

Evaluation of Appropriate Use of Meropenem at a Community Hospital: A Frontline Perspective

Rachel A. Benesh

ABSTRACT:

Purpose: Emergence of multidrug-resistant Gram-negative organisms has become increasingly more common in recent years. Antimicrobial resistance and multidrug-resistant organisms are a significant cause of patient morbidity, mortality, and healthcare cost. The Centers for Disease Control and Prevention reports antibiotic-resistant threats based on the level of concern to human health, naming multiple Gram-negative organisms including extended-spectrum beta-lactamase-producing and carbapenem-resistant Enterobacterales. In light of rising resistance and an urgent need for stewardship, judicious use of broad-spectrum antibiotics such as carbapenems is an increasingly critical area of opportunity. The objective of this study is to evaluate meropenem prescribing and appropriateness of use.

Methods: This was a retrospective chart review of hospitalized patients aged 18 to 89 who received at least 48 hours of meropenem during the study period of January through July 2021. Patients were eligible if they had at least one positive culture growing a Gram-negative organism during the study period. Patients were excluded if they were transplant recipients, pregnant, had neutropenic fever or neutropenic precautions ordered, or had an initial culture growing a carbapenem-resistant organism. Primary outcomes included assessment of meropenem prescribing and overall appropriateness of use. Appropriateness of meropenem was based on the medication order and baseline serum creatinine, in addition to culture and susceptibility results. Secondary outcomes included new onset *Clostridioides difficile* infection during therapy, new multidrug-resistant infection requiring treatment, readmission for same infectious complaint within 30 days, in-hospital all-cause mortality, need for mechanical ventilation due to pneumonia, and duration of hospitalization and ICU length of stay. Results were analyzed using descriptive statistics. This study was deemed institutional review board exempt.

Results: A total of 297 charts were reviewed and 55 were included for analysis. Meropenem dose and frequency was appropriate 80% of the time, whereas only 65% was appropriate with respect to culture and susceptibility results. Combined overall appropriateness was 51% (n=28). Appropriateness based on culture and susceptibility was most frequently categorized as presence of extended-spectrum beta-lactamase producing organism (n=19), subjective clinical worsening (n=13), and allergy precluded alternate therapy (n=8). There was no incidence of new onset *Clostridioides difficile* infection in any patient during therapy. Readmission for same infectious complaint within 30 days was 9%, new multidrug-resistant infection requiring treatment was 11%, and incidence of in-hospital all-cause mortality was 15%. Of the patients with an indication of pneumonia, 70% were on mechanical ventilation at the time of meropenem initiation. The incidence of co-infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) for ventilated patients with pneumonia was 40%. The average duration of ICU and hospital length of stay was 13 and 16.6 days, respectively. Patients received meropenem on average for 6.7 days.

Conclusion: Appropriate dosing and frequency of meropenem was observed in the majority patients. However, culture and susceptibility results corresponding with overall appropriateness of meropenem use was observed in approximately half of patients. As a result, there is a need for targeted prospective audit and feedback for prescribers to promote judicious use of meropenem. Additional areas of opportunity include clarification of allergic reaction and pharmacist dose adjustments for renal function and indication.
