Presentation Type:
Poster Presentation
Subject Category: Diagnostic/Microbiology
Impact of CLSI Break Point Changes Over the Past Decade on Antimicrobial Susceptibility in Gram-Negative Bacteria
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Background: Over the past decade, the CLSI has updated susceptibility break points for several antimicrobial agents. The purpose of this study was to evaluate the impact of these changes against gram-negative bacteria at our academic medical center. **Methods:** In this retrospective, IRB-approved study, we collected consecutive, nonduplicate clinical isolates of *Enterobacter cloacae*, *Escherichia coli*, *Klebsiella aerogenes*, *K. oxytoca*, *K. pneumoniae*, and *Pseudomonas aeruginosa* for the past decade (2010–2019) at our academic medical center and 3 adult ICUs. Susceptibility testing was performed using the BD Phoenix automated system. For these isolates, susceptibilities for 7 β-lactams (aztreonam, ceftriaxone, ceftazidime, cefepime, piperacillin/tazobactam, ertapenem, and meropenem) and 2 fluoroquinolones (levofloxacin, ciprofloxacin) were calculated based upon CLSI break points in 2010 and current CLSI break points in 2020. Any change >5% in susceptibility was deemed significant for this analysis. **Results:** In 17.5% of Enterobacteriales isolates tested, at least 1 antimicrobial demonstrated significant decline. Ertapenem was the most commonly affected antimicrobial (45% of the isolates) followed by ceftriaxone (35%) and cefepime (25%). Susceptibilities of aztreonam, ceftazidime, and meropenem were not affected for any of the Enterobacteriales. The most common organism demonstrating a significant impact on change in susceptibility among the Enterobacteriales was *E. cloacae* (41.7% of the time) followed by *E. aerogenes* (20.8%), *K. oxytoca* (12.5%), *K. pneumoniae* (8.3%) and *E. coli* (4.2%). Most of the impact was observed hospital-wide (33.3%), followed closely by the MICU (28.6%), the NSICU (23.8%) and the CVICU (14.3%). For *P. aeruginosa*, the impact of the antimicrobial break-point changes on susceptibility was more pronounced than the Enterobacteriales. Overall, 93.8% of the time there was a significant decline in antimicrobial susceptibility. Each antimicrobial (ciprofloxacin, levofloxacin, meropenem, and piperacillin/tazobactam) demonstrated a significant decline in susceptibility hospital-wide and in each ICU except for the susceptibility of meropenem in the NSICU. **Conclusions:** Changes in break points had a significant impact on the susceptibility of all antimicrobials for *P. aeruginosa* at our institution, both hospital-wide and in the adult ICUs. Although the impact was less for the Enterobacteriales, ertapenem, ceftriaxone, and cefepime demonstrated significant susceptibility changes, especially with *E. cloacae*. Understanding and evaluating the impact of the break-point changes may lead to changes in empiric therapy in other institutions.
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Indications for and Utility of Tracheal Aspirate Cultures for the Diagnosis of VAI
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Background: Tracheal aspirate bacterial cultures are routinely collected in mechanically ventilated children for the evaluation of ventilator-associated infections (VAIs). However, frequent bacterial colonization of endotracheal and tracheostomy tubes contribute to the marginal performance characteristics of the test for diagnosing VAI. Published literature characterizing drivers of culture collection and the predictive value of positive cultures are limited. **Methods:** This single-center, retrospective cohort study included children admitted to the pediatric intensive care unit who were receiving mechanical ventilation for at least 48 hours and had 1 or more semiquantitative tracheal aspirate cultures collected between September 1, 2019, and August 31, 2020. Indications for culture collection were determined through medical record review and included fever, hypothermia, tracheal secretion changes, radiographic pneumonia, increased oxygen requirement, and/or increased positive end-expiratory pressure (PEEP). A positive culture was defined as moderate or heavy growth of a noncommensal bacterial organism. A purulent Gram stain was defined as detection of moderate or many white blood cells. Diagnosis of VAI was based on treating-clinician documentation and was ascertained through medical record review. Logistic regression accounting for clustering by patient was performed to estimate the association between indications for culture collection and (1) culture positivity, (2) purulent Gram stain, and (3) diagnosis of VAI. **Results:** In total, 625 tracheal aspirate cultures were performed in 261 unique patients. Common indications for culture collection included isolated fever or hypothermia (n = 124, 20%), fever with an increase in oxygen requirement or PEEP (n = 71, 11%), isolated increase in oxygen requirement or PEEP (n = 67, 11%), or isolated secretion change (n = 54, 9%) (Figure 1). Overall, 230 cultures (37%) were positive and 218 (35%) Gram stains were purulent. There were no associations between culture indications and a positive culture. Presence of isolated fever was negatively associated with a purulent Gram stain (odds ratio [OR], 0.49; 95% CI, 0.30–0.81; $P = .005$); otherwise, there were no associations between indication and purulent Gram stain. Finally, in a multivariable model, odds of VAI diagnosis increased with both the number of indications for culture collection and purulent Gram stain, but not with positive culture (Figure 2). **Conclusions:** Number and type of clinical signs were not associated with tracheal aspirate culture positivity or purulence on Gram stain,

Figure 1. Indications for respiratory culture collection (Total N=625)

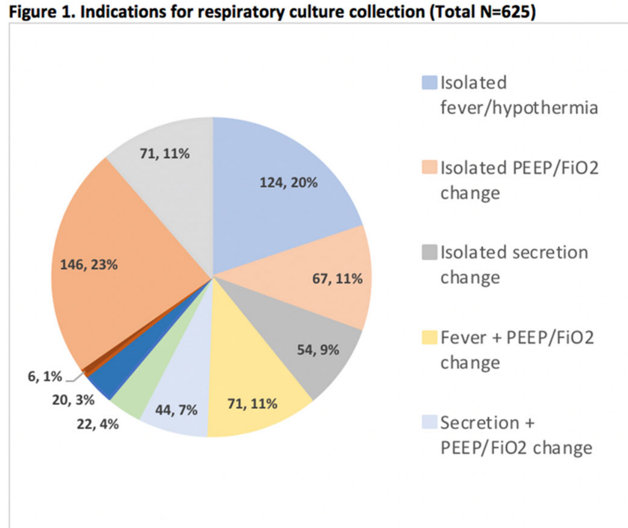

Figure 2. Multivariable analysis of factors associated with VAI