

## Use and abuse of magnesium sulfate in asthmatic exacerbations<sup>☆</sup>



### Uso y abuso del sulfato de magnesio en las crisis asmáticas

Dear Editor:

Different clinical practice guidelines recommend the use of intravenous (IV) magnesium sulphate (MgSO<sub>4</sub>) for management of asthma exacerbations that do not respond to first-line treatment with bronchodilators (BDs) and steroid therapy.<sup>1</sup>

One systematic review supports its use on the basis that it can achieve a reduction in hospital admission of 68% (odds ratio [OR], 0.32; 95% confidence interval [CI], 0.14–0.74), although it analysed a small number of studies and patients.<sup>2</sup> It should be used early in patients older than 5 years that do not respond to treatment.

In contrast, there is only one clinical trial analysing the effect in infants or pre-school children, with no efficacy observed in this age group.<sup>3</sup>

There is great variability in the use of MgSO<sub>4</sub> in paediatric emergency departments in other countries,<sup>4</sup> and the frequency and conditions of use in hospitals in our country have not been reported previously.

The primary objective of our study was to assess the effectiveness of MgSO<sub>4</sub> in preventing hospital admission and the secondary objective to assess the factors associated with successful treatment with MgSO<sub>4</sub>.

A descriptive, retrospective, observational, retrospective study was conducted, including patients aged 0–16 years with wheezing or asthmatic crisis who received treatment with MgSO<sub>4</sub> iv in the PEDs of two hospitals between January 2010 and December 2019.

The primary endpoint was the success of treatment, defined as prevention of hospital admission. We also analysed other variables related to the use of MgSO<sub>4</sub>: patient age, patient sex, adequate previous intensive treatment at the PED (3 nebulisations in 1 h of salbutamol and ipratropium bromide and steroids), time elapsed to administration to MgSO<sub>4</sub>, classification of asthma exacerbation based on GINA criteria in both hospitals, presence of respiratory infection and consolidation in the Chest X - ray. The drug was considered to be correctly used in patients over 5 years of age in whom it was administered within 2h of arrival at the ED after receiving BD (3 doses) and corticosteroids.

The statistical analysis was performed with the SPSS® statistical software.

MgSO<sub>4</sub> was administered 208 times in the EDs of the 2 hospitals, hospital A 163 (mean 30,000 EDs/year) and hospital B 45 cases (18,000 EDs/year). [Table 1](#) summarises the characteristics of the patients.

Magnesium sulphate was used more frequently in male patients with severe exacerbations, and the median age was 56 months; 98 of the 208 patients were aged less than 5 years.

In 133 of the patients, the exacerbation was associated with infection. A chest radiograph was performed in 177 patients, detecting consolidation in 56.

In 188 patients, MgSO<sub>4</sub> was administered after absence of improvement with conventional treatment in the PED, usually late, with administration after 2 h of arrival to the PED in 161 of the patients.

The 45 patients managed in hospital B were admitted. On the other hand, 11 of the 163 patients managed in hospital A did not require admission.

In the univariate logistic regression analysis, we found an association between correct administration of the drug (meeting the 3 aforementioned criteria) and the probability of not being admitted (OR, 0.15; 95% CI, 0.02–0.90; *P* = .03). This association was not confirmed in the multiple regression model, in which only the severity of the exacerbation was associated with a higher probability of admission ([Table 2](#)).

As did previous authors, we found substantial variability in the use of MgSO<sub>4</sub> in our area. The drug was used under circumstances that was not always consistent with the available evidence. This was particularly the case of the age of administration, as a large percentage of the patients treated with it were infants and children under 5 years. This, combined with its late administration (more than 4h after arrival to the PED in 52% of cases) could have contributed to the poor outcomes. Another salient finding was the low proportion of patients that were not hospitalised compared to previous studies. A possible partial explanation is that the administration of MgSO<sub>4</sub> may influence the decision to admit children with asthma exacerbations, as evinced in one of the studied hospitals.<sup>5</sup> It could also be due to its use being reserved for the most severe and refractory exacerbations with the aim of avoiding admission to the paediatric intensive care unit rather than admission to the hospital,<sup>6</sup> which could explain its infrequent use.

In conclusion, although the literature supports the use of iv MgSO<sub>4</sub> off-label in paediatrics to prevent the admission of children with asthmatic crisis, its administration in our area did not adhere to recommendations or achieve the desired effects. It would be necessary to establish correct protocols for its use and to investigate the characteristics of the responding patients in order to implement an appropriate use of the drug.

The main limitations of the study are its retrospective design and the lack of objective criteria for hospital admission.

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**Table 1** Characteristics of the patients treated with intravenous magnesium sulphate.

Variable	Total	Hospital A	Hospital B	P
<i>Number of treatments; n (%)</i>	208	163 (78.40)	45 (21.60)	–
<i>Age (months)</i>				
Median (IQR)	56.0 (28.0–90.0)	56.0 (28.0–89.0)	59.0 (30.0–92.0)	0.744
≤60 months; n (%)	98 (47.12)	75 (46.01)	23 (51.11)	
>60 months; n (%)	110 (52.88)	88 (53.99)	22 (48.89)	
<i>Sex; n (%)</i>				0.549
Male	126 (60.58)	97 (59.51)	29 (64.44)	
Female	82 (39.42)	66 (40.49)	16 (35.56)	
<i>Severity; n (%)</i>				0.210
Moderate	50 (24.04)	36 (22.09)	14 (31.11)	
Severe	158 (75.96)	127 (77.91)	31 (68.89)	
<i>Infection; n (%)</i>				0.018
Yes	133 (63.94)	111 (68.10)	22 (48.89)	
No	75 (36.06)	52 (31.90)	23 (51.11)	
<i>Consolidation; n (%)</i>				0.006
Yes	56 (26.92)	45 (27.61)	11 (24.44)	
No	124 (59.62)	90 (55.21)	34 (75.56)	
X-ray not performed	28 (13.46)	28 (17.18)	0	
<i>NPA sample taken; n (%)</i>				0.011
Yes	135 (64.90)	99 (60.74)	36 (80.00)	
No	73 (35.10)	64 (39.26)	9 (20.00)	
<i>NPA test results; n (%)</i>				0.705
Rhin	43 (31.85)	35 (35.35)	8 (22.22)	
RSV	10 (7.41)	6 (6.06)	4 (11.11)	
Influenza	6 (4.44)	5 (5.05)	1 (2.78)	
Other virus	17 (12.59)	9 (9.09)	8 (22.22)	
Multiple viruses	22 (16.30)	16 (16.16)	6 (16.67)	
Negative	37 (27.41)	28 (28.28)	9 (25.00)	
<i>Appropriate previous treatment; n (%)</i>				0.576
Yes	188 (90.38)	146 (89.57)	42 (93.33)	
No	20 (9.62)	17 (10.43)	3 (6.67)	
<i>Timing of administration (h); n (%)</i>				0.608
<1 h	14 (6.73)	10 (6.13)	4 (8.89)	
1–2 h	33 (15.87)	26 (15.95)	7 (15.56)	
2–4 h	51 (24.52)	37 (22.70)	14 (31.11)	
4–8 h	52 (25.00)	41 (25.15)	11 (24.44)	
>8 h	58 (27.88)	49 (30.06)	9 (20.00)	
<i>Appropriate use of MgSO<sub>4</sub>; n (%)</i>				0.454
Yes	10 (4.81)	7 (4.29)	3 (6.67)	
No	198 (95.19)	156 (95.71)	42 (93.33)	
<i>Hospital admission; n (%)</i>				0.126
Yes	197 (94.71)	152 (93.25)	45 (100)	
No	11 (5.29)	11 (6.75)	0 (0)	

IQR, interquartile range; MgSO<sub>4</sub>, magnesium sulphate; NPA, nasopharyngeal; Rhin, rhinovirus; RSV, respiratory syncytial virus.

**Table 2** Multiple logistic regression.

	Significance	OR	95% CI	
Age	0.919	0.999	0.977	1.021
Sex	0.649	1.505	0.259	8.750
Duration (days)	0.998	1.000	0.984	1.017
Infectious disease	0.197	3.044	0.561	16.506
Time (days)	0.691	0.944	0.713	1.252
Severity of attack	0.006	12.167	2.034	72.784
Correct use	0.146	0.120	0.007	2.089

CI, confidence interval; OR, odds ratio.

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## Health-related quality of life in preadolescents before and during the lockdown<sup>☆</sup>



## Calidad de vida relacionada con la salud en preadolescentes antes y durante el confinamiento

Dear Editor:

The state of alarm declared in Spain due to the coronavirus disease 2019 (COVID-19) pandemic lasted for 98 days, during which the Spanish population was under strict home confinement.

Health-related quality of life (HRQoL) is a widely studied construct in the literature that refers to a state of physical, mental, and social well-being.<sup>1</sup> The objective of our study was to compare HRQoL in preadolescents in Spain before and during the COVID-19 lockdown.

We conducted a 2-wave longitudinal study (wave 1, December 2019; wave 2, lockdown period, at least 62 days after it began). The participants were 165 students (38.2% male) from year 6 of primary education to year 2 of compulsory secondary education (ESO in Spanish) enrolled in 5 schools in the regions of Aragón, Asturias and Castilla y León in Spain.

We used the KIDSCREEN-27.<sup>2</sup> This version assesses 5 dimensions with 27 items. The reliability indicators were adequate.

We obtained consent for participation of the students, and the study was approved by the schools and the research ethics committee.

We found significant differences in physical well-being, with a substantial decrease during the lockdown ( $P < .001$ ) during the lockdown. In contrast, scores for the autonomy and parents dimension increased during the lockdown ( $P < .001$ ) (Table 1). We did not find significant differences based on sex or educational stage.

The significant decrease in physical well-being could be expected given the restrictions to free movement and suspension of face-to-face classes and activities. This situation affecting a large portion of European children and adolescents was a major source of concern<sup>3</sup> and should be taken into account in case of future total or partial lockdown situations.

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