

**Title:** Retrospective review of antibiotics reserved for resistant infections in a community hospital emergency department

**Purpose:** To prevent antibiotic resistance, it is imperative that antibiotics are utilized appropriately to treat bacterial infections. Emergency department (ED) providers typically start broad-spectrum therapy on patients with infections, with subsequent antibiotic de-escalation occurring during the inpatient hospital stay once the culture and sensitivity results become available. However, patients can present to EDs with known resistant infections and prior culture and sensitivity results, at which point ED providers should order tailored-antimicrobial therapy for the infections. It is advantageous to ensure that these antibiotics are being used appropriately to treat infectious disease states in patients presenting to the emergency department.

**Methods:** Patient records from Nov 1, 2016 through May 1, 2019 will be queried for patients who were ordered at least one dose of antibiotics on formulary (or were previously on formulary) at this institution that are typically reserved for resistant infections including imipenem/cilastatin, linezolid, daptomycin, quinupristin/dalfopristin, tigecycline, amikacin, polymyxin E, ceftazidime/avibactam, and ceftolozane/tazobactam. We anticipate most of the records found will relate to orders for imipenem/cilastatin and linezolid. Patients will be excluded if they were not administered at least one of the antibiotics listed above while in the ED. Data that will be extracted from the medical records include: demographics, details of all antimicrobial therapy provided, historical information pertaining to the treated infections, culture and sensitivity reports, pertinent laboratory values and radiological scan results, lengths of stay in various clinical departments, documented and trends of adverse-effects to the antibiotics during the patients hospital stay, and clinical outcomes. The primary objective of this evaluation is to determine if these antibiotics reserved for resistant infections are being used for appropriate infections.

**Results:** Between Nov 1, 2016 and May 1, 2019, the antibiotics of interest were ordered 107 times. The average patient age was 59 years old; 54 women and 53 men. Imipenem-cilastatin was ordered 73 times (68%) and linezolid was ordered 27 times (25%). The remaining 7% of orders were comprised of daptomycin (four times), tigecycline (one time), and amikacin (two times). Quinupristin/dalfopristin, polymyxin E, ceftazidime/avibactam, and ceftolozane/tazobactam were not ordered during the queried time frame. When retrospectively accounting for infection type, pathogen, dose, duration, known patient allergies, and patients' history of MDR pathogen, 22 (20%) of these orders have been deemed inappropriate. These 22 inappropriate orders involved the unnecessarily broad-spectrum therapeutic selection of imipenem-cilastatin for 18 (81%) orders and linezolid in 4 (18%) orders. Inappropriate agents were also selected when ED providers attempted to avoid untrue patient allergies in 7 (3%) orders. The average length of stay for patients who received appropriate and inappropriate therapy was similar at approximately 5 days. Amongst the 107 queried orders, 28 pharmacy interventions were observed, including documented pharmacy consultations. Of these pharmacy interventions 24 (85%) were associated with appropriate antibiotic selection while 4 (15%) were associated with inappropriate antibiotic selection.

**Conclusion:** There is an opportunity for education to improve this institution's ED regarding the selection of appropriate antimicrobial agents reserved for multi-drug resistant infection. Inappropriate broad antibiotic selection can be avoided through educating ED providers and nurses to challenge patient allergies and better assess a

patient's history of MDR organisms. The pharmacy department can also provide education to the ED staff regarding identification of true patient allergies and antibiotic cross-reactivity.