Medical Direction and Practices Board
Treatment of Eclampsia in the Prehospital Setting
White Paper

In the 2023 protocol updates, the MDPB seeks to align MEMS protocols for the treatment of presumed eclamptic seizures with the current recommendations from the OBGYN community. Acknowledging the current American College of Obstetricians and Gynecologists (ACOG) recognition that eclampsia can occur "up to 6 weeks" after delivery, the MDPB has changed the indications in the protocol to represent this. Also, understanding that magnesium sulfate is believed to have a preventative effect against eclamptic seizures and is recommended treatment as eclampsia prophylaxis by ACOG, the MDPB has added that the protocol is to be used on these patients who are "post-ictal," that is, after their seizure.

Eclampsia is defined by new onset seizure activity (which may be impressively tonic-clonic or subtly focal) in a pregnant or recently post-partum patient without a history of epilepsy or another cause such as head trauma or stroke. Though previously understood to be an evolution of pre-eclampsia, itself a syndrome defined by hypertension and proteinuria (or less commonly renal and/or liver dysfunction), ACOG, in their Practice Bulletin 222 issued in June 2020, cautions that many patients may lack such a history: "Of note, a significant proportion of women (20–38%) do not demonstrate the classic signs of preeclampsia (hypertension or proteinuria) before the seizure episode." [1] The College also suggests that while there may be predictive symptoms such as headache, vision changes, or other neurologic symptoms, one study showed that the majority of eclamptic patients did not have these tell-tale signs. Thus, the historical dogma of a linear progression from pre-eclampsia to eclampsia is now thought to be incorrect. The EMS clinician should not rely on the absence of a pre-eclamptic history or traditional symptoms to rule in or out the development of eclampsia in a seizing pregnant or recently post-partum patient.

Regarding the use of magnesium sulfate in the treatment and prevention of eclamptic seizures, ACOG is very clear: "Magnesium sulfate is more effective than phenytoin, diazepam, or nimodipine in reducing eclampsia and should be considered the drug of choice in the prevention of eclampsia in the intrapartum and postpartum periods." [1] The pathophysiology of pre-eclampsia and eclampsia is still poorly understood and beyond the scope of this white paper. It is interesting to note, however, that prevailing expert opinion is that eclamptic seizures are mostly self-limited, and the role of the magnesium sulfate is to prevent reoccurrence rather than to break the seizure.

The optimal loading dose of magnesium sulfate is less clear but based on available research and literature at the time of the protocol update, 4 grams IV/IO is a frequently cited dose. The duration of the IV/IO infusion is also without consensus in the literature. The clinician must balance desire to prevent rapid reoccurrence of the life-threatening seizure against the very real potential for dangerous magnesium toxicity. The adverse effects of magnesium sulfate come primarily from its function as a smooth muscle relaxant. This action can lead to respiratory depression and cardiac arrest. In the hospital, this smooth muscle effect is monitored by checking the patient's deep tendon reflexes during and after the administration of the drug. Our review of the literature revealed recommended timing of the loading dose from as little as 15 minutes to as long as 30 minutes. Based both on our combined practical experience as physicians, and our desire for rapid EMS intervention, the MDPB has chosen the timelier of the infusion protocols, i.e., 15 minutes. An additional factor in this decision was our plan for the EMS clinician to proceed quickly down the treatment algorithm rather than wait an extended period for the loading dose to determine efficacy. The IM route is noted in the literature to be more unpredictable in terms of potential adverse effects. However, all cited resources are unanimous in recommending IM administration in the presence of presumed eclamptic seizure without IV/IO access. The ideal dosage is again without consensus, but the MDPB has chosen to keep the previously recommended protocol dosage for clinician familiarity and as it falls within the recommended ranges of the current research the MDPB reviewed. Notably, our IM dosage is at the low end of the recommended literature at this time.

New to this protocol is the instruction to begin an intravenous infusion after the loading dose is complete. This addition is based on the recommendation of ACOG and other OBGYN advisory groups. A 2010 Cochrane review found that magnesium sulfate significantly reduced the risk of seizure recurrence. Unfortunately, current research has not established the ideal therapeutic level of circulating magnesium sulfate, and as such, the recommended dosage of a continual infusion is debated. The MDPB has selected a dose on the lower end of the recommendations, which go as high as 2 grams/hour, in the theory that this will limit potential toxicity and given the expected immediacy of transport, can be adjusted by the receiving hospital to efficacy and provider comfort.

Also new to the protocol is the recommendation to give an additional 2-gram bolus of magnesium sulfate over 2-5 minutes for a recurrent presumed eclamptic seizure. This protocol comes directly from the consensus statement from the National Partnership for Maternal Safety published in the journal *Obstetrics & Gynecology* in August 2017. In their Practice Bulletin, ACOG agrees with this strategy, and suggests that the additional bolus may even go up to 4 grams over the same rapid period. The MDPB has chosen to stay at the lower end as the EMS clinician is less prepared to respond to magnesium toxicity than the in-hospital provider.

Finally, the MDPB has added the instruction to proceed to benzodiazepines in the presentation of refractory seizures. This is contrary to recommended eclampsia treatment by OBGYN specialists. Indeed, the NPMS consensus statement: “Although medications such as diazepam or lorazepam can arrest or shorten an eclamptic convulsion, either therapy can result in maternal apnea, cardiac arrest, or both. Parenteral magnesium sulfate does not cause any significant maternal or neonatal central nervous system depression when properly used; it is the drug of choice to treat and prevent eclamptic convulsion in the United States.”

It is very important for the EMS clinician to understand our reasoning behind this recommendation. The MDPB does not dispute that benzodiazepines are not ideal for the treatment and prevention of eclamptic seizures. However, the MDPB acknowledges that in the pre-hospital setting, it may be difficult to determine if a patient’s seizures are due to eclampsia, epilepsy, or another causative effect (trauma, ischemia, etc.). For this reason, if a pregnant or recently post-partum patient continues to seize after a repeat bolus of magnesium sulfate, the MDPB suggests that the EMS clinician treat for these other potential causes of the seizure. The MDPB expects the prehospital clinician to be prepared to treat potential adverse effects of the benzodiazepine administration, most commonly apnea. In this case, the MDPB believes the potential ill-effects to the mother (and fetus) of untreated seizures of a non-eclamptic nature are too great to ignore. Thus, in these cases, benzodiazepines are a drug of last resort requiring anticipation of the potential detrimental effects, only to be used in the presence of failed magnesium sulfate therapy.

References

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3) Dennis, Alicia, 2021. “Management of Pre-eclampsia: Issues for Anaesthetists,” Anaesthesia (6), 9:1009-1020. https://doi.org/10.1111/j.1365-2044.2012.07195.x

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