a newly developed protocol based on red blood cell lysis and differential centrifugation of bacteria, followed by VITEK®2 card set-up. VITEK®2 results from the direct method were compared with a reference method (VITEK®2 results using a 24-hour colony).

Results. In the prospective study, a total of 109 nonduplicate samples were collected, with *E. coli* (n = 54) and *Klebsiella pneumoniae* (n = 51) the main pathogens detected. In addition, a total of 52 blood culture bottles were spiked with resistant Gram-negative rods. Overall weighted essential agreement was 98.8%, and categorical agreement was 97.9% between the direct and reference methods. Accurate results were produced for the main antibiotics used to treat enteric Gram-negative bacteremia, including ceftriaxone, piperacillin–tazobactam and meropenem. Mean turnaround time to susceptibility results for *Enterobacteriaceae* in the prospective study was 9.0 (±1.3) hours.

Conclusion. Preliminary data from direct antimicrobial susceptibility testing by VITEK®2 for enteric Gram-negative rod bacteremia suggest this technique is accurate, practical, easily integrated in the laboratory workflow, and substantially cheaper than its competitor technology. The next phase of this study will assess the impact of faster antimicrobial susceptibility turnaround time on patient outcomes and antimicrobial stewardship targets.

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

2068. Evaluation of Ceftazidime-Avibactam Disks from Different Commercial Manufacturers for Susceptibility Testing against Meropenem Nonsusceptible Enterobacteriaceae

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Background. Ceftazidime and avibactam (CAZ-AVI) diffusion disks have been widely used in hospitals and clinical laboratories 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 two 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/≥16/4 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 susceptibility testing against a challenging 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.

2069. Automation Process Improving Microbiological Laboratory Efficiency

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Background. Automation minimizes hands-on steps and facilitates process improvement in the microbiology laboratory. The impact on the efficiency improvement of the culturing process in an academic regional hospital after implementation of total laboratory automation (TLA) was evaluated.

Methods. After approval from the Quality Improvement Review Board, a retrospective analysis of microbiological data in Becton Dickenson (BD) Clinical Insights Research Database was performed. Then, laboratory process change and reported microbiological results turnaround time (TAT) before and after implementation of the TLA was compared (2013 vs. 2016). Specimens were classified into blood, respiratory, urine, wound and others. Statistical analysis was performed with SAS software version 9.2. The comparison was done using chi-square test for categorical and log-transformed t-test for continuous variables. A P-value of < 0.05 was considered statistically significant.

Results. A total of 9,351 pre-defined common and clinically important positive mono-microbial culture results were included in the organism identification (ID) TAT analysis. The time of the day at which results were reported in 2016 was more evenly distributed throughout a 24-hour period, rather than delaying to the following morning (P < 0.0001). The definitive positive bacterial pathogen identification TAT was significantly shorter across all sources in 2016 compared with 2013 with overall TAT mean (standard deviation) of 56.8 (24.3) hours in 2013 vs. 43.3 (20.8) hours in 2016 (P < 0.0001). The negative results' (n = 58,640) TAT was also shortened in 2016 for all (P < 0.05), except for respiratory and other sources.

Conclusion. Automation facilitates microbiological laboratory efficiency improvement with shorter definitive organism identification TAT across all specimens as well as shorter TAT for negative results with most specimen sources. This information would facilitate earlier, more accurate and appropriate antibiotic choices which in turn improves clinical decision making and enhances optimal patient care.

Disclosures. **Y. Tabak**, Becton, Dickinson and Company: Employee, Salary. **L. Vankeepuram**, Becton, Dickinson and Company: Employee, Salary. **S. Kurtz**, Becton, Dickinson and Company: Employee, Salary. **D. Sellers**, Becton, Dickinson and Company: Employee, Salary.

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

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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) or research study blood collection, adds 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 inoculated into a lytic media collection vessel (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. Processed samples were tested using an investigational assay for universal bacterial detection on the Accelerate Pheno™ system. Results were analyzed manually and with proprietary software. Descriptive statistics were performed to inform future CTD.

Results. Empiric antibiotic therapy was initiated prior to blood collection in 89% (P-A) and 36% (P-B) of participants. Improved detection sensitivity was achieved in P-B over P-A, when a study sample was obtained prior to empiric antibiotic therapy initiation (Table 1).

Table 1	P-A	P-B
Total samples	26	25
Prior ABT	89%	36%
% positive, n	15%, 5*	24%, 6
SOC BD BACTEC™ Bottle Positive	26	6
SOC BD BACTEC™ Bottle Negative	0	19
BD BACTEC™ Control Positive	4	N/A
Collection Vessel Positive	3	4
Collection Vessel Negative	23	21
Sensitivity	50%	67%
Specificity	96%	100%
*Collection vessel detected 1 positive sample that the BD BACTEC™ bottle control missed.		

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. Metzger**, NIH: Grant Investigator, Grant recipient. Accelerate Diagnostics, Inc.: Employee, Salary.

2071. Evaluation of BD Phoenix™ CPO Detect Assay for Detection of Carbapenemase Producing Organisms in Clinical Samples in Singapore

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Background. Rapid and accurate detection of CPO is crucial to a targeted infection control strategy, as in Tan Tock Seng Hospital (TTSH), a large tertiary hospital in Singapore, where cohorting of CPO colonised patients is driven by PCR-based genotypic identification. A newly released panel for the BD Phoenix system, the CPO Detect panel, includes CPO detection with Amber Class identification, alongside standard Phoenix antibiotic susceptibility testing. We evaluated this system in the context of the TTSH CPO control strategy.

Methods. A total of 201 isolates from CHROMID® positive rectal swabs taken as part of inpatient screening, and from clinical samples with confirmed carbapenem resistance, were assayed prospectively between January and April 2018. Ninety-five samples were sampled retrospectively from 2017. CPO genotype was determined using PCR targeting NDM, KPC, oxa48-like, IMI and IMP carbapenemases. Isolates were analysed on the CPO Detect assay in parallel.

Results. A broad range of CPO genotypes was achieved and results were comparable in both prospective and retrospective samples. Overall, a concordance of 76% was found between CPO Detect determination of CPO status (both positive and negative) and PCR (238/313 isolates). PCR genotype was in agreement with the Ambler class found by CPO Detect in 151/200 positives (75.5%), 27 samples were not assigned an Ambler class and Ambler class was mismatched in 8 samples. Partial agreement was noted in 17 samples in which CPO Detect indicated a single Ambler class, but PCR identified two carbapanemase genes. CPO Detect outright failed to detect 14/200 PCR positive samples (7%) of which 10 were IMI. CPO Detect did however identify a CPO in a further 54 samples which were PCR negative.

Conclusion. Compared with PCR, CPO Detect had a sensitivity of 93% in CPO detection and agreement of 75.5% with respect to Ambler class specificity. False negatives were overwhelmingly the IMI genotype. We are continuing to characterise these by further molecular means, as well as the 54 samples found by CPO Detect but PCR negative.

	CPO Detect (Ambler Class)					
PCR Genotype	A	B	D	CPO Unspecified	No CPO Detected	Total
IMI	20				10	30
IMP	1	17		3	1	22
KPC	13	1		2	1	17
NDM		25	3	2		30
oxa-48	1	2	76	3		82
Dual Carbapenemases		5	12		2	19
PCR Negative	4	28	3	18	60	113
Total	39	78	94	28	75	313

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2072. Multicenter Evaluation of the Etest vs. Agar Dilution for Susceptibility Testing of *Helicobacter pylori*

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Background. *Helicobacter pylori* is associated with peptic ulcer disease and gastric malignancy. Antimicrobial susceptibility testing (AST) is often requested for patients who fail eradication therapy. The CLSI reference method, agar dilution (AD), is not performed in most laboratories and maintaining organism viability during transit to a reference laboratory is difficult. We assessed the performance of the Etest (bioMerieux) as a method for *H. pylori* AST in comparison to AD.

Methods. Frozen stocks of 82 *H. pylori* isolates with AD results previously reported by Mayo Clinic were prepared from the same plate for distribution to participating laboratories. Etest was performed at ARUP Laboratories and Cleveland Clinic (CC). For Etest, isolates were incubated for 72 hours in a microaerobic atmosphere. Aged Mueller–Hinton agar with 5% sheep blood plates were inoculated with a three McFarland suspension prepared in brain heart infusion broth. Etest strips were applied and MICs read after 72 hours of microaerobic incubation. Results were interpreted by applying CLSI and EUCAST breakpoints. Categorical agreement (CA), very major, major and minor errors (VME, ME, and mE) were determined for Etest using AD as the reference method. Isolates with errors were repeat tested in duplicate by Etest to determine the final results summarized below.

Results. For clarithromycin, 65% of isolates were resistant (R) by AD; Etest results at each laboratory showed 97.5% CA (1 mE and 1 ME). For tetracycline, only 2.5% of isolates were R by AD; a single VME occurred at both ARUP and CC (98.8% CA) with the same isolate. The AD dilutions tested for amoxicillin prevented interpretation with EUCAST breakpoints. With one exception, amoxicillin Etest results were susceptible (S, ≤0.125 mg/L) at both laboratories (98.8% of MICs ± one dilution). Applying levofloxacin EUCAST breakpoints (S, ≤1 mg/L) to interpret ciprofloxacin results, 57.8% of isolates were R by AD. ARUP CA was 97.5% (1 ME, 1 VME) and CC CA was 96.3% (1 ME, 2 VMEs).

Conclusion. Clarithromycin, tetracycline, and ciprofloxacin Etest results for *H. pylori* showed acceptable CA (>95%) at both testing sites compared with the AD reference method. The comparative ease of performance and reproducibility of the Etest may help standardize it as an AST method for *H. pylori.*

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2073. Positive Clinical Impact of MALDI-TOF for the Management of Inpatient Pneumonia Without Additional Antimicrobial Stewardship (AS) Support

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Background. Matrix-assisted laser desorption ionization time-of-flight (MALDI-TOF) mass spectrometry decreases time to identification (ID) and has been shown to improve antibiotic utilization when combined with real-time AS intervention. We assessed the impact of MALDI-TOF without additional AS support in patients with inpatient pneumonia.

Methods. This was a single-center quasi-experimental study of adult patients with a pneumonia who had a positive respiratory culture with bacteria that were identified by MALDI-TOF from August 2016–February 2017 (Pre-MALDI-TOF) and August–February 2018 (Post-MALDI-TOF). The primary endpoint was the time to initiation of optimal therapy before and after MALDI-TOF. The secondary endpoints included: clinical cure at 7 days; inpatient antibiotic duration; infection-related length of stay (LOS); overall LOS; excess antibiotic days; and costs. *T*-tests, Mann–Whitney *U*, and chi-squared tests were used for comparisons where appropriate.

Results.

Table 1: Time to Optimal Therapy and Intervention Opportunities

	Pre-MALDI-TOF (180)	Post-MALDI-TOF (180)	*P*-Value
Total opportunities for interventions, *n* (%)	152 (84)	168 (93)	0.007
De-escalation performed, *n*/*N* (%)	105/152 (69)	124/152 (74)	0.40
Escalation performed, *n*/*N* (%)	29/152 (19)	34/152 (20)	0.79
Time to Identification, h, median, IQR	63 [46–72]	32 [24–46]	<0.001
Time-to-optimal therapy, hour, median, IQR	73 [55–89]	56 [48–73]	<0.001
Excess doses	0 [0–1]	1 [0–3]	0.003
Excess cost	2,122.57	3,335.72	0.007

Table 2: Outcomes

	Pre-MALDI-TOF	Post-MALDI-TOF	*P*-Value
In-hospital mortality	7 (4)	8 (4)	0.79
Inpatient duration of antibiotics, days, median, IQR	7 [5–10]	7 [5–9]	1
Infection related LOS, days, median, IQR	7 [5–11]	7 [5–9]	0.09
Overall hospital LOS, days, median, IQR	14.5 [7–32]	13 [6–29]	0.26
Clinical cure	145 (81)	150 (83)	0.49

Conclusion. The implementation of MALDI-TOF without AS support for pneumonia patients reduced the time to ID and optimal therapy but there were no significant differences in clinical outcomes. It did not positively impact excess antibiotic doses or costs.

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