Antimicrobial Resistance Rates to Commonly Used Combination Therapies
Ross Jones, PharmD Candidate¹, Kimberly A. Couch, PharmD, MA, FIDSA, FASHP¹,²
¹University of Maryland Eastern Shore School of Pharmacy and Health Professions ²CompleteRx

Abstract

Purpose:
The increasing rate of antimicrobial resistance poses a serious challenge to contemporary practice. Comprehensive, multifaceted, and novel strategies must be employed to mitigate the impact of microbial evolution. While it is standard practice to review local sensitivities to single agents, institutions less commonly screen for the prevalence of bacteria with dual resistance to first-line combination therapies. This study aims to assess local patterns of antibiotic resistance to frequently employed empiric combination regimens. From the results of this assessment, intra-institutional recommendations may be made to reduce first line failure by improving empiric combination selection.

Methods:
This project was approved by the appropriate ethics committee or institutional review board and informed consent was waived. Order sets will be reviewed for recommended combination therapies. The microbiology laboratory database was queried for all Gram-negative bacilli cultures in 2014 and the number of isolates and susceptibility to individual agents tested for pathogens isolated in 2014. Additionally, the database will be queried for the incidence of co-resistance for the combination of the recommended agents for sepsis, healthcare associated pneumonia, diabetic foot infection, skin and soft tissue infection, intra-abdominal infection, and complicated urinary tract infection. Data will be analyzed for incidence of co-resistance in combination therapy that is recommended and in alternate combination therapies.

Results

Prevalence by Organism

Bloodborne Infections

Respiratory Infections

Wound Infections

Urinary Tract Infections

Discussion

Analyses of localized resistance patterns is essential to appropriate empiric therapy selection. Assessing resistance rates to individual antimicrobials is standard practice within institutions, however this analysis can miss emerging patterns of resistance to multidrug empiric therapies. The potential benefit in assessing trends of co-resistance is to optimize empiric combination selection so as to minimize treatment failure.

This project works best when large data sets are available. This analysis was performed using a relatively small data set from a rural community hospital, and as such has all the limitations associated with small sample sizes. With the small sample sizes obtained in this exercise, statistical significance can not be reached for any of the co-resistance analyses. The urinary tract infection isolates represent the largest source specific subset and accordingly present the most reliable data.

One interesting facet of this co-resistance assessment is that lower rates of resistance will yield less robust data sets. For instance, in the bacteria-source group, only one isolate of K. pneumoniae was resistant to any of the first line beta-lactams, all other isolates were sensitive. This is certainly positive from a treatment perspective, though it makes data interpretation more challenging.

Another limitation encountered in this study was the inability to sort culture data to the extent initially anticipated. However, this does not impose a major limitation. For instance hospital acquired pneumonia was initially the proposed infection type to be assessed, however the sorting process was only able to narrow the search down to respiratory culture isolates, which may have also included community acquired pneumonia. This does not pose a major limitation however, since only Gram-negative rod isolates were assessed. The bacteria assessed, K. pneumoniae, P. aeruginosa, and E. coli are typically nosocomial pathogens often seen in respiratory cultures, rarely implicated in community acquired pneumonia.

Conclusions

This study was able to effectively assess sensitivity to first line beta-lactam agents in the most common bacterial isolates for major infection sites. Notably resistance rates to empiric therapies employed were reasonably low within this institution. Co-resistance was analyzed to the extent possible given the limitations imposed by the data sets. The researchers believe that this exercise can potentially impact patient outcomes and reduce mortality by better informing optimal empiric combination antimicrobial therapy selection, especially if performed at a larger institution with more robust data sets.

Disclosures

Authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation: Ross Jones: nothing to disclose Kimberly A. Couch, PharmD: nothing to disclose

Figure 1.
Figure 2.
Figure 3.
Figure 4.
Figure 5.
Figure 6.
Figure 7.