

Magnesium Sulphate for Fetal Neuroprotection

FETAL NEUROPROTECTION PRIOR TO PRETERM BIRTH	CLINICAL GUIDELINES
Professionally prepared by	Consultant Obstetric Anaesthetist
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Policy to be followed by (target staff)	Nurses, Obstetricians, Anaesthetists, Paediatricians

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1. Purpose

The purpose of this guideline is to provide guidance to clinicians for the use of Magnesium Sulphate (MgSO₄) to women at risk of preterm birth in order to prevent cerebral palsy of the infant.

2. Indications for Use

- a) Magnesium sulphate for neuroprotection of the fetus, newborn and child should be offered to women between **24 weeks and 0 days** and **33 weeks and 6 days** gestation (or less where a viable outcome is anticipated) who are in established preterm labour or having a planned preterm birth within 24 hours.
- Regardless of plurality (number of babies in utero)
 - Regardless of parity
 - Regardless of anticipated mode of delivery
 - Whether or not antenatal corticosteroids have been given
 - If at 23 weeks gestation the parents wish for the baby to be resuscitated and given intensive care the mother should be given magnesium. If parents have decided against active resuscitation, it would not be appropriate to give magnesium.
- b) When early preterm birth is planned commence magnesium sulphate as close to four hours before birth as possible.

3. Good Practice Points

a) Timing

If delivery before 34 weeks is anticipated to occur sooner than 4 hours, there continues to be some advantage from administration of Magnesium therefore it should be given.

b) Urgent delivery

If urgent delivery is required for maternal/Fetal compromise (e.g. Fetal distress/antepartum haemorrhage) then delivery should not be delayed to administer Magnesium Sulphate.

c) Repeat doses

If Magnesium Sulphate has been given and preterm birth does not occur but at a later time appears imminent, there is no current evidence for repeating doses of Magnesium Sulphate after the initial course.

d) Place of administration

MgSO₄ should be administered on Labour Ward where there are appropriate staff and resources for adequate maternal and Fetal monitoring.

e) **In utero transfer**

IV Magnesium sulphate should only be administered where maternal ventilatory and respiratory support is immediately available. Therefore, Magnesium sulphate should be stopped during the transfer.

4. Dose and Route of Administration

Loading dose:

Give 4g MgSO₄ intravenously over **20** minutes via an infusion pump.

Maintenance dose:

Continue to infuse MgSO₄ IV at 1gram/hour

Continue regimen until birth or 24 hours, whichever comes first.

5. Monitoring

Maternal Monitoring for signs of toxicity

- Hourly urine output
- Hourly respiratory rate
- 2 hourly blood pressure
- Reflexes and Consciousness (Alert, Verbal, Pain, Unresponsive Score) assessed 4-6 hourly.

Fetal monitoring

If labour has been diagnosed with continuous cardiotocograph (CTG).

In the absence of complications, Fetal monitoring should be performed 8 hourly.

- From 28 weeks with CTG
- In the absence of complications Fetal monitoring should be undertaken 8 hourly □
- 27+6 and below with intermittent auscultation.

6. Toxicity

Toxicity is unlikely with the described protocols; serum Magnesium levels do not require monitoring unless the woman has renal compromise.

Toxicity levels correlate with serum magnesium concentrations:

	Magnesium Level (mmol/l) □
Therapeutic range (for PET/unknown for neuroprotection)	2-4
Loss of tendon reflexes, weakness, nausea, feeling of warmth, flushing, somnolence, double vision, slurred speech.	5
Muscle paralysis, respiratory arrest	6-7.5
Cardiac arrest	>12

Suggested action if toxicity is present:

Loss of Patellar reflex	Stop maintenance infusion Check Magnesium level Withhold further Magnesium until reflexes return or serum levels known
Oxygen Saturation persistently <92%	Commence facial oxygen Check patellar reflexes, inform Obstetricians and Anaesthetists If patellar reflexes present then exclude other causes If patellar reflexes absent then act as above

Drug Protocol for Calcium Gluconate

Treatment for respiratory depression due to overdose of MgSO₄.

Significant respiratory depression should be treated with calcium gluconate, 1g IV should be given slowly over ten minutes (10 ml 10% solution).

Calcium Gluconate is to be given by a doctor.

7. Interactions

Theoretically the neuromuscular blockade effect of Magnesium could be exacerbated by concurrent use of Nifedipine. This is seldom reported in clinical practice. If the mother becomes hypotensive, use of both drugs should be reviewed by the Obstetrician.

8. Fetal and Neonatal Effects

The responsible obstetrician at birth should inform the Paediatric team that the mother has been receiving MgSo₄.

Neonatal hypermagnesemia may produce hyporeflexia leading to poor sucking and rarely respiratory depression. This effect lasts for up to 24 hours following birth. The neonatal team should be aware the mother has had Magnesium Sulphate.

9. References

1. RCOG Scientific Impact Paper No 29 August 2011: Magnesium Sulphate to Prevent Cerebral Palsy Following Preterm Birth.
2. Doyle LW, Crowther CA, Middleton P, Marret S, Rouse D. Magnesium sulphate for women at risk of preterm birth for neuroprotection of the fetus. *Cochrane Database Sys Rev* 2009.
3. Constantine MM, Weiner SJ, Shriver EK (NICHD). Maternal-Fetal Medicine Units Network (MFMU). Effects of antenatal exposure to magnesium sulphate on neuroprotection and mortality in preterm infants: a meta-analysis. *Obstet Gynecol.* 2009; 114:354-64.
4. National Institute of Clinical Excellence (2015) Preterm labour guideline - revised January 2017. NICE.