

Table 1. Demographics and Clinical Characteristics

| | Patients with CRPA (N=13) |
|---|---------------------------|
| Demographics | |
| Age (mean, range), years | 62, 31-78 |
| Female (n, %) | 6 (46) |
| Risk factors | |
| Long-term care facility (n, %) | 2 (15) |
| Hospitalization in prior 90 days (n, %) | 6 (46) |
| IV antibiotics in prior 90 days (n, %) | 5 (38) |
| ICU level care and intubation (n, %) | 9 (69) |
| Renal failure (n, %) | 10 (77) |
| Immunocompromised* (n, %) | 3 (23) |
| Bone Marrow or Solid Organ Transplant | 0 (0) |
| SARS-CoV-2 PCR positive on admission (n, %) | 5 (38) |
| Infections from respiratory source (n, %) | 9 (69) |
| Outcomes | |
| Length of stay post positive culture (median, IQ range), days | 18 (7, 27) |
| Antibiotic days of therapy for CRPA (median, IQ range) | 11 (9, 17) |
| Hospital Mortality (n, %) | 8 (62) |

* HIV/AIDS or Biologic/Steroids

attributed to multidrug-resistant *Pseudomonas aeruginosa*. A recent study of 128 patients with nosocomial pneumonia due to *P. aeruginosa* showed the noninferiority of ceftolozane-tazobactam compared to meropenem. However, the resistance of ceftolozane-tazobactam due to AmpC mutations has been described. Compared with 2019, we observed an increase from 2 to 13 cases of ceftolozane-tazobactam-resistant *P. aeruginosa* (CRPA) during the COVID-19 pandemic at our institution in the Bronx, New York. **Methods:** A report of patients with CRPA between March and August 2020 was obtained. Data collected included demographics, hospitalization/IV antibiotic use in prior 90 days, SARS-CoV-2 PCR result, ICU admission, length of stay, antibiotic days of therapy, mortality, etc. **Results:** In total, 13 patients with CRPA infection were reviewed (Table 1). Among them, 2 patients were on the same inpatient medical-surgical unit but separated by 5 months. Also, 11 patients were from different medical-surgical units or ICUs. In addition, 5 patients (38%) were SARS-CoV-2 PCR positive. None of these COVID-19 patients were cohorted on the same unit, making horizontal spread of CRPA or COVID-19 unlikely. Finally, 8 of these patients died while hospitalized (4 were COVID-19 patients). **Conclusions:** We found a high incidence of mortality in patients with CRPA infection. Many patients had prolonged hospital stay and required ICU admission. Few patients were from long-term care facilities. Given the associated morbidity and mortality, increased surveillance and intensified antimicrobial stewardship efforts are needed to mitigate the impact of CRPA during the COVID-19 pandemic.

Funding: No

Disclosures: None

Antimicrobial Stewardship & Healthcare Epidemiology 2021;1(Suppl. S1):s70-s71

doi:10.1017/ash.2021.137

Presentation Type:

Poster Presentation

Subject Category: MDR GNR

Treatment of Extensively Drug-Resistant (XDR) *Acinetobacter* in US Veterans' Affairs (VA) Medical Centers

Margaret Fitzpatrick; Katie Suda; Linda Poggensee; Amanda Vivo; Geneva Wilson; Makoto Jones; Martin Evans; Nasia Safdar and Charlesnika Evans

Background: Infections caused by *Acinetobacter* spp are often healthcare acquired and associated with high mortality. Extensively drug-resistant

(XDR) *Acinetobacter* are nonsusceptible to at least 1 agent in all but 2 or fewer antibiotic classes. Few of the new antibiotics targeting multi-drug-resistant gram-negative bacteria are effective against XDR *Acinetobacter*. Recent national guidelines for treatment of resistant gram-negative infections do not include *Acinetobacter*, leaving a knowledge gap in best practices. **Methods:** This retrospective cohort study included microbiology, clinical, and pharmacy data from all patients hospitalized between 2012 and 2018 at any Veterans' Affairs medical center who had cultures that grew XDR *Acinetobacter* spp. Bivariate unadjusted analyses compared clinical outcomes by monotherapy versus combination therapy. Using mixed-effects ordinal logistic regression, propensity score-adjusted models accounting for severity of illness and other variables associated with treatment were fit to compare outcomes. **Results:** Of 11,546 patients with 15,364 cultures that grew *Acinetobacter* spp, 408 patients (3.5%) had 666 cultures (4.3%) with XDR *Acinetobacter*. Moreover, 276 of these patients (67.6%) had gram-negative targeted antibiotic treatment within -2 to +5 days from the culture. Furthermore, 118 patients (42.8%) received monotherapy, most commonly piperacillin-tazobactam (n = 54, 45.7%) or an anti-*Pseudomonas* cephalosporin (n = 21, 17.8%). Also, 158 (57.2%) patients received combination therapy, most commonly a carbapenem (n = 93, 58.9%) and/or polymyxin (n = 68, 43.0%). Moreover, 41 patients (25.9%) received both a carbapenem and polymyxin. In both unadjusted and adjusted analyses, there were no significant differences in the odds of 30-day mortality (aOR, 1.43; 95% CI, 0.86-2.38) or 1-year mortality (aOR, 1.04; 95% CI, 0.68-1.60) between combination therapy and monotherapy groups. Among 264 patients (96%) whose cultures occurred during an inpatient or long-term care admission, unadjusted analyses showed increased odds of in-hospital mortality (OR, 1.89; 95% CI, 1.08-3.29) and longer postculture length of stay in the combination therapy group: median, 23 days (IQR, 11-57) versus 14 days (IQR, 7-32) (P = .02). However, with propensity score adjustment, these associations were no longer significant. Furthermore, there was no significant difference in odds of 90-day readmission between groups in either unadjusted or adjusted analyses (aOR, 1.20; 95% CI, 0.74-1.95). **Conclusions:** In this large national cohort of patients with XDR *Acinetobacter* cultures, more patients received combination therapy than monotherapy, and carbapenems and polymyxins were the most-used classes. However, there were no significant differences in outcomes between patients receiving combination therapy and monotherapy, suggesting lack of clinical benefit to the common practice of treating XDR *Acinetobacter* infections with multiple antibiotics. Further research is needed to determine optimal treatment strategies for this pathogen.

Funding: No

Disclosures: None

Antimicrobial Stewardship & Healthcare Epidemiology 2021;1(Suppl. S1):s71

doi:10.1017/ash.2021.138

Presentation Type:

Poster Presentation

Subject Category: Molecular Epidemiology

Extended-Spectrum B-Lactamases in *E. coli* Isolates From Hospitalized Patients: A Single-Center Snapshot From Croatia

Tomislav Mestrovic; Branka Bedenic; Maja Tomic-Paradzic and Domagoj Drenjancevic

Background: A significant increasing trend in the prevalence of *Escherichia coli* strains that produce extended-spectrum β -lactamases (ESBLs) has been observed in recent years, both in the community setting and in the healthcare arena. We aimed to provide a snapshot of the current situation with *E. coli* β -lactamase-producing strains in a single general hospital by appraising their β -lactamase content and plasmid types, which will inform further clinical and research efforts. **Methods:** Our study population consisted of all hospitalized patients in different clinical units of the General Hospital in Slavonski Brod during a 1-year period: internal medicine, infectious disease, surgery, urology and ICU. Phenotypic tests for the detection of ESBLs and plasmid-mediated AmpC β -lactamases were initially pursued, followed by the molecular detection (polymerase chain

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reaction, PCR) of resistance genes using primers for *bla*TEM, *bla*CTX-M, and *bla*SHV. PCR-based replicon typing (PBRT) was conducted to type resistance plasmids carrying ESBL genes. **Results:** During the study period, 30 *E. coli* isolates with reduced susceptibility to third-generation cephalosporins (ie, ceftazidime, cefotaxime, and ceftriaxone) were detected in hospitalized patients. These isolates stemmed from blood culture (66.7%), wound swabs (13.3%), urine (13.3%), and drainage content (6.7%). Alongside complete resistance to β -lactam antimicrobial agents, they were also characterized by high resistance to gentamicin (93.3%) and ciprofloxacin (96.7%), whereas 23.3% of isolates were also resistant to ertapenem. Most isolates harbored both *bla*CTX-M and *bla*TEM genes concurrently (46.7%), while solitary *bla*TEM and *bla*CTX-M genes were found in 33.3% and 20% of these isolates, respectively. The presence of SHV β -lactamases was not found in any of the isolates. PBRT revealed a wide array of diverse plasmid groups, with most of the isolates harboring different combinations; however, 80% of isolates were characterized by plasmid incompatibility group B/O (IncB/O). **Conclusions:** We detected increased frequency of both TEM and CTX-M type β -lactamases in *E. coli* isolates from a single-hospital setting, with significant consequences for further treatment approaches. The high prevalence of broad- and extended-spectrum β -lactamase producers tends to prompt an increased carbapenem use (potentially resulting in increased resistance to carbapenems); thus, this type of analytical work should become a standard approach (where possible) in hospital centers in our country and worldwide.

Funding: No

Disclosures: None

Antimicrobial Stewardship & Healthcare Epidemiology 2021;1(Suppl. S1):s71–s72

doi:10.1017/ash.2021.139

Presentation Type:

Poster Presentation

Subject Category: MRSA/VRE

Hospital Onset Vancomycin-Resistant Enterococci Infections in a Northern California Tertiary-Care Center From 2019 to 2020

Stephanie Rasmussen and Sarah Waldman

Background: Understanding the epidemiology and risk factors for nosocomial infections with vancomycin-resistant enterococci (VRE) is necessary for the prevention and control of VRE infections in the hospital setting. We sought to determine the incidence of nosocomial infections of VRE and to ascertain predictors associated with nosocomial infection. **Methods:** In this retrospective cohort study, data were collected from patients with VRE infection from January 2019 to December 2020 at a tertiary-care center in northern California. VRE infections were designated as hospital onset (HO) if the specimen was collected >3 days after hospital admission or community onset (CO) if the specimen was collected \leq 3 days after admission. Associations between HO infections with time, unit, and specimen were identified. **Results:** Over the 2-year period, 214 unique VRE infections were identified in hospitalized patients; 115 infections were CO and 99 were HO. HO-VRE were associated most frequently with stay in medical/telemetry units (68%), followed by oncology–transplant units (15%) and ICUs (12%). There were \sim 4.7 and \sim 3.6 HO-VRE infections per month in 2019 and 2020, respectively. No differences were identified between HO-VRE infections in 2 medical units regarding glycopeptide and cephalosporin use in those units. The sources of VRE infections were urinary 45%, bloodstream 15%, stool 10%, and other 30%. Of the 45 infections in urine, 51% were identified from catheters (Foley and straight) and 27% were identified from clean-catch urine. Interestingly, 71% of patients with VRE identified from urine did not report urinary tract infection (UTI) symptoms at the time of collection. Urine was most often collected for urinalysis and culture from patients with nonspecific symptoms such as fever, leukocytosis, hypotension, tachycardia, or altered mental status. All urine collected from patients who reported UTI symptoms grew >100,000 CFU/mL in culture, while only 75% of cultures from patients without symptoms grew >100,000 CFU/mL. The most common antibiogram was resistance to

ampicillin, cefazolin, levofloxacin, minocycline, penicillin, tetracycline, and/or vancomycin (42% of cases) and susceptibility to both daptomycin and linezolid (60% of cases). **Conclusions:** HO-VRE infections were frequently identified with urinary sources and were often associated with catheter use. However, the frequent lack of concurrent UTI symptoms suggests VRE colonization rather than infection in many cases. Understanding the epidemiology and risk factors for HO-VRE infections is essential for developing infection prevention protocols to reduce the incidence of those infections.

Funding: No

Disclosures: None

Antimicrobial Stewardship & Healthcare Epidemiology 2021;1(Suppl. S1):s72

doi:10.1017/ash.2021.140

Presentation Type:

Poster Presentation

Subject Category: Occupational Health

Experience with Bloodborne Pathogen Exposures Among Operation Room Nurses in Korea: A Qualitative Study

JaHyun Kang and Hyunsook Lee

Background: Operation room (OR) nurses are at a high risk for bloodborne pathogen (BBP) exposures because they are constantly in contact with blood and body fluid (BBF) through surgical sites, and they frequently use sharp surgical instruments and sutures during surgeries. We explored occupational experiences with BBP exposures among OR nurses in South Korea. **Methods:** With an institutional review board's approval, this qualitative research was performed with 12 OR nurses who had worked for >3 months and had experienced BBP exposures. Based on the main research question "How is the experience of BBP exposure among OR nurses?" the semistructured questions for in-depth interview were prepared. Narrative data were collected through 1-hour individual interviews from June to September 2020 and were analyzed using a thematic analysis method. **Results:** The average age of the participants was 34.4 years with an average 9.75 years of clinical experience. The main theme extracted was "The nurses are alerted to their safety after experiencing the aftereffects and emotional trauma from BBP exposures," with 4 subthemes and 14 concepts. The first subtheme, "OR nurses risking exposure to BBF," included (1) hurried doctors and hasty nurses; (2) sharp surgical instruments everywhere; (3) deprioritized self-protection due to ongoing surgery; (4) inattentive to BBF risk; and (5) uncomfortable, foggy goggles and receded safety devices. The second subtheme, "BBP exposures occurred in a flash," included (1) sharp injury occurred in a split second; (2) temporarily treat sharp wounds while hiding frightened feelings; and (3) OR nurses concentrated on surgery by suppressing anxiety and sharp wounds. The third subtheme, "Burdened time that could be overwhelmed alone," included (1) BBP exposures moments that I wish to reverse; (2) anger over dangerous environments and the turmoil of anxiety; (3) exhausted body and facial discoloration due to taking post-exposure prophylaxis; and (4) exposure to BBP that I want to hide from family and friends. The fourth subtheme, "Voice for everyone's safety," included (1) establishing a safety culture, which requires everyone's efforts, and (2) necessity of practical resources for decreasing BBP exposures. **Conclusions:** The participating OR nurses felt that they were working with a high risk to BBF exposures and called for institutional interventions to reduce the risks, including surgeons' attentive collaboration. Korean hospitals should make greater efforts to establish safety culture in ORs and to provide repeated, tailored education to prevent BBF exposures. They should also supply high-quality protective equipment and safety-engineered devices for OR nurses.

Funding: No

Disclosures: None

Antimicrobial Stewardship & Healthcare Epidemiology 2021;1(Suppl. S1):s72

doi:10.1017/ash.2021.141