Intravenous Magnesium Replacement in Patients With Hypomagnesemia: Time Is of the Essence

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To the Editor:

We read with interest the comparison of short versus prolonged infusion rates of intravenous (IV) magnesium in hospitalized patients with hypomagnesemia.[1] The primary outcome was to determine whether there was a difference in the percent of days requiring magnesium replacement out of the magnesium length of stay for these 2 infusion rates. The short infusion rate was 1.8 ± 0.4 g/h, but the actual prolonged infusion rate was not reported. The authors concluded that prolonged magnesium infusion rates did not decrease magnesium replacement requirements, based on the infusion required in 34.8% of days in the short cohort versus 37.5% of days in the prolonged cohort.

The primary outcome chosen was arbitrarily dependent on the clinician prescriber who would determine what their "personal threshold" may be for IV magnesium replacement. It also could have been related to the optimal therapeutic range provided (1.4-2.7 mg/dL is larger than many institutions). We are not aware of any data to support an actual "desired" therapeutic range of 2 to 2.7 mg/dL as listed in the article because it was not obtained from clinician prescribers but by the authors.

Serum magnesium concentrations were obtained before and after dosage; however, this information was not provided, only the average total grams of IV magnesium administered (4.8 g in the short and 3.5 g in the prolonged cohort without mention of dose in relation to the patient's body weight). A common rule of thumb for IV magnesium replacement is a serum change range of 0.08 to 0.18 mg/dL per gram administered; therefore, the change expected from 3 to 5 g of IV magnesium would have been 0.2 to 0.9 mg/dL.[2,3] Unfortunately, various other factors were not reported including renal function, use of enteral or oral nutrition, presence of diarrhea, and insulin or diuretic use that could have affected the primary and secondary outcomes. In addition, the number of patients who received oral magnesium was reported, but the rationale why it was used (over IV replacement or concurrently), dose, and number of days received were not, as this could have contributed to fecal magnesium losses.

The patient population mentioned in the title of the article may not be straightforward as nearly one-third of patients were surgical (provided in Table 1). Furthermore, the safety of short IV magnesium infusions merits attention as there was a 3-fold increase in the occurrence of hypermagnesemia (presumably observed on the following day). In addition, there was a substantially higher number (11% vs. 0%) of patients with hypotension (e.g., less than 90/60 mm Hg) in the short versus prolonged infusion cohort. Although not statistically significant, this would be clinically significant and a reason not to advocate for a shorter infusion duration.

The use of a therapeutic outcome, such as cessation of physical or cardiac symptoms or even use of potassium replacement needs, instead of serum magnesium concentrations may benefit future prospective trials of IV magnesium to determine the optimal infusion rate for patient safety. Since this is one of the few published studies comparing IV magnesium infusion rates to date, the missing details may explain why no differences were noted, as well as a type II statistical error.

Authors' Note

Authors had access to the data and both substantially participated in writing the manuscript.

Declaration of Conflicting Interests

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References

1. Doshi S, Waller J, Clemmons A. Prolonged versus short infusion rates of IV magnesium in hospitalized general medicine patients with hypomagnesemia [published online ahead of print December 17, 2018]. *Hosp Pharm*. doi:10.1177/0018578718817941.
2. Hammond DA, Stojakovic J, Kathe N, et al. Effectiveness and safety of magnesium replacement in critically ill patients admitted to the medical intensive care unit in an academic medical center: a retrospective, cohort study. *J Intensive Care Med*. 2019;34(11-12):967-972.
3. Ryman KM, Canada TW. Deficiencies of magnesium replacement in the critically ill. *J Intensive Care Med*. 2018;33(5):325-326.