Increasing Uptake and Correct Administration of Magnesium Sulfate for Management of Severe Preeclampsia and Eclampsia

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Objectives

At the end of the workshop, participants will be able to:

- Describe new WHO guidelines for management of severe pre-eclampsia and eclampsia, including the recommended regimen for MgSO4
- Describe new findings on prevalence of magnesium toxicity
- Describe job aids to assist providers to correctly administer MgSO4
- Describe a simple monitoring tool for women being treated with MgSO4
- Describe measures to implement to increase access to MgSO4
Price of preeclampsia and eclampsia

A woman in a developing country:

- **Is 7 times** more likely to develop PE (2.8% of live births) than in developed countries (0.4% of live births).
- **Is 3 times** more likely to progress to eclampsia if she develops PE (2.3% of pre-eclamptic women in the developing world compared with 0.8%).
- **Is up to 14 times** more likely to die of eclampsia should she develop it—even in hospital settings.
- **Has an approximately 300 times higher** risk of dying of PE and eclampsia than a woman in a developed country.
Time of eclampsia occurrence

- Approximately 38 to 55% of all cases of eclampsia occur antepartum
- 13-36% occur intrapartum
- 5-39% occur within the first 48 hours following childbirth
- 5-17% occur greater than 48 hours postpartum
Comprehensive management of women with severe PE and eclampsia should include:

- Anticonvulsant drugs
- Antihypertensive drugs, and
- Timed childbirth

We are only focusing on MgSO4 today.
Aspirational goals

All women with severe preeclampsia receive MgSO$_4$ for prevention of eclamptic seizures.

MgSO$_4$ is administered as soon as possible after the first eclamptic seizure, wherever that occurs, to prevent recurrent fits.
Two randomized control trials provided the scientific evidence needed to promote MgSO₄ as the anticonvulsant of choice for the treatment of severe preeclampsia and eclampsia:

- The Magnesium Sulfate for Prevention of Eclampsia (MAGPIE) Trial for women with preeclampsia (2002).
Despite its endorsement by WHO and its presence on most essential medicines lists, MgSO\textsubscript{4} is still:

- Underutilized;
- Incorrectly administered; or
- Unavailable in many low-resource settings
Low coverage of MgSO$_4$ for management of severe preeclampsia and eclampsia is due to a combination of factors:

- Restrictive policies
- Supply/Logistics issues
- Provider factors

Photo: PATH/Evelyn Hockstein
Barriers to uptake of MgSO\textsubscript{4} : Policy

- Administration may be limited to:
  - MDs
  - Comprehensive emergency obstetric and newborn care facilities

- Clinical protocols may not include MgSO\textsubscript{4} as the anticonvulsant of choice for treatment of severe PE/E

- Clinical protocols may only recommend MgSO\textsubscript{4} for “imminent” eclampsia or eclampsia
Barriers to uptake of MgSO$_4$ : Multiple product presentations of MgSO$_4$

Available presentations:
- 1% (10 mg/mL)
- 2% (20 mg/mL)
- 10% (100 mg/mL)
- 15% (150 mg/mL)
- 20% (200 mg/mL)
- 50% (500 mg/mL)

Photo: PATH/Evelyn Hockstein
Barriers to uptake of MgSO$_4$ : Complex dosing

The current regimen is complex and requires:

- Different **dilutions** for initial intravenous (IV) loading dose (20%), IV additional dose for recurrent seizures after loading dose (50%), and intramuscular (IM) doses (50%):
  - Requires calculating the amount of diluent to add to the solution to get the correct dilution.

- Different **doses** for:
  - IV and IM doses.
  - Loading and maintenance doses.
Barriers to uptake of MgSO₄: Confusing data on MgSO₄ dosing

- Published dosage regimens for MgSO₄ vary widely
- There does not appear to be a clear threshold concentration for ensuring the prevention of convulsions
- Timing of drug discontinuation has been arbitrary; there are no high quality data to guide therapy
Barriers to uptake of MgSO₄: Perception of risk of magnesium toxicity

**Evidence**
- Review of literature shows very few cases of toxicity.
- Toxicity mostly related to medication errors or in cases of renal insufficiency.

**Provider Reluctance**
- Providers may be reluctant to administer maintenance dosing because of fear of toxicity.
- Administering maintenance dosing requires careful monitoring which may be difficult when there are shortages of qualified health care providers.
- Providers may have difficulty remembering signs of toxicity and how to assess for them.
Barriers to uptake of MgSO₄: Preference for IM injections

- Most high resource settings administer MgSO₄ by continuous IV perfusion
- In many low resource settings, however, IM dosing is favored because:
  - Pump devices that facilitate continuous IV infusion of MgSO₄ may not be available or may not be reliable
  - IM injections are relatively safer than continuous IV infusions in settings that do not have pumps to control the IV infusion
  - All providers administering MgSO₄ may not be competent/comfortable to do so by continuous IV infusion
Barriers to uptake of MgSO4: Pain of IM injections

- Complaints of pain and side effects during IM injections may negatively influence:
  - A health care provider’s decision to initiate or continue treatment
  - A patient’s acceptance of ongoing treatment
- The repeated IM maintenance injections could potentially lead to development of abscess
Any other barriers to uptake of MgSO$_4$ that you have experienced?
There are four key opportunities for increasing uptake of MgSO\(_4\):  

1. Develop enabling policies  
2. Improve product presentation  
3. Develop simplified regimen to reduce complexity  
4. Increase provider confidence and comfort
1 – Develop enabling policies: MgSO₄

- MgSO₄ included in clinical protocols:
  - Anticonvulsant recommended for all women with severe PE and eclampsia
  - MgSO₄ listed as the first-line anticonvulsant for management of severe PE/E
- Use of MgSO₄ **not** limited to CEmONC facilities
- All skilled maternal care providers authorized to diagnose severe PE/E and administer MgSO₄
- Consider task shifting at least the initial dose to cadres working in the community
1 – Develop enabling policies: Task shift

- Increased uptake of MgSO₄.
- Earlier administration of MgSO₄.
- Prevention of eclampsia and recurrent fits.
- Reduced mortality (perinatal / maternal).
1 – Develop enabling policies: Include MgSO$_4$ for treatment of severe PE/E in NLEM

- Include MgSO$_4$ for treatment of severe PE/E on national list of essential medicines
- Only register WHO-recommended presentations of MgSO$_4$:
  - 500 mg/mL in 2-mL ampoule (50%)
  - 500 mg/mL in 10-mL ampoule (50%)

WHO Model List of Essential Medicines

17th list
(March 2011)

Status of this document
This is a reprint of the text on the WHO Medicines web site
1 – Develop enabling policies: Include MgSO$_4$ in HMIS

- Monitor:
  - Availability of MgSO4 at the MOH medical store / health care facilities
  - Cases of severe PE/E
  - Uptake of MgSO4
  - Deaths attributed to severe PE/E
1 – Develop enabling policies: Quality improvement initiatives

- Maternal death reviews:
  - Number of women who died from severe PE/E who did not receive MgSO4

- Chart audits
  - Review management of women with severe PE/E

- Performance standards for management of severe PE/E
Any other recommendations to improve policy environment?
2 - Improve product presentation

- Develop package(s) with the correct strengths of MgSO\textsubscript{4} for loading and maintenance doses with an appropriate identification (e.g., color coding).
- There is ongoing work under the UN Commission on Life-Saving Commodities for Women and Children (UNCoLSC) recommendation 10 to revise product presentation.
3 - Develop simplified regimen to reduce complexity

Simplified regimen will lead to:

- Increased uptake of a safe, effective dosing regimen of MgSO$_4$.
- Reduced mortality (perinatal/maternal).
Study in India used 50% solution for loading and continuous maintenance IV infusion.

Loading dose only regimen for treatment of eclampsia

- Approximately 10 percent of eclamptic women will have repeated seizures if managed expectantly.
- Some researchers observed that many patients with eclampsia who did not receive maintenance therapy due to suspicion/fear of toxicity or stockouts of MgSO₄ did not convulse any further.
Any other recommendations to improve product presentation / dosing?
4 – Increase provider confidence and comfort: Computer animation tool

- Includes a tool where the learner can enter any concentration of MgSO4 and determine the appropriate preparation and administration.
4 – Increase provider confidence and comfort: Use of apps to assist with dosing

- Interactive mobile phone application guides providers through the steps for safe preparation and administration using the current WHO protocol.

- Based on demand, it can be revised for country-specific dosing regimens and translated into other languages.
Increase provider confidence and comfort: Use checklists to guide administration of MgSO$_4$

Checklists:

• Break down complex tasks into steps.

• Facilitate standardization of procedures.

• Provide prompts / reminders for students and veteran providers.

• Can be used for training and quality improvement initiatives.
4 – Increase provider confidence and comfort: Use simple tools to monitor women receiving MgSO₄

- Contains all parameters to be monitored
- Provides space for administration of medications
- Provides a “snapshot” of the woman and baby’s conditions
- Currently being evaluated in both basic and comprehensive emergency obstetric care facilities in sub-Saharan African countries
4 - Increase provider confidence and comfort: Develop simplified delivery mechanisms

Fig. 1. Springfusor® pump (Go Medical, Australia).
Any other recommendations to improve provider competence / comfort with administering MgSO₄?
Together we can make a difference and ensure that every woman who needs MgSO₄ receives it in a safe, timely manner.
Comments?

Questions?
Materials

- Computer animation tool
- Checklists
- LIVKAN Chart
- Suggested indicators for M&E of programs to detect and treat severe PE/E
Thank you!

Photo credit: Susheela Engelbrecht
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References


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