Association Between Carbapenem Resistance and Mortality Among Adult, Hospitalized Patients With Serious Infections Due to Enterobacteriaceae: Results of a Systematic Literature Review and Meta-Analysis

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OBJECTIVE
The purpose of the study was to investigate the association between CRE infections among adults in the United States and mortality among hospitalized patients with infections due to Enterobacteriaceae.

METHODS
Background: Previous evidence suggests that the incidence of patients with infections due to carbapenem-resistant CRE (CRKP) is on the rise worldwide. However, no information currently exists regarding the mortality associated with CRE. This study aimed to estimate the relative risk of mortality among patients with infections caused by CRE versus Those with infections caused by carbapenem-susceptible Enterobacteriaceae (CSE).

Methods: A systematic literature review was performed using the PRISMA guidelines. A search was conducted using the following databases: MEDLINE, EMBASE, and Cochrane databases from inception until December 2015. The search algorithm included keywords for carbapenem resistance and mortality paired with terms for severe infections and Enterobacteriaceae. Literature was analyzed using the meta-analysis software program. Heterogeneity was quantified using the Cochran Q and i2 statistics.

RESULTS
Systematic Literature Review
- Of the 37 studies identified for inclusion in the review and eligible for data extraction, 1260 unique citations were identified from literature searches, 277 articles were retrieved, and 1033 were reviewed.
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- Of the 1033 articles reviewed, 22 reported data that met criteria for inclusion in the meta-analysis.

Meta-Analysis
- Among patients with infections caused by CRE, use of carbapenems has been compromised owing to the high mortality rates associated with CRE infections. In fact, a recent retrospective study showed a 2- to 3-fold higher risk of overall mortality among patients with infections caused by CRKP vs CSE. In patients with infections caused by KPC-producing CRE, the risk of overall mortality compared with patients with infections caused by CSE was even higher.

CONCLUSIONS
The results of this study suggest that the use of carbapenems in patients with infections caused by CRE is associated with a significantly higher risk of overall mortality compared with patients with infections caused by CSE. These findings highlight the need for alternative treatments for CRE infections and underscore the importance of developing new antibiotics that can be safely and effectively used in patients with CRE infections.

REFERENCES

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DISCLAIMERS
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Figure 1. Systematic Literature Review and Study Flowchart

Figure 2. Mortality in Patients With CRE Infections Due to CSE and CRKP

Figure 3. Mortality in Patients With Non-CRE-producing CSE Infections vs CRKP-producing CSE Infections

Figure 4. Mortality in Patients With Non-CRE-producing CSE Infections vs Non-CRE-producing CRKP Infections

Figure 5. Mortality in Patients With Non-CRE-producing CSE Infections vs Non-CRE-producing CRKP Infections

Figure 6. Mortality in Patients With CRE Infections Due to CSE and CRKP

Figure 7. Mortality in Patients With Non-CRE-producing CSE Infections vs Non-CRE-producing CRKP Infections

Figure 8. Mortality in Patients With Non-CRE-producing CSE Infections vs Non-CRE-producing CRKP Infections