Polystyrene Sulfonate Resins in Hyperkalemia

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Introduction

Hyperkalemia is a potentially life threatening electrolyte abnormality defined as a serum potassium >5.0 mEq/L. Polystyrene resins, including sodium polystyrene sulfonate (SPS) and calcium polystyrene sulfonate (CPS) have long been used to treat hyperkalemia. SPS/CPS act by exchanging a cation for potassium within the intestinal lumen. While SPS and CPS have been available since the 1960s, there are rising concerns about the validity of the data supporting its use and about serious adverse gastrointestinal effects.

Methods

We conducted a systematic review using Cochrane Library, EMBASE (1947 - 2019) and Medline (1946-2019) databases. Our population of interest was adult patients who received SPS/CPS for hyperkalemia. **Primary studies that provided data on change in serum potassium when using SPS/CPS were included.** The primary outcome was change in serum potassium. The secondary outcomes included adverse effects of SPS/CPS and prevention of recurrent hyperkalemia. Literature reviews, systematic reviews, case studies, case series and editorial pieces were excluded. Included studies were assessed for risk of bias.

Results

Five randomized control trials, twenty-one observational studies and five quasi-experimental trials were included. A total of 226570 patients were included. Two thousand and seventy patients were studied for the primary outcome and 224500 patients were studied for the secondary outcomes. Study designs were heterogeneous and not amenable to meta-analysis. Only two randomized control trials and one observational study were considered to be at low risk of bias. The majority of studies included non-hemodialysis outpatients older than 65 years. Of the included studies 21/23 (91%) demonstrated a reduction of serum potassium >0.5mEq over the study period. Sixty-eight percent of studies investigated the effects of SPS/CPS after 24 hours. A few high-quality observational studies suggest an increased risk of serious adverse gastrointestinal events with a relative risk of 2.10 and a hazard ratio of 1.25-1.94, however the absolute risk remain low.

Discussion

This systematic review demonstrates a continued lack of high-quality evidence for the use of SPS/CPS in hyperkalemia. Studies investigated highly-variable timelines and the most robust evidence SPS/CPS use is in chronic hyperkalemia. While the absence of high-quality evidence

does not exclude the possibility of benefit, prescribers must understand that the use of SPS/CPS in acute hyperkalemia is not supported by high-quality evidence.