Evaluation of the efficacy of electrolyte replacement protocol in ICU and non-ICU patients

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Purpose/Background: To treat electrolyte abnormalities or prevent complications associated with them, many hospitalized patients receive intravenous or enteral electrolyte replacements. To date, there are a myriad of approaches to replacement, however, the medical literature suggests that protocolized electrolyte replacement is more effective than non-protocolized replacement. Our institution currently uses the same electrolyte replacement protocols for potassium, magnesium, and phosphorus in both ICU and non-ICU patients. Currently there is a paucity of literature evaluating the efficacy and safety of electrolyte replacement protocols in non-ICU patients. In addition the protocols in use at our institution have not been validated. The objective of this study is to evaluate the efficacy of the electrolyte replacement protocols in both ICU and non-ICU patients.

Methods: This study was designed as a retrospective, chart review composed of adult patients (18 years or older) admitted with orders for potassium, magnesium, and/or phosphorus electrolyte replacement protocols between February 1, 2015 and October 31, 2015. It was pre-specified that 30 patients would be identified for each of the 6 replacement groups. This prespecification was based upon the sample sizes seen in previous electrolyte protocol studies. Patients who received protocolized doses followed by post-replacement labs were included for further review. The primary endpoint was the percentage of ICU and non-ICU patients with repeat lab values within normal range after protocolized repletion. Secondary endpoints included percentage of patients with repeat lab values above or below normal range after repletion, as well as the change in electrolyte values with appropriate protocol use.

Results: 302 patients were screened and 122 were excluded from this analysis. The absence of a repeat lab draw was the most frequent reason for exclusion. Of the 30 ICU patients who received potassium replacement, 27 (90%) had a post-replacement lab value within normal limits, compared to 28 of the 30 (93.3%) non-ICU patients who received potassium replacement (p=0.64). Among the patients who received magnesium replacement, 90% of both ICU and non-ICU patients had a post-replacement lab value within normal limits (p=1.0). Of the 30 ICU patients who received phosphorus replacement, 16 (60%) achieved a repeat lab value within normal limits, compared to 22 of the 30 (73.3%) non-ICU patients who received phosphorus replacement (p=0.11). The only significant difference between pre- and post-replacement electrolyte value was seen in the magnesium replacement analysis, with a mean increase of 0.54 mg/dL in the ICU group compared to 0.32 mg/dL in the non-ICU group (p=0.0365). Only one adverse event, hyperphosphatemia, occurred during all included repletion attempts.

Conclusions: There were no significant differences in the efficacy of potassium, magnesium, or phosphorus replacement protocols between ICU and non-ICU patients. Our institution’s electrolyte replacement protocols enabled the majority of ICU and non-ICU patients to achieve target serum electrolyte ranges without resulting in supraphysiologic serum concentrations.