Inpatient Antipseudomonal Beta-Lactam Use Optimization in a Community Hospital

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Background: Broad-spectrum antimicrobial agents, specifically antipseudomonal beta-lactams, have significantly increased in use within United States hospitals due to rising rates of multi-drug resistant organisms. A common goal for hospital antimicrobial stewardship programs is to measure and optimize the use of these agents, given their broad-spectrum coverage. Several strategies have been proposed to reduce the unnecessary use of these agents. The purpose of this study is to optimize antipseudomonal beta-lactam use for patients admitted with an indication for antimicrobial therapy by targeting pharmacist interventions, educational initiatives, order sets, and empiric treatment algorithms in a community hospital setting.

Methods: This is a retrospective, quality improvement study comparing patients who were previously admitted and received broad-spectrum antipseudomonal beta-lactam therapy prior to the implementation of antimicrobial stewardship strategies to reduce the use of these agents and compared to patients admitted and receiving broad-spectrum antipseudomonal beta-lactams after implementation of antimicrobial stewardship strategies. Such strategies include placing a formalized pharmacist-driven antibiotic time out for targeted antimicrobial agents, including anti-pseudomonal beta-lactams, providing educational information to select hospital staff, and updating empiric treatment algorithms within Carteret Health Care. The primary outcome measure will be antipseudomonal beta-lactam use measured in days of therapy before and after the implementation of a formalized pharmacist-driven antibiotic time out. Secondary outcome measures include length of antimicrobial therapy, use of other targeted antimicrobial agents, and potential cost savings associated with optimized use of antipseudomonal beta-lactams. In addition, retrospective patient data will be analyzed prior to implementing the formalized antibiotic time out. Once the pharmacist-driven antibiotic time out is performed, pharmacists will document and update antibiotic orders accordingly. Educational initiatives will also be conducted to ensure the ideal use of these agents, including appropriate initiation and de-escalation of therapy. Through these optimization strategies, we aim to improve antipseudomonal beta-lactam therapy use within the organization.

Results: A total of 515 patients were included in the study, of which 259 patients were in the pre-intervention group, and 256 patients were in the post-intervention group. Antipseudomonal beta-lactam therapy use was measured days of therapy per 1000 patient days resulting in no difference in piperacillin/tazobactam and meropenem (142.2 vs. 142.6 DOT; 9.7 vs. 9.9 DOT) compared to cefepime (36.4 vs. 42.3 DOT). Length of therapy decreased for piperacillin/tazobactam and meropenem. Targeted agents such as fluoroquinolones, monobactams, and anti-MRSA agents were compared pre-and post-intervention. Anti-MRSA agent vancomycin, increased by 15% (88.8 vs. 104.1 DOT). Culture-specific antimicrobial indications accounted for 36% of patients, whereas empiric therapy accounted for 64%. The formalized pharmacist-driven antibiotic time out implemented post-intervention received about 37% of patients on antipseudomonal beta-lactams for more than 72 hours, and 63% on therapy for less than 3 days. After implementation of the pharmacist-driven antibiotic time out, antipseudomonal beta-lactams overall had no change in cost savings.

Conclusion: Overall antipseudomonal beta-lactam use optimization within Carteret Health Care remained the same. Implementation of a pharmacist-driven antibiotic time out was not effective in decreasing the use of these broad-spectrum agents.