Ertapenem for surgical prophylaxis: the impact of antimicrobial stewardship interventions on inappropriate carbapenem utilization at a community teaching hospital

Purpose:
The Centers for Disease Control and Prevention (CDC) have recognized carbapenem-resistant Enterobacteriaceae (CRE) as an urgent threat in the United States. Inappropriate use of carbapenems appears to be a contributing factor in the development of CRE. At our hospital, we have observed an average of 14 CRE isolates per year since 2016. Additionally, there has been a recent outbreak of Carbapenem-resistant Acinetobacter baumannii (CRAB) within our region. Internal analysis of ertapenem utilization revealed a significant number of providers using this antibiotic for surgical prophylaxis, specifically abdominal procedures. In response, our Antimicrobial Management Team (AMT) delivered a multimodal intervention to promote the appropriate use of ertapenem. The primary objective of this study is to evaluate the impact of our interventions on ertapenem utilization for surgical prophylaxis.

Methods:
From March to October 2019, a pre-post study was performed to evaluate ertapenem utilization for surgical prophylaxis. Our AMT interventions were formally implemented in June 2019, although provider feedback and discussion were initiated in May 2019. Computer-generated reports were evaluated to identify all antibiotics utilized for abdominal surgical prophylaxis. Data collection included usage of ertapenem and other antibiotics, type of abdominal surgery, and prescriber information. In addition, surgical site infections (SSI) rates were monitored. Appendectomy and trauma cases were excluded. For appendectomy cases, it was unclear if ertapenem was utilized for prophylaxis or treatment of suspected infection. The interventions employed by our AMT included a review and update of our surgical prophylactic antibiotic protocol (SPAP) and policy, extensive provider education, and monitoring of policy compliance by adding ertapenem utilization to the Division of General Surgery quality scorecard. The antibiotics recommended in the SPAP are consistent with the American Society of Health-System Pharmacists Antimicrobial Prophylaxis in Surgery guideline. As a quality measure, our stewardship initiative was considered successful if monthly ertapenem utilization comprises less than 5 percent of all prophylactic antibiotics dispensed for abdominal surgery. This 5 percent threshold allows for cases where ertapenem use may be warranted based on a patient’s history. Approval by the institutional review board at our hospital was deemed unnecessary for this study.

Results:
In total, 1,080 abdominal surgical cases were reviewed. The quality measure of less than 5 percent ertapenem utilization was achieved each month after AMT interventions in June 2019, as demonstrated
by monthly ertapenem use for surgical prophylaxis: 13.7 percent in March, 13.4 percent in April, 4.9 percent in May, 8.9 percent in June, 3.1 percent in July, 2.2 percent in August, 4.5 percent in September, and 3.4 percent in October. Overall, the number of ertapenem cases was 58 pre-study (March to June) versus 16 post-study (July to October), accounting for a 72.4 percent reduction in prophylactic utilization. The most common indications for prophylactic ertapenem use were cholecystectomy (48 percent), laparotomy (23 percent), laparoscopy (14 percent), and colostomy (5 percent). In addition, the rate of SSI did not increase as a consequence of AMT intervention, suggesting the alternate antimicrobial agents in the SPAP are safe and effective for surgical prophylaxis in our patient population.

Conclusion:
The stewardship interventions implemented by our AMT were successful at reducing prophylactic use of ertapenem through provider education, SPAP monitoring for compliance with provider feedback, and reporting of quality measures at the Division of General Surgery meetings. Currently, an internal audit is being performed to ensure antimicrobial prophylaxis in appendectomies is managed appropriately. Our AMT will continue to identify, monitor, develop, and deliver interventions in an effort to reduce the incidence of CRE and CRAB as a part of the ongoing stewardship service at our institution.