Polymicrobial Conditions Affect Antibiotic Susceptibility in Clinically Relevant Bacterial Species

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ABSTRACT

Polymicrobial communities will synergize to exhibit significantly different antibiotic susceptibility profiles compared to their monoculture counterparts.

HYPOTHESIS

Our experimental design follows the CLSI M100 and M7 guidelines for determining AST in the clinical setting. CLSI-recommended quality control organisms were chosen because they have been commonly used in the literature and are available in the CLSI's Standard Methods for the Determination of Minimum Inhibitory Concentrations (M IC) of Antimicrobial Agents (CLSI, 2015a, 2015b). MICs were determined for select isolates of PA, E. faecalis, and A. baumannii. MIC results were compared to those observed in pure cultures to determine whether treatment with penicillin and/or tetracycline significantly alters the susceptibility profile of the bacterial isolate.

EXPERIMENTAL DESIGN

RESULTS

In the results, we observe a significant change in the susceptibility profile of a polymicrobial isolate when compared to its monoculture counterpart. This change in susceptibility is not observed when the isolate is treated with penicillin and/or tetracycline. These findings suggest that polymicrobial infections may be more difficult to treat with antibiotics than single-species infections.

SIGNIFICANCE AND FUTURE DIRECTIONS

Our data across the two methods - MIC and viability - demonstrate several notable results. Polymicrobial infections were more resistant to antibiotics than single-species infections. In addition, penicillin and tetracycline did not show a difference in the observable MIC in the polymicrobial condition over the given values for the individual. In other words, the range of possible MIC values of the individual species was affected. In conclusion, however, an opposite effect was observed for susceptibility rates in that the MIC values for vancomycin and A. baumannii when treated with penicillin and E. faecalis were significantly decreased.

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REFERENCES


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