

Magnesium Sulphate for Eclampsia and Fetal Neuroprotection: A Comparative Analysis of Protocols Across Canadian Tertiary Perinatal Centres

Dane A. De Silva, MPH,^{1,2} Diane Sawchuck, RN, PhD,¹ Peter von Dadelszen, MBChB,^{1,2} Melanie Basso, RN, MSN,³ Anne R. Synnes, MDCM, FRCPC, DPhil,^{2,4} Robert M. Liston, MBChB, FRCSC,¹ Laura A. Magee, MD, FRCPC^{2,5,6}; on behalf of the MAG-CP Collaborative Group (Appendix 1)

¹Department of Obstetrics and Gynaecology, University of British Columbia, Vancouver BC

²Child and Family Research Institute, University of British Columbia, Vancouver BC

³Children's and Women's Health Centre of British Columbia, Vancouver BC

⁴Department of Pediatrics, University of British Columbia, Vancouver BC

⁵Department of Medicine, University of British Columbia, Vancouver BC

⁶Department of Medicine, British Columbia Women's Hospital and Health Centre, Vancouver BC

Abstract

Background: Magnesium sulphate (MgSO₄) has been recommended for fetal neuroprotection to prevent cerebral palsy, with national societies adopting new guidelines for its use. A knowledge translation project to implement Canadian guidelines is ongoing. Discussion about MgSO₄ for fetal neuroprotection could not occur distinct from MgSO₄ for eclampsia prophylaxis and treatment. Thus, in order to explore standardization of MgSO₄ use in Canada, we sought to compare local protocols for eclampsia and fetal neuroprotection across tertiary perinatal centres.

Methods: Twenty-five Canadian tertiary perinatal centres were asked to submit their protocols for use of MgSO₄ for eclampsia prophylaxis/treatment and fetal neuroprotection. Information abstracted included date of protocol, definitions of indications for treatment, details of MgSO₄ administration, maternal and fetal monitoring, antidote for toxicity, and abnormal signs requiring physician attention. Descriptive analyses were used to compare site protocols with known definitions of preeclampsia. Data from the Canadian Perinatal Network (CPN) were used to verify what was done in clinical practice.

Results: Twenty-two of the 25 centres submitted protocols for eclampsia prevention/treatment. Eleven of these provided a definition of preeclampsia that warranted treatment; five of the 22 advised treatment of severe preeclampsia only. Criteria for treatment and monitoring procedures varied across centres. Sixteen of the 22 sites with protocols had data from the CPN. Of 635 women with pre-eclampsia, 422 (66.5%) received MgSO₄. Twenty of 25 centres provided protocols for fetal neuroprotection. Definitions of indications were consistent across sites, except for gestational age cut-off.

Conclusion: This study suggests that local protocols are often inconsistent with published evidence. While this may be related to local institutional practices, relevant processes must be put in place to maximize uniformity of practice and improve patient care.

Résumé

Contexte : L'utilisation de sulfate de magnésium (MgSO₄) a été recommandée à des fins de neuroprotection fœtale dans le but de prévenir l'infirmité motrice cérébrale; des sociétés nationales adoptent d'ailleurs de nouvelles lignes directrices quant à son utilisation. Un projet de transfert des connaissances visant la mise en œuvre des lignes directrices canadiennes est en cours. Le rôle du MgSO₄ en ce qui concerne la neuroprotection fœtale ne peut être abordé sans que l'on mentionne son utilisation dans le cadre de la prophylaxie et de la prise en charge de l'éclampsie. Ainsi, pour explorer la standardisation de l'utilisation de MgSO₄ au Canada, nous avons cherché à comparer les protocoles locaux qui en régissent l'utilisation en matière d'éclampsie et de neuroprotection fœtale dans les centres périnataux tertiaires.

Key Words: Magnesium sulphate, fetal neuroprotection, preeclampsia, eclampsia, protocol

Competing Interests: None declared.

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Méthodes : Nous avons demandé à 25 centres périnataux tertiaires canadiens de nous soumettre leurs protocoles quant à l'utilisation du $MgSO_4$ aux fins de la neuroprotection fœtale et de la prophylaxie / prise en charge de l'éclampsie. Les renseignements que nous avons tirés de ces protocoles comprenaient la date du protocole, les définitions des indications de traitement, les détails de l'administration du $MgSO_4$, le monitoring maternel et fœtal, l'antidote pour contrer la toxicité et les symptômes anormaux nécessitant l'offre de soins médicaux. Des analyses descriptives ont été utilisées pour comparer les protocoles de ces centres aux définitions connues de la prééclampsie. Des données issues du Réseau périnatal canadien (RPC) ont été utilisées pour vérifier ce qui se faisait dans le cadre de la pratique clinique.

Résultats : Vingt-deux des 25 centres nous ont soumis leurs protocoles de prévention / prise en charge de l'éclampsie. Onze de ces centres nous ont fourni une définition de ce qui était considéré comme une prééclampsie justifiant une prise en charge; cinq des 22 centres ne préconisaient que la prise en charge de la prééclampsie grave. Les critères des interventions de traitement et de monitoring variaient d'un centre à l'autre. Seize des 22 sites comptant des protocoles présentaient des données issues du RPC. Au sein d'un groupe de 635 femmes connaissant une prééclampsie, 422 (66,5 %) ont reçu du $MgSO_4$. Vingt des 25 centres nous ont fourni leurs protocoles de neuroprotection fœtale. Les définitions des indications étaient uniformes d'un site à l'autre, sauf en ce qui concerne le seuil en matière d'âge gestationnel.

Conclusion : Cette étude avance que les protocoles locaux ne concordent souvent pas avec les données probantes publiées. Bien que cela puisse être attribuable aux pratiques institutionnelles locales, des processus pertinents doivent être mis en place pour maximiser l'uniformité de la pratique et améliorer les soins offerts aux patientes.

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INTRODUCTION

Magnesium sulphate has long been used in obstetrics for prophylaxis and treatment of preeclampsia and eclampsia, and historically as a tocolytic for preterm labour.¹⁻⁵ Recently, administration of $MgSO_4$ has been advocated for fetal neuroprotection in the preterm infant to decrease the risk of cerebral palsy, based on evidence from randomized controlled trials and meta-analyses.⁶⁻¹² The Society of Obstetricians and Gynaecologists of Canada and similar national societies have therefore adopted guidelines for use of $MgSO_4$ in women with imminent preterm birth at < 32 weeks' gestation.^{13,14}

ABBREVIATIONS

CIHR	Canadian Institutes of Health Research
CPN	Canadian Perinatal Network
HDP	hypertensive disorders of pregnancy
IM	intramuscular
IV	intravenous
MAG-CP	$MgSO_4$ for Fetal Neuroprotection of the Preterm Infant
$MgSO_4$	magnesium sulphate

MAG-CP is a knowledge translation project funded by the Canadian Institutes of Health Research and designed to promote the implementation of the 2011 SOGC clinical practice guideline "Magnesium sulphate for fetal neuroprotection"¹³ in Canadian tertiary perinatal centres. This project was stimulated by knowledge that practice change does not usually follow simple dissemination of information; rather, practice change requires active knowledge translation, a recognized mandate of the CIHR.¹⁵

Active knowledge translation can take many forms. As one of many approaches being undertaken by MAG-CP, site visits were conducted to address the impact of each site's organizational culture on practice change within that site. Early in the course of these site visits, it became clear that discussion of $MgSO_4$ for fetal neuroprotection could not occur distinct from discussion about the administration (and ideally, standardization) of $MgSO_4$ for other indications, namely eclampsia prevention and treatment.

In order to explore existing standardization of $MgSO_4$ administration in Canadian tertiary perinatal centres, we undertook a comparative analysis of $MgSO_4$ protocols for preeclampsia/eclampsia and fetal neuroprotection.

METHODS

From May 2012 to May 2013, the coordinator or site investigator of each of Canada's 25 tertiary perinatal centres was asked to submit its English or French language $MgSO_4$ protocols for eclampsia prophylaxis and treatment and for fetal neuroprotection. Protocols that were in draft form were accepted. Between January and June 2014, the centres were contacted to obtain any subsequent updated protocols. These protocols were written by respective leads in each of the sites, using appropriate documentation and evidence from the literature.

The following information was abstracted from both the local preeclampsia/eclampsia and fetal neuroprotection protocols: date of protocol, definitions of preeclampsia/eclampsia and fetal neuroprotection that provided the indication for treatment, routes of $MgSO_4$ administration, availability of pre-mixed bags of $MgSO_4$ and concentration used, loading and maintenance dosage and duration of treatment, the nature of maternal and fetal monitoring and its frequency, abnormal signs requiring physician attention, and any antidote for toxicity. The anonymity of the centres was preserved and each was identified by a letter, rather than by name.

Descriptive analyses were used to describe site protocol recommendations; they were then compared with the

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