to pharmacy-managed surveillance software for AST review and intervention. The primary outcome was time to optimal therapy (TOT) from initial culture positivity. Secondary outcomes included TOT based on organism and clinical pharmacy staffing hours, hospital length of stay, and all-cause mortality.

Results. Among 324 patients screened with a first episode of GN BSI, 121 and 119 patients were included in the pre- and post-intervention groups, respectively. Apart from intensive care unit admission at the time of culture collection, there were no significant differences in baseline characteristics between the two groups. The post-intervention group had a significantly shorter TOT (60.2 ± 36.0 hours vs. 29.0 ± 24.0 hours, $P < 0.001$). Notably, time to escalation for patients with third-generation cephalosporin-resistant isolates was significantly shorter in the post-intervention group (48 ± 36.0 hours vs. 19.2 ± 16.8 hours, $P < 0.01$). In the post-intervention group, TOT was significantly shorter during fully staffed clinical pharmacy hours vs. reduced clinical pharmacy staff hours (18.48 ± 31.2 hours vs. 31.44 ± 38.4 hours, $P = 0.014$). No differences were seen in length of stay or all-cause mortality.

Conclusion. The implementation of RDT with a pharmacy-driven AST substantially decreased TOT for GN BSIs. This study also highlights the positive impact of clinical pharmacy staff on shorter TOTs.

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

1808. Matrix-Assisted Laser Desorption/Ionization-Time of Flight (MALDI-TOF) and Vitek 2 Along With Antimicrobial Stewardship (ASP) Result in Faster Antimicrobial Therapy for Infected Patients: The CHI Health Experience

Stephen Cavalieri, PhD[1]; Seunghyug Kwon, MD[1]; Renuga Vivekanandan, MD[2]; Sumaya Ased, PharmD[3]; Cassara Carroll, PharmD[3]; David Schmidt, PharmD[4] and Christopher Destache, PharmD[5]; [1]Pathology, CHI Health, Omaha, Nebraska, [2]Medicine, Creighton University School of Medicine, Omaha, Nebraska, [3]CHI Health, Pharmacy, Omaha, Nebraska, [4]Pharmacy, CHI Health, Omaha, Nebraska, [5]Pharmacy Practice, Creighton University School of Pharmacy and Health Professions, Omaha, Nebraska

Session: 218. Antimicrobial Stewardship: Impact of New Diagnostics
Saturday, October 6, 2018: 12:30 PM

Background. Rapid organism identification (ID) and antimicrobial susceptibility testing (AST) are critical to treatment of infected patients. We sought to capture time between specimens collected for bacterial culture and appropriate therapy for patients, along with other pertinent patient management data from 2017 (without MALDI-TOF/Vitek 2 and ASP) and 2018 (with MALDI-TOF/Vitek 2 and ASP).

Methods. Patients were eligible if admitted to CHI Health in March or April 2018 either with positive sputum, blood, or urine culture. Patients were retrospectively obtained from the Microbiology Laboratory for March 2017 and sequential patients with positive culture were reviewed. A total of 75 patients from each year (25 positive blood cultures, 25 urine cultures, 25 sputum cultures),, respectively, were compared. A time-in-motion study was performed to compare time to identification (ID), AST results and acted upon by ASP. Data were entered into SPSS (ver. 25) for analysis. Results are reported as mean (±SD) or percentage.

Results. Mean patient age and Charlson comorbidity index was not significantly different between 2017 and 2018. Time to obtain culture, delivery to Microbiology, and Gram-stain was not different between the two groups. Time to organism ID was significantly faster in 2018 (2018, 25.2 ± 13.7; 2017, 34.2 ± 17 hours, $P = 0.001$). Time to AST results was also significantly faster for patients in 2018 compared with 2017 (19.8 ± 14.1 compared with 28.5 ± 15.1 hours, $P = 0.001$). ASP recommended significantly more adjustments to empiric antimicrobial therapy (25% of 2018 vs. 1% in 2017, $P < 0.001$). In addition, length of hospital stay was significantly shorter for patients in 2018 compared with 2017 (2018, 8.3 ± 7 days; 2017, 15.6 ± 18.3 days, $P < 0.001$). Finally, in-hospital length of antimicrobial therapy was significantly shorter in 2018 compared with 2017 (2018, 6.6 ± 3.7 days; 2017, 8.8 ± 7.7 days, $P < 0.05$).

Conclusion. The use of MALDI-TOF/Vitek 2 leads to an average 18 hours faster microbial ID and AST results. ASP is able to make recommendations for infectious diseases management more appropriately with quicker ID and AST results.

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

1809. Improved Vancomycin Utilization With Rapidly Available Xpert MRSA/SA BC PCR and Microbiologist Case Review

Lisa Li, MDCM[1]; Piera Calissi, PharmD[2]; Edith Blondel-Hill, MD[1,2]; Bing Wang, MD[1,2] and Amanda Wilmer, MD[1,2]; [1]Pathology and Laboratory Medicine, University of British Columbia, Vancouver, BC, Canada, [2]Interior Health Authority, Kelowna, BC, Canada

Session: 218. Antimicrobial Stewardship: Impact of New Diagnostics
Saturday, October 6, 2018: 12:30 PM

Background. *Staphylococcus aureus* bloodstream infections are life threatening, and are empirically treated with vancomycin. Our objective was to assess the impact of a rapidly available PCR for methicillin-resistant *S. aureus* (MRSA) on the amount and duration of vancomycin use in methicillin-sensitive *S. aureus* (MSSA) bloodstream infections.

Methods. In October 2016, the Xpert® MRSA/SA BC assay, a PCR to detect MRSA from blood cultures, was implemented at Kelowna General Hospital. MRSA PCR was performed on one bottle per episode for blood cultures with Gram-positive cocci in clusters in at least 3/4 bottles. The medical microbiologist promptly phoned the most responsible physician with results to streamline antibiotics. All episodes of MSSA bacteremia between January 1, 2013 to September 30, 2016 (pre-implementation group) and November 1, 2016 to January 31, 2018 (post-implementation group), were matched to corresponding vancomycin defined daily doses (DDD) and days of therapy (DOT) in pharmacy records. Patients with ≥5 DOTs were excluded if they had allergies to β-lactams, polymicrobial infections with organisms requiring vancomycin, were on hemodialysis (vancomycin convenience dosing), or were transferred from another hospital with known *S. aureus* bacteremia. Mean vancomycin DDDs and DOTs, and the proportion of patients receiving at least one dose of vancomycin, were compared between groups. Categorical variables were analyzed using the chi-square test, while continuous variables were compared using the *t*-test.

Results. In the pre-PCR group, 383 episodes of MSSA bacteremia were identified, with 21 excluded. In the post-PCR group, 100 episodes were found, with 3 excluded.

Significantly more patients received at least one dose of vancomycin in the pre-PCR (70.2%) compared with the post-PCR group (54.6%) ($P < 0.01$). The mean DDD was 1.5 in the post-PCR group, less than the pre-PCR group at 2.8 ($P < 0.01$). The mean DOT also decreased, with the post-PCR group receiving less vancomycin (1.6 days) compared with the pre-PCR group (2.5 days) ($P < 0.01$).

Conclusion. Rapidly available MRSA PCR for *S. aureus* bloodstream infection coupled with antimicrobial stewardship performed by medical microbiologists led to a significant decrease in vancomycin use.

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

1810. Therapeutic Drug Monitoring of Azole Antifungals at an Academic Medical Center: Opportunities and Lessons Learned

Steven Richardson, PharmD[1]; Vasilios Athans, PharmD, BCPS[1]; Elizabeth Neuner, PharmD, BCPS (AQ-ID)[1]; Kaitlyn Rivard, PharmD[1]; Eric Cober, MD[2]; Adam McShane, PhD[3] and Gary W. Procop, MD, FIDSA[3]; [1]Department of Pharmacy, Cleveland Clinic, Cleveland, Ohio, [2]Department of Infectious Diseases, Cleveland Clinic, Cleveland, Ohio, [3]Department of Laboratory Medicine, Cleveland Clinic, Cleveland, Ohio

Session: 218. Antimicrobial Stewardship: Impact of New Diagnostics
Saturday, October 6, 2018: 12:30 PM

Background. Therapeutic drug monitoring (TDM) is a valuable tool for certain antifungals as it may increase the probability of a successful outcome, minimize drug-related toxicity and interactions, and potentially prevent emergent resistance. With an increasing emphasis on the need for antifungal and laboratory stewardship, we sought to review azole antifungal TDM practices at our institution.

Methods. This was a retrospective quality review of TDM at Cleveland Clinic Main Campus during a 6-month period (March 8, 2017–September 8, 2017), including all azole levels resulting during an inpatient admission. Levels were assessed for timing of collection, redundancy, indication, and characteristics of the patient and ordering service. Levels were further adjudicated as guideline-concordant (GC) or -discordant (GD) according to published TDM guidelines (Figure 1). Primary endpoint: percentage of GC azole levels. Secondary endpoints: indication for TDM, percentage of levels within range, actions taken following a level result, cost, and turnaround time.

Results. Of 301 azole levels obtained, 184 (61%) and 117 (39%) were classified GC and GD (Fig3), respectively. GC and GD levels were collected a median 8 days (IQR 5–14) and 3 days (IQR 2–7) into therapy, respectively. GC levels were more likely to be within therapeutic range compared with GD levels (64% vs. 54%; $P = 0.076$). The most common TDM indications were per lung transplant prophylaxis protocol and concern for absorption (Figure 2). A total of 140 reasons for GD levels were found, with 54 (18%) being an improperly timed voriconazole trough, 39 (13%) redundant TDM orders, 37 (12%) not at steady state, and 10 (3%) with unjustified TDM. Of 117 GD levels, 35 (30%) resulted in antifungal modification within 48 hours, most commonly an increase in dose, $n = 12$ (10%). Mean collection-to-result turnaround time was 1.6 days for all azole levels, and significant costs were attributed to GD levels.

Conclusion. Our review of azole TDM suggests a significant proportion of levels obtained are discordant with available TDM guideline recommendations with respect to timing and redundancy. This presents an opportunity to improve test utilization, antifungal-related outcomes, and clinician confidence when interpreting and acting upon concentration data.

Figure 1.

Definitions of Appropriateness

Guideline-discordant (GD) level

- Not obtained at expected steady state following initiation or dose adjustment (below).
- Voriconazole concentrations not timed as troughs (study definition: <2 hours prior to next administration)
- Redundant level
  - Voriconazole: <48 hours from prior
  - Itra/Posaconazole: <96 hours from prior
- Isavuconazole or fluconazole concentrations obtained without documented justification (examples below).

Guideline-concordant (GC) level

- By exclusion, any concentration not meeting definition for GD

Azole Antifungal Parameters

Azole	Time-to-Steady State (days)	Reference Range (mcg/mL)	Notes
Fluconazole	5-10	N/A	TDM generally not recommended
Itraconazole	7-14	Prophylaxis: 0.5 – 4.0 Treatment: 1.0 – 4.0	Itra- + hydroxyitraconazole Timing as trough not required
Voriconazole	3-5	Prophylaxis/treatment: 1.0 – 6.0	Timing as trough required
Posaconazole	7	Prophylaxis: 0.7 – 4.0 Treatment: 1.0 – 4.0	Timing as trough not required
Isavuconazole	14	N/A	TDM generally not recommended

Possible Indications for Therapeutic Drug Monitoring

- Hemodialysis/filtration
- CNS infection
- Pediatrics (Fluconazole)
- Pathogens with elevated MICs
- Change in dose or dose formulation
- Drug interaction
- Suspected breakthrough infection
- Concern for toxicity
- Concern for poor absorption
- Concern for adherence
- Extracorporeal membrane oxygenation (ECMO)
- Per lung transplant prophylaxis protocol
- Response to previously subtherapeutic level

Figure 2.

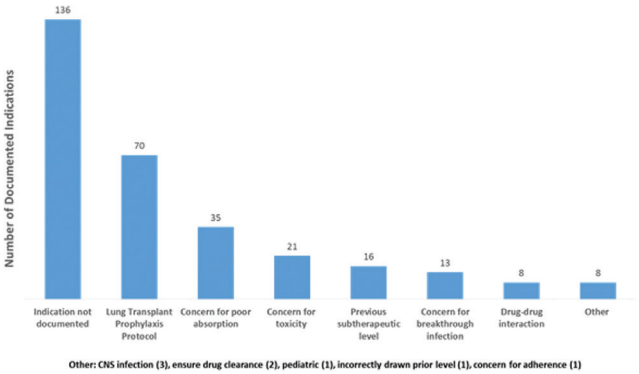
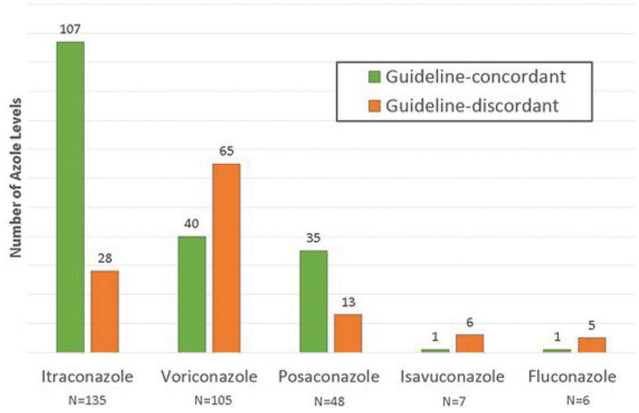


Figure 3.



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1811. Minimizing Time to Optimal Therapy for Enterobacteriaceae Bloodstream Infections: Is Organism Identification Enough?

Laura N. Cwengros, PharmD[1]; Ryan P. Mynatt, PharmD[1]; Tristan T. Timbrook, PharmD, MBA, BCPS[2] and Jason M. Pogue, PharmD, BCPS-AQ ID[1]; [1]Detroit Medical Center, Detroit, Michigan, [2]University of Utah Health Care, Salt Lake City, Utah

Session: 218. Antimicrobial Stewardship: Impact of New Diagnostics
Saturday, October 6, 2018: 12:30 PM

Background. BSI due to ceftriaxone (CRO)-resistant ENT are increasing in frequency, and are associated with delays in time to appropriate therapy. However, treating all patients at risk for CRO-resistant organisms with empiric carbapenem (CARB) therapy risks over exposure. Strategies are needed to appropriately balance these competing interests. The purpose of this study was to compare three methods for accomplishing this balance.

Methods. Retrospective observational study of patients at the Detroit Medical Center with ENT BSI from July 1, 2016 to July 31, 2017. Patients with *E. coli*, *K. oxytoca*, *K. pneumoniae*, or *P. mirabilis* were included if both Verigene® GN-BC and traditional microbiology detected the organism. Patients were excluded if CARB resistance was detected via genetic markers. This study assessed the effectiveness of three methods to predict CRO resistance at the time of organism isolation. The first two methods were based on applying published scoring tools for extended spectrum β-lactamase BSI. If the patient met the cutoff score proposed by the authors they were hypothetically placed on a CARB, otherwise they were placed on CRO. Method 3 was based on results from Verigene. If the CTX-M marker was present patients were hypothetically placed on a CARB, and if not CRO. The methods were compared for their sensitivity, specificity, predictive values, and the number of times they would have resulted in inappropriate therapy or unnecessary escalation to CARB.

Results. Four hundred fifty-one ENT were included, 73 (16%) of which were CRO-resistant. The comparative performance of the three methods is listed in the figure. Verigene performed well and was associated with fewer cases of early under treatment and over treatment. Published ESBL scoring tools performed poorly, missing two-thirds of CRO-resistant isolates and unnecessarily exposing many patients to CARB. Given the improved sensitivity and specificity of Verigene similar overall CARB use would be seen in the cohort despite roughly 40 patients getting placed on CARB 2 days earlier when CRO-resistant BSI was present.

Conclusion. Vergiene significantly outperformed published ESBL scoring tools for identifying CRO-resistant ENT BSI. Institutions should validate scoring tools prior to implementation.

Method	Cutoff	Sens	Spec	PPV	NPV	Under treatment (N)	Over treatment (N)	CARB days per 1000 patient days
Verigene	CTX-M	85	99.7	98	97	11	1	136
Lee	2	32	90	38	87	50	35	134
Augustine (1)	3 OR 1-2 and critically ill	37	88	36	88	46	48	142
Augustine (2)	3	29	89	34	87	52	41	134

Disclosures. **T. T. Timbrook**, BioFire Diagnostics: Scientific Advisor, Speaker honorarium. Roche Diagnostic: Scientific Advisor, Speaker honorarium. GenMark Diagnostics: Scientific Advisor, Speaker honorarium.

1812. Impact of Rapid Identification of Blood Cultures With Antimicrobial Stewardship at Three Community Hospitals Within a Health System

Christy Su, PharmD[1]; Jessica Babic, PharmD[2]; Amy Schilling, PharmD[3] and Audrey Wanger, PhD[4]; [1]Memorial Hermann Greater Heights Hospital, Houston, Texas, [2]Memorial Hermann Southeast Hospital, Houston, Texas, [3]Memorial Hermann The Woodlands Medical Center, The Woodlands, Texas, [4]Department of Pathology and Lab Medicine, Department of Pathology and Laboratory Medicine, McGovern Medical School, Houston, Texas

Session: 218. Antimicrobial Stewardship: Impact of New Diagnostics
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Background. The use of rapid diagnostic tests (RDT) in microbiology decreases time to pathogen identification (ID). When coupled with an Antimicrobial Stewardship Program (ASP), time to optimal antibiotics can be significantly reduced. The purpose of this study was to evaluate the impact of Verigene® Gram-Positive Blood Culture Test (BC-GP) and Gram-Negative Blood Culture Test (BC-GN) implementation with an ASP at three community hospitals within a health system with centralized microbiology services.

Methods. A retrospective analysis was conducted to compare time to targeted antibiotics for treatment of bloodstream infections (BSI) before and after implementation of Verigene®. Patients were included with a positive blood culture for organisms detectable by Verigene BC-GP and BC-GN during September 2016 (pre-implementation group) and September 2017 (post-implementation group). Patients were excluded if positive blood culture had more than one organism, patient was actively being treated for an infection unrelated to blood culture or blood culture results were available after patient expired, was discharged or transferred. Targeted antibiotic therapy was defined as antibiotic therapy tailored toward pathogen based on ID and sensitivities. Each ASP pharmacist received Verigene® notifications in real-time. Secondary endpoints were in-hospital mortality, hospital length of stay (LOS), and days of vancomycin therapy.

Results. A total of 93 patients were included in the final analysis with 42 patients in pre- group and 51 in post-group. Patients achieving targeted therapy during their hospital stay was 38 of 42 (90%) in the pre-group and 47 of 51 (92%) in the post-group. Of those who achieved targeted therapy, time to targeted therapy was 78.4 hours vs. 43.1 hours in pre-group vs. post-group, respectively ($P < 0.001$). No significant difference was detected for in-hospital mortality or hospital LOS. Length of vancomycin therapy was decreased from 85.8 hours to 48.6 hours in post-group ($P < 0.001$).

Conclusion. Implementation of RDT in three community hospitals with a centralized microbiology laboratory resulted in a significantly improved time to targeted antibiotics in patients with BSI when combined with ASP pharmacist real-time notification.

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1813. Development and Validation of Novel Ambulatory Antibiotic Stewardship Metrics

Keith W. Hamilton, MD[1]; Kathleen O. Degnan, MD[2]; Valerie Cluzet, MD[3]; Leigh Cressman, MA[4]; Afia B. Adu-Gyamfi, BA[4]; Pam Tolomeo, MPH[4]; Michael Z. David, MD, PhD[3] and for the CDC Prevention Epicenters Program; [1]Medicine - Infectious Diseases, Perelman School of Medicine at the University of Pennsylvania, Philadelphia, Pennsylvania, [2]Infectious Diseases, Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania, [3]Division of Infectious Diseases, Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania, [4]Center for Clinical Epidemiology and Biostatistics, University of Pennsylvania, Philadelphia, Pennsylvania

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Background. Over 260 million antibiotic courses are prescribed in ambulatory settings per year in the United States: 41% of which are for acute respiratory tract infections (ARTI). Over 50% of these antibiotic courses are inappropriate. However, interventions to improve ambulatory prescribing are little studied, and metrics to track antibiotic use are not well validated.

Methods. To validate metrics for ARTIs in adults, we conducted a retrospective cohort study from January 1, 2016 to December 31, 2016 at 32 primary care practices. We randomly selected 1,200 office visits with a coded respiratory tract diagnosis and determined by medical record review the proportion of visits in which antibiotic prescription was inappropriate using modified Infectious Diseases Society of America treatment guidelines. We determined clinic and provider characteristics associated with inappropriate prescribing. By linear regression, we also determined the aggregate metrics best correlated with inappropriate antibiotic prescribing.