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)

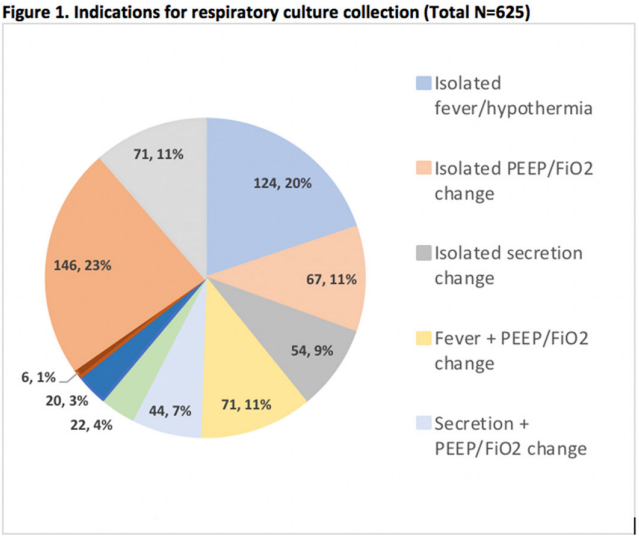
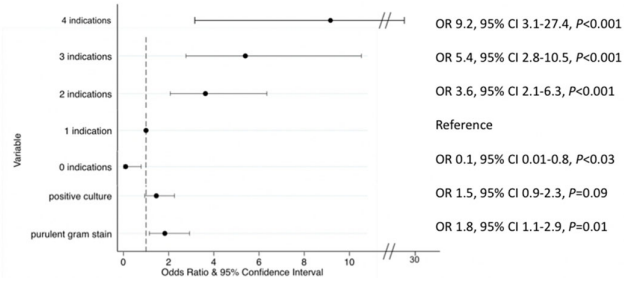


Figure 2. Multivariable analysis of factors associated with VAI



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but they were associated with a clinical diagnosis of VAI. These findings suggest that positive tracheal aspirate cultures may not aid clinicians in the diagnosis of VAI, and they highlight the opportunity for improved diagnostic stewardship.

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Microbiological Identification and Susceptibility Testing Using an Automated Method in a Tertiary-Care Public Hospital in Brazil

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Background: The use of the automated system for identification and susceptibility tests can improve antimicrobial stewardship. The reduction in the time of identification of the pathogen and the correct dose of antibiotic are factors that contribute significantly to institutional programs and patient outcomes. **Objective:** We identified and evaluated the susceptibility tests of microorganisms for common pathogens through antibiograms that accounted for the minimum inhibitory concentration (MIC), in a tertiary-care public hospital in Brazil. **Methods:** This retrospective, cross-sectional study was performed to identify microbiologic profiles after the implementation of a VITEK 2 system at a tertiary-care public hospital in Curitiba, Brazil. Based on data from the medical records, patients with positive cultures of clinical samples from August to December 2017 were included in this study. The analysis included culture results, susceptibility profiles, and MICs of 5 antibiotics: amikacin, cefepime, ciprofloxacin, meropenem and vancomycin. **Results:** In total, 545 antibiograms were evaluated using VITEK 2. The following microorganisms were isolated: 345 gram-negative bacilli (63.3%), 187 gram- positive cocci (34.3%), 9 unidentified microorganisms (1.7%), and 4 yeasts (0.7%). Among the analyzed antibiograms, amikacin was tested in 371 isolates (68.1%), with an MIC of 2 mg/L being the most prevalent value, with a frequency of 224 results (41.1%). Cefepime was tested in 319 isolates (58.5%), with an MIC of 1 mg/L being the most prevalent, with a frequency of 177 results (32.5%). Ciprofloxacin was tested in 470 isolates (86.2%), with an MIC of 0.25 mg/L being the most prevalent value, with frequency of 189 results (34.7%). Meropenem was tested in 318 isolates (58.3%), with an MIC of 0.25 mg/L being the most prevalent value, with a frequency of 223 results (40.9%). Vancomycin was tested in 157 isolates (28.8%), with an MIC of 1 mg/L being the most prevalent value, with frequency of 87 results (16%). **Conclusions:** When analyzing the most frequently isolated microorganisms and their predominant sensitivity profiles in our institution, amikacin proved to be a good therapeutic option, considering the epidemiological profile, as gram-negative bacilli showed greater sensitivity. Furthermore, VITEK 2 systems provided early access to appropriate antimicrobial therapy for patients, which is a known factor for reducing bacterial resistance.

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Using Low-Heat Decontamination to Allow N95 and PPE Reuse During the COVID-19 Pandemic

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Background: US healthcare facilities experienced significant personal protective equipment (PPE) shortages, including N95 masks, in the spring and summer of 2020. The Centers for Disease Control and Prevention issued guidance for extended use, reprocessing, and reuse of N95s. Eskenazi Health (EH) implemented a program to reprocess N95s and other PPE on-site using low-heat decontamination (LHD). EH considered large-scale and small-scale ultraviolet (UV), hydrogen peroxide vapor, and LHD for on-site reprocessing of N95s. All of these methods allowed up to 3 reprocessing cycles according to most literature available at the time. However, each method differed in feasibility and acceptability to staff. EH chose to implement LHD based on both considerations. **Methods:** Numerous small-group meetings were held in April 2020 to determine the feasibility and acceptability of N95 reprocessing methods. Staff wanted a method that was easy for the end user, had quick turnaround, and allowed them to retrieve their own N95s. They favored a method that could be used for all PPE. EH had deployed numerous small UV machines that individuals could use for N95s. The UV machines could not be scaled up easily. To scale up, a multidisciplinary team comprising infection prevention, biomedical engineering, and sterile processing representatives reviewed available methods and implemented LHD. Biomedical engineers determined that existing blanket warmers could be reprogrammed and repurposed for low-heat decontamination. Food warmers were also available but were not needed. Biomedical engineers reprogrammed the blanket warmers to 70°C and developed a wicking system using a towel and water tray to maintain humidity; decontamination took 30 minutes. Testing runs determined that both N95s and eye protection tolerated LHD without apparent damage. Infection prevention staff developed a workflow in which staff deposited all PPE in a paper bag; the PPE bag was centrally reprocessed, marked (Figure 1), and returned to designated locations (Figure 2) for staff to retrieve their original PPE. Sterile processing staff facilitated the reprocessing workflow, and elective surgeries were canceled during the COVID-19 surge. **Results:** From April 20, 2020, to July 19, 2020, 7,512 units were decontaminated with LHD. If each N95 was sterilized thrice (4 uses per N95), then LHD reduced the need to purchase 22,536 N95s. Restarting elective surgeries decreased staff and support from sterile processing; the space was needed for other purposes; and N95 availability increased. All of these factors led to the discontinuation of LHD. **Conclusions:**

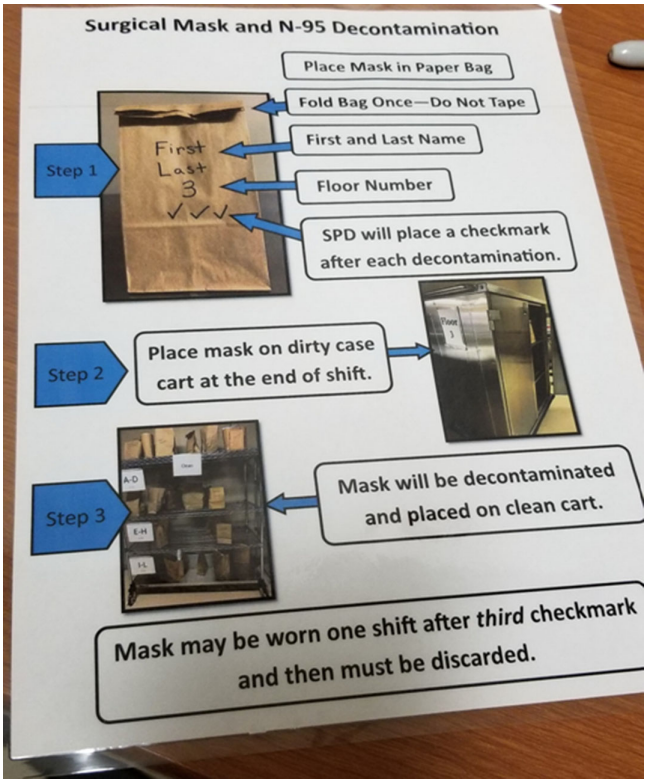

Figure 1.