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Probiotics Use in Hospital-Acquired Infections Among Trauma Patients

Introduction: Trauma patients are at a high risk for hospital-acquired infections (HAIs) such as ventilator associated pneumonia (VAP), surgery site infections (SSIs), and *Clostridium difficile* colitis. Probiotics, known for their ability to mitigate gut dysbiosis through restoration of immune responses, are often administered alongside antibiotics. However, some studies have shown that daily administration of probiotics does not improve hospital outcomes in critically ill patients. The aim of this study was to examine the association between HAIs and probiotics use in trauma patients receiving probiotics during their hospital stay.

Methods: This retrospective study analyzed data from adult trauma patients who presented to a Level 1 trauma center between January 2015 and June 2023. Patient cohorts were divided into the probiotics (PRO) cohort, composed of patients who received probiotics during their hospital stay, and the control (NO-PRO) cohort, composed of patients who did not receive probiotics. The primary outcome was incidence of HAI. Secondary outcomes included time to first dose of probiotics from admission, incidence of in-hospital mortality, hospital length of stay, and incidence of diarrhea. Univariate analyses were performed with $p<0.05$ considered significant.

Results: A total of 116 patients met the inclusion criteria with 56 patients (48%) in probiotics cohort. Baseline demographics were similar between the two groups ($p>0.05$). Development of one or more HAIs was significantly higher in the PRO cohort (57%) than in the NO-PRO cohort (35%, $p=0.017$). Development of hospital-acquired UTIs (29% vs. 5%, $p<0.001$), catheter-associated UTIs (20% vs. 3%, $p=0.005$), *C. difficile* colitis (16% vs. 3%, $p=0.019$), and diarrhea (59% vs. 13%) were also significantly higher in the PRO cohort. Hospital length of stay was also significantly increased in the PRO cohort (median=27 vs. 18 days, $p=0.019$). The mean time to first dose of probiotics from hospital admission was 17.6 days, and the mean time to first dose of probiotics from HAI development was 13.8 days.

Conclusions: Our study found that among trauma patients, probiotics were typically administered well after the development of one or more HAIs and that administration of probiotics was not associated with improvements in patient outcomes, such as HLOS and in-hospital mortality. However, differences in the severity of illness between the two cohorts may be a confounding factor. These findings prompt further investigation into whether probiotics are better utilized as a preventative measure for infection rather than a supplemental treatment for infection. Prospective, multi-center randomized studies are needed to better understand optimization of probiotics use in trauma patients.