Epidemiology of Acute Kidney Injury among Patients Receiving Concomitant Vancomycin and Piperacillin-Tazobactam: Opportunities for Antimicrobial Stewardship

Shigehiko Karino, Keith S. Kaye, Bhagyashri Navalkele, et al.

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ABSTRACT

Despite their common use as an empirical combination therapy for the better part of a decade, there has been a recent association between combination therapy with vancomycin and piperacillin-tazobactam and high rates of acute kidney injury (AKI). The reasons for this increased association are unclear, and this analysis was designed to investigate the association. Retrospective cohort and case-control studies were performed. The primary objective was to assess if there is an association between extended-infusion piperacillin-tazobactam in combination with vancomycin and development of AKI. The secondary objectives were to identify risk factors for AKI in patients on the combination, regardless of infusion strategy, and to evaluate the impact of AKI on clinical outcomes.

AKI occurred in 105/320 (33%) patients from the cohort receiving combination therapy with vancomycin and piperacillin-tazobactam, with similar rates seen in those receiving intermittent (53/160 [33.1%]) and extended infusions (52/160 [32.5%]) of piperacillin-tazobactam. Independent risk factors for AKI in the cohort included having a documented Gram-positive infection, the presence of sepsis, receipt of a vancomycin loading dose (odds ratio [OR], 2.22; 95% confidence interval [CI], 1.05 to 4.71), and receipt of any concomitant nephrotoxin (OR, 2.44; 95% CI, 1.41 to 4.22). For at-risk patients remaining on combination therapy, the highest rates of AKI occurred on days 4 (10.7%) and 5 (19.3%). The incidence of AKI in patients on combination therapy with vancomycin and piperacillin-tazobactam is high, occurring in 33% of patients. Receipt of piperacillin-tazobactam as an extended infusion did not increase this risk. Modifiable risk factors for AKI include receipt of a vancomycin loading dose, concomitant nephrotoxins, and longer durations of therapy.