

TOPICAL CATEGORY: K. Nosocomial and Surgical Infections, Clinical Epidemiology, and Antimicrobial Resistance

Significant Heterogeneity Found in Resistance Trends Between Hospitals: Results of the Antimicrobial Resistance Management (ARM) Program

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Background: Recent guidelines and Joint Commission measures have emphasized the need for active antibiotic resistance surveillance programs. One of the strongest arguments for careful antibiotic stewardship is that usage directly affects resistance. However, what is less clear is whether antibiotic resistance trends are a local or a wide-area phenomenon. Using data submitted by ARM Program hospitals comprising 30+ million drug/isolate combinations, we sought to determine if there were statistically meaningful differences between resistance patterns at different hospitals.

Methods: For each hospital (n=369)/organism (n=19)/antibiotic (n=47) combination, we used a likelihood ratio test to compare the goodness-of-fit of a model that allows for a different resistance trend at the given hospital with one that forced all hospitals to have the same trend. A statistically significant better fit for the former model indicates that the hospital has a trend that is different than the rest of the hospitals. We tested using two different models: a binomial model that allows temporal trends of arbitrary shape, and a more restrictive binomial model that assumes only linear underlying trends. To control for differences caused due to geography, separate sets of tests were run where each hospital was compared only against its 5 nearest spatial neighbors. Bonferroni correction was used to control for multiple-hypothesis-testing errors.

Results: Significant heterogeneity in resistance trends among hospitals was found, predominantly among *Staphylococcus aureus*, *Escherichia coli*, and *Pseudomonas aeruginosa* isolates. Even in the most restrictive case (comparing each hospital/organism/drug combination only against similar hospitals using a linear resistance trend), at least 12% of hospital/organism/antibiotic combinations showed a significantly different trend from the others (true rate <12%; $p \leq 0.05$).

Conclusions: The most significant organism in terms of variability is *S aureus*. These results suggest some organism/antibiotic combinations are more likely to benefit from hospital-specific stewardship than others.

DISCLOSURE/GRANTS

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