Development of a Cystic Fibrosis Specific Antibiogram

Background: The pathophysiology of people with cystic fibrosis (CF), including viscous mucus, provides an ideal environment for infections. During pulmonary exacerbations, people with CF are often receive antimicrobial therapy in order to treat lung infections. As a result, people with CF may have more frequent antimicrobial exposure and therefore may be at increased risk for developing resistant infections. In most institutions, empiric antimicrobial therapy is directed by prior culture results or the institutional antibiogram. Children's Mercy Kansas City (CMKC), like most institutions, excludes CF cultures from the institutional antibiogram. It is therefore necessary to study infection and resistance patterns specific to the CF population in order to optimize antimicrobial treatments. At CMKC, a CF-specific antibiogram was developed in order to address this need.

Methods: CF culture data collection started in January 2015 and will continue through 2026. All positive CF cultures obtained from sputum or throat swabs at CMKC will be included in the CF antibiogram. Individuals with a diagnosis of CF will be identified by a microbiology report. Data collection will include demographics, culture isolate information, and susceptibility data. For individuals with repeat positive cultures for the same microorganism within the same calendar year, only the initial chronological isolate will be included. The susceptibilities for the following bacteria will be included in the antibiogram: methicillin-susceptible *Staphylococcus aureus* (MSSA), methicillin-resistant *Staphylococcus aureus* (MRSA), *Pseudomonas aeruginosa* (PA), *Achromobacter*, *Stenotrophomonas maltophila*, and *Burkholderia* species.

Results: The MSSA, MRSA and PA isolates collected from sputum and throat swabs in the CF population were compared to the CMKC antibiogram. Both gram-positive and gram-negative microorganisms were overall less susceptible in the CF population compared to CMKC isolates. Both MSSA and MRSA were significantly less susceptible to clindamycin in CF cultures compared to non-CF cultures (MSSA 70% vs 81%, MRSA 39% vs 84%, $p < 0.001$). When comparing MSSA and MRSA susceptibilities with other antimicrobial therapies, the results were similar between the CF antibiogram and the CMKC antibiogram. PA was the most prevalent gram-negative isolate seen among CF cultures, and PA isolates were less susceptible in CF cultures than among the hospital-wide population. The susceptibility pattern of the microorganisms collected remained consistent throughout this interim analysis.

Conclusions: This interim analysis demonstrates less susceptible isolates for gram-positive and gram-negative microorganisms in the CF population compared to the hospital wide antibiogram. Furthermore, there did not appear to be significant changes in susceptibility patterns during this analysis. A CF-specific antibiogram is useful to make appropriate empiric antimicrobial selection and to monitor susceptibility trends over time.