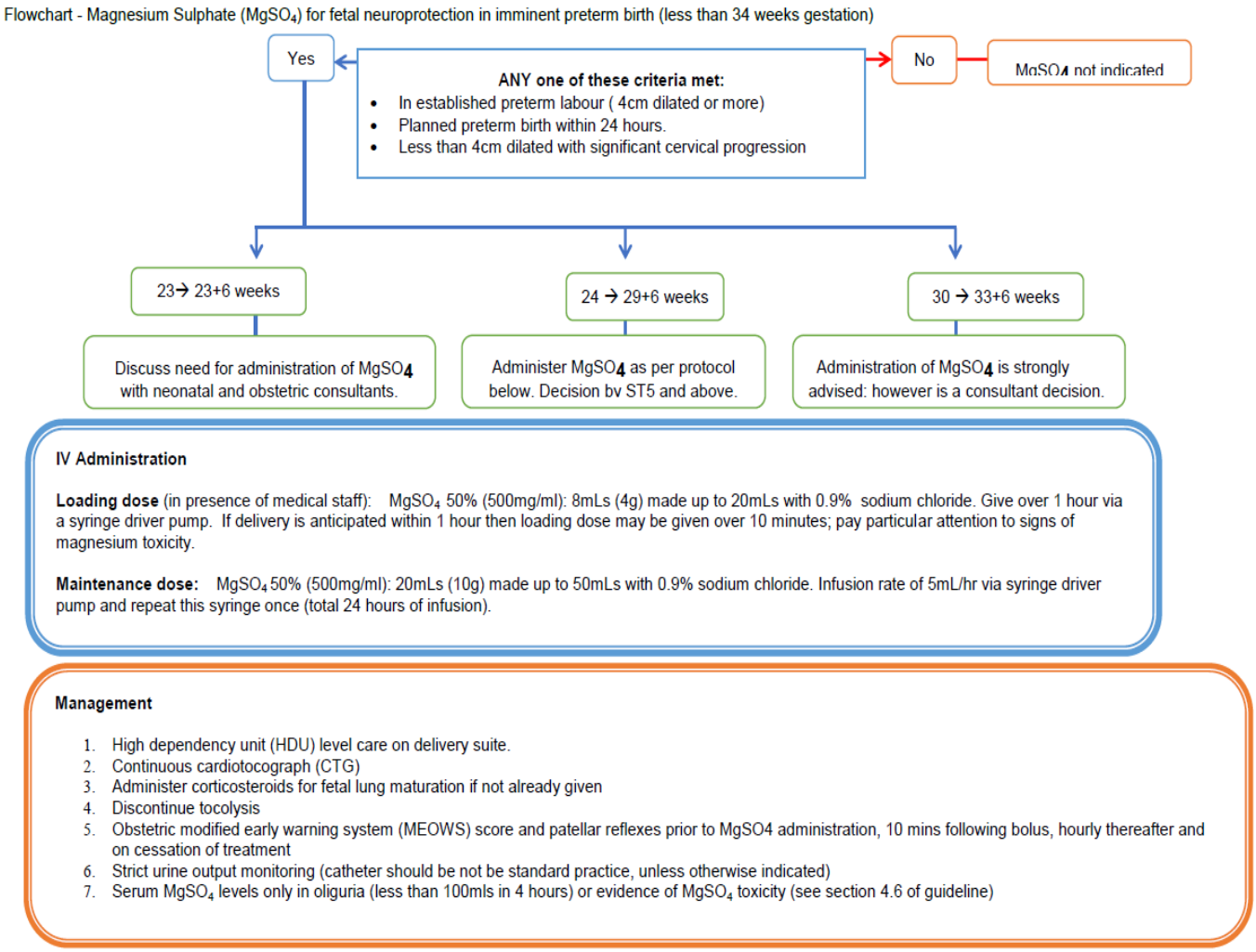
Antidote: 10mls of 10% Calcium Gluconate IV over 10 minutes

Oliguria:

- There is a higher risk of magnesium toxicity in patients with oliguria (less than 100mls/4hours)
- Check magnesium level every 4 hours during period of oliguria
- Reduce or stop magnesium sulphate infusion depending on level
- If at any time the clinical signs suggest high levels, stop the infusion and check magnesium level

Magnesium sulphate level	**Action**
less than 3mmol	Continue maintenance infusion at 5ml/hour
greater than /=3mmol	Adjust infusion rate to 2.5ml/hour
greater than /= 3.9 mmol	Stop the infusion

Magnesium Sulfate (MgSO4) for Fetal Neuroprotection in Preterm Pregnancy (less than 34 weeks gestation:



4.2 Dosage of magnesium sulfate:

Loading dose:
Magnesium sulfate 50% (500mg/ml): 8mLs (4g) made up to 20mLs with 0.9% sodium chloride. Administer over 1 hour via a syringe driver pump. Loading dose should be given in the presence of medical staff. If delivery is anticipated within 1 hour then loading dose may be given over 10 minutes with particular attention to signs of magnesium toxicity.

Maintenance dose:
Magnesium sulfate 50% (500mg/ml): 20mLs (10g) made up to 50mLs with 0.9% sodium chloride. Infusion rate of 5mL/hr via syringe driver pump and repeat this syringe once (total 24 hours of infusion).

How to Write the Prescription:

	Date	Infusion Fluid	Volume	Drugs to be added	Rate	Signature
LOADING DOSE	XX/XX/20XX	0.9% sodium chloride	12mls	8mls of 50% magnesium sulfate (4g)	20ml/hr	***A.A***
MAINTENANCE DOSE	XX/XX/20XX	0.9% sodium chloride	30mls	20mls of 50% magnesium sulfate (10g)	5ml/hr	***A.A***

4.3 Monitoring while on magnesium sulfate

- Check pulse, blood pressure, respiratory rate, patellar reflexes and pulse oximetry before the loading dose and 10 minutes after the start of the infusion, and again at the end of the loading dose.
- Hourly obstetric modified early warning system (MEOWS) and patellar reflexes for the duration of infusion.
- Strict urine output monitoring; catheter is not compulsory however urinary output should be strictly monitored and greater than 100mls in 4 hours.
- Continuous cardiotocograph (CTG) in discussion with the Obstetric team

***** Serum magnesium levels are not routinely recommended unless the patient is oliguric or has suspected magnesium toxicity *****

4.4 Repeat Dosing of magnesium sulfate

To avoid giving magnesium sulfate where mothers are not likely to deliver within 24 hours, the best approach is an accurate diagnosis of preterm labour; this is covered in the NICE guideline for Preterm Labour. There is no high-quality evidence (RCTs) to guide us as to whether multiple doses are necessary, and what should be the minimum interval between first and repeat dose of magnesium sulphate.

The Australian National Guidance was the first to be published globally and recommends: "In the event that birth does not occur after giving magnesium sulphate for neuroprotection of the infant, and preterm birth (less than 30 weeks gestation) again appears imminent (planned or definitely expected within 24 hours), a repeat dose of magnesium sulfate may be considered at the discretion of the attending health professional".

The NIHCD funded Rouse trial had repeat doses in their protocol. This large trial also used a higher loading dose of magnesium sulfate (6g) and recommended repeat loading if the infusion had been stopped for more than 6 hours. The trial outcomes showed significantly lower moderate to severe cerebral palsy rates in the magnesium sulfate arm suggesting that repeat dosing is safe.

In the absence of clear NICE guidance regarding repeat doses it remains at the discretion of the responsible consultant to decide whether to give a repeat dose of magnesium sulfate. Evidence would suggest repeat dose can be given to those women less than 30 weeks gestation if delivery did not occur within 24 hours. The half-life of magnesium sulphate is

short with 90% renally excreted in 24 hours, therefore if the decision is made to repeat dose pay close attention to signs of toxicity.

4.5 Side effects of magnesium sulfate

- facial flushing
- nausea and vomiting
- sweating
- hypotension and tachycardia

There is a potential theoretical interaction between magnesium sulfate and calcium channel blockers (e.g. nifedipine) of hypotension and neuromuscular blockade effects, although this is seldom seen in clinical practice (Magee LA 2005). If hypotension occurs, due to exaggeration of effect of magnesium sulfate in patients already established on nifedipine, magnesium sulfate infusion should also be stopped immediately and the woman should be brought to the attention of a consultant obstetrician.

4.6 Toxicity with magnesium sulfate

Toxicity is rare but there is an increased risk in women with renal compromise.
Suspect toxicity if: See Table 1 below.

- tendon reflexes are absent
- respiratory rate less than 8 breath per minute
- oxygen saturation below 95%
- drowsiness/ abnormal conscious level
- urine output less than 100ml over 4 hours
- hypotensive

STOP the infusion immediately if toxicity is suspected and call the registrar. Serum magnesium monitoring is recommended in such cases. Involve obstetric and anaesthetic consultants.

The treatment is 1g of calcium gluconate (10mls of 10% solution) IV over 10 minutes.

Magnesium levels	**Effects**
0.8-1.0	Normal plasma concentrations
1.7-2.5	**Therapeutic range**
2.5-5.0	Electrocardiogram (ECG) changes (P-Q interval prolongation, widen QRS complex
4.0-5.0	Reduction in deep tendon reflexes
More than 5. 0	Loss of deep tendon reflexes
More than 7.5	Sinoatrial and atrioventricular blockade, respiratory paralysis and central nervous system (CNS) depression
More than 12	Cardiac arrest

Table 1 **magnesium sulfate levels (mmol/L) concentration and its potential effects**

2. How many babies does the trust deliver per year?

2017 - 9964
2018 - 9545
2019 - 9165

2b.How many babies are delivered under 33+6 weeks?

2017 - 369
2018 - 377
2019 - 395

3. What strengths of IV MGSO4 does the pharmacy stock?

- Magnesium Sulphate 50% (1g in 2ml) (4mmol in 2ml) Injection
- Magnesium Sulphate 50% (5g in 10ml) (20mmol in 10ml) Injection

4. Have there been any serious incidents with the use of magnesium sulphate? If so please can you tell me if these were in the maternity setting?

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5. Have there been any patient safety incidents reported in relation to the prescription or administration of MgSO4 in the last 3 years?

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