

Budget impact analysis of Intravenous Magnesium Sulfate for Treating Asthma Exacerbations in Children

Short running title: Intravenous Magnesium Sulfate in Asthma

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31 To the editor

32 In children with asthma exacerbation the early use of intravenous magnesium sulfate (MS)
33 has become more extensive over the last few years. Evidence in clinical trials has shown
34 reduction of hospital admissions in children using MS IV, without severe adverse events
35 (1). The use of MS could cause a substantial impact on the healthcare budget. In a recent
36 issue of Pediatric Pulmonology , Buendia et al, reported show that MS is cost-effective in
37 a tropical country (2). However, cost-effectiveness analyses alone do not provide
38 information on the drug's impact on the total healthcare budget, because this is dependent
39 on the number of treated patients. Thus, the expected budget impact of a new treatment
40 should be explicitly estimated, in addition to the traditional cost-effectiveness.

41 To estimate this budget impact of MS , we using the mean expected cost per patient of MS
42 in asthma exacerbations estimated by Buendia et al , assuming a time horizon defined of 4
43 years, a total population under 18 years of age, in Colombia in 2019 of 12 808 647
44 habitants (3), a prevalence of asthma in this age group (19%) (4), proportion of
45 uncontrolled cases of 21%(5), and finally a market shares for MS (Year 1: 25%, Year 2:
46 50% , Year 3: 75%, Year 4: 100%). The economic model showed that MS for treating
47 pediatric patients with asthma exacerbations was associated with a lower total cost than
48 standard therapy, substantial savings per patient (US \$1,149; CI 95% US\$1,139 -1,160) vs
49 (US \$1,598 US\$1,586- 1,611) average cost per patient), Figure 1. Our evidence suggests
50 that intravenous MS, administered after failure to improve a first dose of albuterol, is a
51 cost-saving for the treatment of children with asthma exacerbations. Compared with the
52 current treatment without MS, the alternative treatment with MS provided total cost saving
53 US\$ 461 million.

54 Previous publications have shown that asthma has a relevant impact on healthcare resources
55 consumption and related expenditures, especially in severe case. Avoiding complications
56 and mechanical ventilation is important since they are associated with worsening long term
57 respiratory function and resource consumption. We used retrospective data reported in a
58 previously cost –effectiveness study, and this information do not exclude the possibility
59 that medical invoices were incomplete or missing data. In this study reported that several
60 measures were employed to ensure data accuracy, including the use of software with
61 automatic calculation functions and error alerts and a review of outliers by the research
62 team. In conclusion, MS IV was cost-saving in emergency settings for treating children
63 with asthma exacerbations. This shift in treatment approach proved to be economically
64 favorable, reducing the cost of hospitalization and mechanical ventilation. This evidence
65 can be used by decision-makers in our country to improve clinical practice guidelines and
66 should be replicated to validate their results in other middle-income countries.

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68 References

1. Shan Z, Rong Y, Yang W, Wang D, Yao P, Xie J, et al. Intravenous and nebulized magnesium sulfate for treating acute asthma in adults and children: a systematic review and meta-analysis. *Respir Med.* 2013;107(3):321-30.
2. Buendia JA, Acuna-Cordero R, Rodriguez-Martinez CE. The cost-utility of intravenous magnesium sulfate for treating asthma exacerbations in children. *Pediatr Pulmonol.* 2020.
3. Estadísticas DAN. Proyecciones de población 2018 [03/07/2019]. Available from: <https://www.dane.gov.co/index.php/estadisticas-por-tema/demografia-y-poblacion/proyecciones-de-poblacion>.
4. Dennis RJ, Caraballo L, Garcia E, Rojas MX, Rondon MA, Perez A, et al. Prevalence of asthma and other allergic conditions in Colombia 2009-2010: a cross-sectional study. *BMC Pulm Med.* 2012;12:17.
5. Neffen H, Fritscher C, Schacht FC, Levy G, Chiarella P, Soriano JB, et al. Asthma control in Latin America: the Asthma Insights and Reality in Latin America (AIRLA) survey. *Rev Panam Salud Publica.* 2005;17(3):191-7.

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