Magnesium Sulfate for Neuroprotection Practice Guideline

I. Background:

Magnesium sulfate has been suggested to have neuro-protective effect in retrospective studies from 1987 and 1996. Since that time three randomized control trials have been performed to assess magnesium therapy for fetal neuroprotection. These studies have failed to demonstrate statistically significant decrease in combined outcome of cerebral palsy and death or improved overall neonatal survival. However, these results did demonstrate a significant decrease in cerebral palsy of any severity by 30%, particularly moderate-severe cerebral palsy (40-45%). The number needed to treat at less than 32 weeks gestation is 56.

The presumptive mechanism of action for magnesium sulfate focuses on the N-methyl-D-aspartate receptor. Additional magnesium effects include calcium channel blockade resulting in cerebrovascular relaxation and magnesium mediated decreases in free radical production and reductions in the production of inflammatory cytokines.

Magnesium sulfate should not be used as a tocolytic simply because of the potential for neuro-protective effects. In a recent committee opinion, ACOG states "the available evidence suggests that magnesium sulfate given before anticipated early preterm birth reduces the risk of cerebral palsy in surviving infants" but specific guidelines should be established. "The U.S. FDA has recently changed the classification of magnesium sulfate injection from Category A to Category D. However, this change was based on a small number of neonatal outcomes in cases in which the average duration of exposure was 9.6 weeks. The ACOG Committee on Obstetric Practice and the Society for Maternal-Fetal Medicine continue to support the use of magnesium sulfate in obstetric care for appropriate conditions and for appropriate, short term (usually less than 48 hours) durations of treatment."

II. Inclusion:

A. Estimated gestational age of **$24^{0/7}$** to **$31^{6/7}$** weeks gestation
   A) Gestational ages $22^{0/7}$ to $23^{6/7}$ are not included in this recommended practice guideline for magnesium intervention. However, individualized patient discussion and NICU consultation is recommended to determine if patient desires full intervention. MFM consultation is recommended for patients who desire full intervention to guide appropriate management and intervention.
B. Preterm labor patients (*on tocolytics*) that have cervical dilation of ≥5 cm
C. Preterm premature rupture of membranes with evidence of either labor or chorioamnionitis
D. Anticipated or planned delivery for maternal medical/fetal indications or other associated circumstances (marked symptomatic cervical length shortening, etc) in which the likelihood for delivery within the upcoming 24 hours is high.

III. Exclusion:

A. Preeclampsia / Eclampsia on magnesium sulfate prophylaxis for seizure prophylaxis
B. Situations of maternal or fetal instability when delay of delivery will be detrimental to patient or fetus
C. Maternal contraindication to magnesium sulfate
   a. Myasthenia gravis
   b. Pulmonary disease (i.e. hypertension, pneumonia, severe asthma exacerbation, ARDS, edema)
   c. Cardiac diseases (Class II-IV)
   d. Renal Failure

IV. Method:

A. 6 g bolus of magnesium sulfate over 30 minutes
B. Continue 2g/h maintenance until birth, if delivery anticipated
C. Maternal monitoring of vitals including urine output (UOP) and clinical examination every 4 hours
   a. UOP <100mL in 4 hours → careful clinical evaluation, check magnesium level and consider decreasing maintenance infusion rate
D. Continuous fetal monitoring during magnesium therapy
E. Discontinue magnesium sulfate after 12 hours if imminent delivery is no longer anticipated
F. After magnesium has been discontinued and delivery is expected to occur at less than 32 weeks within the next 24 hours:
   a. > 6 hours since discontinuation of the magnesium → re-bolus 6g followed by 2g/h maintenance
   b. < 6 hours since discontinuation of magnesium → continue 2g/h maintenance

Disclosure: These care clinical guidelines follow ACOG and evidence of available literature. Clinical evaluation of each individual patient to determine optimal management is recommended and MFM consultation is available for further assistance.

References:

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3. Mercer BM, Merlino AA; Society for Maternal-Fetal Medicine.Magnesium sulfate for preterm labor and preterm birth. Obstet Gynecol. 2009 Sep;114(3):650-68.
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