

ABSTRACT 2007/April 26, 2007

SUBJECT CATEGORY: 1. Antimicrobial Issues: New Drug Development, Pharmacokinetics, and Resistance and Susceptibility Testing

[TITLE] Heterogeneity in Resistance Trends Greatest in Largest Hospitals: Results of the Antimicrobial Resistance Management Program

John G. Gums, PharmD, Sanjay Ranka, PhD, Christopher M. Jermaine, PhD
Univ. of Florida, Gainesville, FL, USA

Background: Recent guidelines (*CID* 2007;44:159-77) have emphasized the need to develop institutional programs to enhance antimicrobial stewardship. An underlying assumption of hospital-based antimicrobial stewardship is that resistance patterns are heterogeneous and therefore can be controlled locally. Using data from 369 hospitals in the US and Puerto Rico enrolled in the ARM Program, we sought to determine if trends in antimicrobial resistance do vary across hospitals, and if so, what types of hospitals have the greatest heterogeneity in resistance trends.

Methods: Using a k-means clustering algorithm, hospitals were automatically grouped into 30 clusters where each cluster consisted of hospitals of similar size (total number of beds and ICU beds), whether outpatients were accepted, location, and institution type (academic/teaching or community). Resistance trends at each of the 369 hospitals were compared with the overall trends in the hospital's cluster using a binomial likelihood ratio test ($p = 0.05$). Multiple-hypothesis-testing errors were controlled. Each cluster was ranked according to the fraction of individual resistance trends that were significantly different.

Results: Significant heterogeneity in trends was found. 12% of all observed local "bug/drug" trends were significantly different from those at the similar hospitals in the same cluster. In one cluster (a set of seven large, Northeastern hospitals averaging 735 beds) more than 35% of all local "bug/drug" trends were significantly different from the overall cluster trend. The most significant factor influencing cluster heterogeneity was average hospital size. The correlation coefficient between cluster heterogeneity and the average bed count was 0.74; it was 0.66 for the average ICU bed count. Clusters composed of academic/teaching hospitals also had more heterogeneous trends.

Conclusions: These results suggest that resistance patterns do vary across hospitals. Since the heterogeneity in resistance trends was greatest in the largest hospitals, it suggests the possibility that effective antimicrobial stewardship is both more important and has a greater opportunity for impact at such institutions.

DISCLOSURE/GRANTS

AstraZeneca, Roche Pharmaceuticals
National Science Foundation