June 2017 to December 2017. The automated PCR test was performed directly from respiratory specimens. The results were compared with in-house PCR for detection of carbapenemase genes performed on KP colonies isolated from respiratory specimens as our reference method. Patient and clinical characteristics between patients with CPK and non-CPK were also analyzed.

**Results.** The prevalence of CPK was 10.6% (18/169 isolates). The automated PCR test had 91.12% accuracy, 66.7% sensitivity (95% CI, 40.9–86.6), 94.00% specificity (95% CI, 88.9–91.0), 57.1% positive predictive value (95% CI, 39.5–73.1) and 95.96% negative predictive value (95% CI, 92.8–97.85). Of 18 isolates, bla*TEM* was the most common carbapenemase gene (7 isolates; 94.4%), followed by *bla**SHV* (7 isolates; 38.9%). A combination of *bla**TEM* and *bla**SHV* was detected in 6 isolates (33.3%). There were 7 (38.8%) colonizations and 11 (61.1%) infections. The significant risk factors for CPK included post-surgery (P = 0.04) and prior antibiotics exposure (P = 0.04). There was a trend toward higher mortality in patients with CPK albeit not significantly (33% vs. 24.5%, P = 0.41).

**Conclusion.** The automated PCR test has an acceptable accuracy with fair sensitivity for the detection of carbapenemase genes. It is unique that OXA-48 and OXA-48-like carbapenemases in our institute. This diagnostic test may be used for rapid diagnosis or infection control purposes. Exposure to antibiotics associated with colonization or infection with CPK. Patients with CPK had higher mortality.

**Disclosures.** All authors: No reported disclosures.

### 2065. Whole Genome Sequencing for Antimicrobial Resistance Prediction in MRSA and VRE: A Real-world Application

**Ahmed Babiker**, MBBS1; **Moustapha M. Mustapha**, MBBS, PhD2; **Yoshi Doi**, MD, PhD3; and **Lee H. Harrison**1, MD4; 1Division of Infectious Diseases, University of Pittsburgh Medical Center, Pittsburgh, Pennsylvania; 2Genomic Epidemiology Laboratory, Infectious Diseases Epidemiology Research Unit, University of Pittsburgh, Pittsburgh, Pennsylvania; 3University of Pittsburgh Medical Center, Pittsburgh, Pennsylvania; and 4Infectious Diseases, University of Pittsburgh Medical Center, Pittsburgh, Pennsylvania

**Session:** 232. Diagnostics: Resistance Testing  
**Date:** Saturday, October 6, 2018: 12:30 PM

**Background.** The antimicrobial resistance (AMR) crisis represents a serious threat to public health and the healthcare economy. The impact of increasing AMR has resulted in concentrated efforts to increased rapid molecular diagnostic of AMRs. In combination with publicly available web-based AMR databases, whole-genome sequencing (WGS) offers the capacity for detection of antibiotic resistance genes with low turnaround times and is becoming increasingly affordable. Here we sought to examine concordance between WGS-based resistance prediction and phenotypic susceptibility testing results for prospectively collected VRE and MRSA clinical isolates using publicly available tools.

**Methods.** MRSA and VRE isolates were prospectively collected and underwent WGS at the University of Pittsburgh Medical Center (UPMC) between December 2016 and December 2017. Antibiotic-resistant gene content was assessed by upload of assembled contigs to ResFinder, NCBI beta-lactamase and CARD using a BLASTn search. Routine susceptibility was performed by Microscan™. Phenotypic susceptibility testing and WGS results were available for 109 isolates. The automated PCR test was performed directly from respiratory specimens. The results were compared with in-house PCR for detection of carbapenemase inhibitors (phenylboronic acid, aminocephalosphonic acid, clavulanic, dipicolinic acid, ethylenediaminetetraacetic acid, and avibactam) and temocillin resistance were determined using a testing panel developed on a 96-spot MALDI-TOF MS target (MBT Biotarget 96, Bruker Daltonics, Germany). Microdroplets (6 µl) containing bacterial suspension and antibiotic or antibiotic/inhibitor in cation-adjusted Mueller-Hinton broth were spotted on the target and incubated for 4 hours at 36°C in a humidity chamber to avoid evaporation. The medium was subsequently removed and MALDI-TOF MS of the cells adhered to the target were performed. The minimum inhibitory concentration (MIC) was considered to be the lowest concentration at which the MALDI Biotyper software yielded no organism identification. Synergy was defined by an eightfold or greater reduction of the meropenem MIC in the presence of an inhibitor. The absence of synergy between meropenem and inhibitors as well as high-level temocillin resistance was considered suggestive of OXA production.

**Results.** After 4 hours, the method was able to correctly detect the foreknown resistance mechanisms of all tested strains (KPC, MBL, OXA, and AmpC), yielding results that agreed with those obtained by performing broth microdilution with 18 hours of incubation.

**Conclusion.** The DOT-MGA approach allowed easy identification and differentiation of carbapenemase production, delivering reliable results one day earlier than the usual phenotypic methods, thus displaying great potential for the clinical setting.

**Disclosures.** E.A. Idelevich, Bruker Daltonik: Co-inventor of a pending patent, Licensing agreement or royalty.

### 2066. Accelerated Detection of Carbapenem Resistance Mechanisms in Enterobacteriaceae by MALDI-TOF Mass Spectrometry Using the Direct-on-Target Microdroplet Growth Assay (DOT-MGA)

**Carlos Correa-Martinez**, MD1; **Evgeny A. Idelevich**, MD2; **Katrin Sparbier**, PhD2; **Markus Kostzrzwess**, PhD1; and **Karsten Becker**, Prof.1; 1Institute of Medical Microbiology, University Hospital Münster, Münster, Germany; 2Bruker Daltonik, Bremen, Germany

**Session:** 232. Diagnostics: Resistance Testing  
**Date:** Saturday, October 6, 2018: 12:30 PM

**Background.** The differential identification of carbapenemases relies mostly on molecular techniques. Current phenotypic methods require 18 hours of incubation. We propose a matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS)-based direct-on-target microdroplet growth assay (DOT-MGA) aiming to offer an easy and rapid phenotypic identification of AmpC, KPC, MBL and OXA production.

**Methods.** Seven well-characterized Enterobacteriaceae strains recommended by EUCAST for carbapenemase detection were analyzed. Synergy between meropenem and carbapenemase inhibitors (phenylboronic acid, aminocephalosphonic acid, clavulanic, dipicolinic acid, ethylenediaminetetraacetic acid, and avibactam) and temocillin resistance were determined using a testing panel developed on a 96-spot MALDI-TOF MS target (MBT Biotarget 96, Bruker Daltonics, Germany). Microdroplets (6 µl) containing bacterial suspension and antibiotic or antibiotic/inhibitor in cation-adjusted Mueller-Hinton broth were spotted on the target and incubated for 4 hours at 36°C in a humidity chamber to avoid evaporation. The medium was subsequently removed and MALDI-TOF MS of the cells adhered to the target were performed. The minimum inhibitory concentration (MIC) was considered to be the lowest concentration at which the MALDI Biotyper software yielded no organism identification. Synergy was defined by an eightfold or greater reduction of the meropenem MIC in the presence of an inhibitor. The absence of synergy between meropenem and inhibitors as well as high-level temocillin resistance was considered suggestive of OXA production.

**Results.** Processed and interpreted with a computer-based algorithm.

**Results.** After 4 hours, the method was able to correctly detect the foreseen resistance mechanisms of all tested strains (KPC, MBL, OXA, and AmpC), yielding results that agreed with those obtained by performing broth microdilution with 18 hours of incubation.

**Conclusion.** The DOT-MGA approach allowed easy identification and differentiation of carbapenemase production, delivering reliable results one day earlier than the usual phenotypic methods, thus displaying great potential for the clinical setting.

**Disclosures.** E.A. Idelevich, Bruker Daltonik: Co-inventor of a pending patient, Licensing agreement or royalty and Speaker honorarium. K. Sparbier, Bruker Daltonik: Employee, Salary. M. Kostzrzwess, Bruker Daltonik: Employee, Salary. K. Becker, Bruker Daltonik: Co-inventor of a pending patent, Licensing agreement or royalty and Speaker honorarium.

### 2067. Novel Methodology for Same-Day Antimicrobial Susceptibility Testing on VITEK 2 for Gram-Negative Rod Bacteremia

**Catherine Hogan**, MD, MSc1; **Indre Budvytiene**, MS, CLS2; **Nancy Watz**, CLS2; and **Zain Ali Banerji**, MD3; 1Department of Pathology, Stanford University School of Medicine, Stanford, California; 2Clinical Microbiology Laboratory, Stanford University Medical Center, Palo Alto, California; and 3Department of Medicine, Division of Infectious Diseases and Geographic Medicine, Stanford University School of Medicine, Stanford, California

**Session:** 232. Diagnostics: Resistance Testing  
**Date:** Saturday, October 6, 2018: 12:30 PM

**Background.** Bloodstream infections with Gram-negative rods are potentially fatal and require tailored antimicrobial treatment. Optimizing therapy is currently limited by the 1–2 days turnaround time required for antimicrobial susceptibility testing. Novel same-day technologies have been developed but are expensive. Here, we describe and investigate the accuracy of a repurposed existing technology (VITEK2 bioMérieux) for same-day susceptibility testing directly from clinical settings.

**Methods.** Starting in August 2017, patients with blood cultures positive for Gram-negative rods were prospectively included. In addition, aerobic and anaerobic blood culture bottles were spiked with a standardized inoculum of enteric Gram-negative rods from a repository of frozen samples. Positive blood cultures were processed using
2068. Evaluation of Ceftazidime-Avibactam Disks from Different Commercial Manufacturers for Susceptibility Testing against Meropenem Nonsusceptible Enterobacteriaceae

Lynn-Yao Lin, MS and Ian A. Critchley, PhD1; Allergan plc, Irvine, California

Session: 232. Diagnostics: Resistance Testing
Saturday, October 6, 2018: 12:30 PM

Background. Ceftazidime and avibactam (CAZ-AVI) diffusion disks have been widely used in the clinical laboratory in the United States for susceptibility testing of infections caused by Enterobacteriaceae and Pseudomonas aeruginosa. A few cases of high error rates and overcalling of resistance in some carbapenem-resistant Enterobacteriaceae (CRE) isolates have been reported. The purpose of this study was to evaluate the performance of CAZ-AVI diffusion disks made by four manufacturers, in comparison with that of the standard broth microdilution (BMD) method for susceptibility testing against a large collection of CRE.

Methods. A panel of 110 meropenem nonsusceptible Enterobacteriaceae clinical isolates, including 98 Klebsiella pneumoniae, eight Enterobacter cloacae, and four Escherichia coli were tested using CAZ-AVI (30/20 µg) diffusion disks manufactured by Hardy Diagnostics (Hardy) and BD Biosciences (BD). These isolates harbored various carbapenemase genes including KPC-2, KPC-3, VIM, NDM, OXA, ESBL, and altered OmpK35 and OmpK36. The same isolates were tested for susceptibility to CAZ-AVI by BMD using a custom-made Trek panel. Correlation between minimal inhibitory concentration (MIC) and disk diffusion inhibition zones was assessed based on Clinical and Laboratory Standards Institute (CLSI) breakpoints and error rate analysis.

Results. Overall disk diffusion inhibition zones correlated well with MIC for disks manufactured by both Hardy and BD according to CLSI CAZ-AVI breakpoints (susceptible/resistant): MIC ≤8/4/≤20/≤12 µg/mL disk diffusion ≥21/≤20 mm. Error rates were low for the Hardy disks grown on Hardy and BD Mueller–Hinton agar (MHA) with 0.9% very major errors (VME)/1.8% major errors (ME) and 1.8% VME/5.5% ME, respectively. The error rates for BD disks grown on Hardy and BD MHA plates were 1.8% VME/0% ME and 1.8% VME/6.4 ME, respectively. ME rates appeared to be lower when Hardy MHA plates were used for both Hardy and BD disks.

Conclusion. CAZ-AVI (30/20 µg) disks manufactured by Hardy and BD performed well in the study. In disk diffusion testing against a wide set of CRE isolates, these data showed good categorical agreement between disk diffusion and BMD methods. Error rates were lowest when Hardy MHA plates were used for both Hardy and BD disks.

Disclosures. L. Y. Lin, Allergan: Employee, Salary. I. A. Critchley, Allergan (at time of study): Employee, Salary.

2070. Antibiotic Therapy Effects on Enterobacteriaceae Detection Directly from Blood: Pilot Study Implications for Future Clinical Trial Design

Amy Irwin, DNP, MS, RN1; Sandra Giddins, BT, MS (ASC1); Irina Yushkevich, MS2; Alexis Jeffers, BA; Michelle Barron, MD3; Nancy Madinger, MD4; Martin Fuchs, MS; Sungbo Kim, PhD5; Steven Metger, BA6; and Connie Price, MD7

Infectious Diseases, Denver Health and Hospital Authority, Denver, Colorado, 8Infectious Diseases, University of Colorado Denver, Aurora, Colorado, 9Internal Medicine/Infectious Diseases, University of Colorado Denver Aurora, Colorado, 9Infectious Diseases, University of Colorado, Denver, Colorado, 10Accelerate Diagnostics, Inc., Tucson, Arizona, 11Research and Development, 3959 S. Country Club Road, Suite 470, Phoenix, Arizona, 12Infectious Diseases, University of Colorado School of Medicine/Denver Health and Hospital, Denver, Colorado

Session: 232. Diagnostics: Resistance Testing
Saturday, October 6, 2018: 12:30 PM

Background. Detection of bacteremia directly from blood may improve time to clinical diagnosis and initiation of appropriate antibiotic therapy for hospitalized patients. Administration of empiric antibiotic therapy, whether prior to standard of care (SOC), may mask true isolates and add to challenges in bacterial recovery. Strategies to improve detection were explored in this pilot study to inform future clinical trial design (CTD) on Enterobacteriaceae (ENT) detection directly from blood. One of the objectives was to assess effects of prior antibiotic administration on novel assay performance.

Methods. Confirmed ENT bacteremic (Protocol A (P-A), n = 26), and suspected bacteremic (Protocol B (P-B), n = 25) participants were enrolled into one of two IRB approved protocols after obtaining informed consent. Fresh whole blood (20 mL) was collected within 12 hours of SOC blood culture positivity (P-A) or 20 hours of SOC blood culture collection (P-B), and divided: 10 mL into a lytic media collection vial (P-A and B); and 10 mL into a BD BACTEC® Bottle (P-A) as a control, or an Isolator® lysis centrifugation tube (P-B) for quantification. For collection vessels, a 3-hour amplification step in lytic growth medium followed by cleanup and concentration steps was employed. Processing strategies were tested against a set of CRE isolates. These data showed good categorical agreement between disk diffusion and BMD methods. Error rates were lowest when Hardy MHA plates were used for both Hardy and BD disks.

Results. Confirmed ENT bacteremic (Protocol A (P-A), n = 26), and suspected bacteremic (Protocol B (P-B), n = 25) participants were enrolled into one of two IRB approved protocols after obtaining informed consent. Fresh whole blood (20 mL) was collected within 12 hours of SOC blood culture positivity (P-A) or 20 hours of SOC blood culture collection (P-B), and divided: 10 mL into a lytic media collection vial (P-A and B); and 10 mL into a BD BACTEC® Bottle (P-A) as a control, or an Isolator® lysis centrifugation tube (P-B) for quantification. For collection vessels, a 3-hour amplification step in lytic growth medium followed by cleanup and concentration steps was employed. Processing strategies were tested against a set of CRE isolates. These data showed good categorical agreement between disk diffusion and BMD methods. Error rates were lowest when Hardy MHA plates were used for both Hardy and BD disks.

Conclusion. Prior antibiotic administration and low bacterial load in clinical samples affects ability to detect ENT directly from blood. Multiple factors are critical to address in future CTD to increase sensitivity of detecting ENT directly from blood including: (1) Targeting study samples prior to antibiotic therapy initiation and (2) Using enzymatic methods to neutralize antibiotics present in the blood.

Disclosures. M. Fuchs, Accelerate Diagnostics, Inc.: Employee, Salary. S. Kim, Accelerate Diagnostics, Inc.: Employee, Salary. S. Metger, NIH: Grant Investigator, Grant recipient. Accelerate Diagnostics, Inc.: Employee, Salary.