Rani Sebti, MD; 1 Hackensack University Medical Center, Newtown, Pennsylvania

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Background. Early organism identification via rapid diagnostics has been shown to reduce time to effective antimicrobial therapy and improve patient outcomes in patients with bacteremia, but antimicrobial susceptibility testing is still required to optimize therapy. The objective of this study was to determine the impact of an institution-specific rapid susceptibility testing method on outcomes in patients with bacteremia.

Methods. This was a retrospective pre- and post-intervention study of 100 adult patients with bacteremia. Patients were excluded if they had polymicrobial infection, fungemia, blood cultures collected at outside hospitals, or if they expired prior to susceptibility results. Patients were identified through a report containing positive blood cultures from October 2017 to February 2018 (pre-intervention [PrI]) and October 2018 to February 2019 (post-intervention [PoI]). The primary endpoint was the rate of clinical failure (a composite of 28-day mortality or bacteremia persisting greater than 6 days). Secondary endpoints included microbiologic outcomes, time to effective and optimal therapy, length of stay (LOS) and therapy adjustments.

Results. Baseline characteristics were similar between groups; a third of the patients were immunosuppressed (Table 1). The most common sources of infection were urinary and intra-abdominal, and the most common organisms identified were E.coli and Klebsiella spp. No significant difference in the rate of clinical failure was identified between PrI and PoI (24% vs. 18%, P = 0.6242) (Table 2). In the PoI, the time to identification, susceptibility results, and effective therapy was significantly shorter compared to the time to optimal therapy and LOS. In the PoI, antimicrobial stewardship program (ASP) interventions were made significantly sooner after susceptibility results.

Conclusion. In this small, retrospective, single-center study, the implementation of a rapid susceptibility testing method was associated with reduced time to susceptibility results and more rapid interventions by the ASP, but no difference in the rate of clinical failure or time to optimal therapy was identified.

Table 1: Baseline characteristics

| Characteristics                      | Total n=100 | Pre-intervention n=50 | Post-intervention n=50 | p-value |
|--------------------------------------|-------------|-----------------------|------------------------|---------|
| Age, median (IQR)                   | 69 (59–78)  | 69 (59–76)            | 70 (59–79)             | 0.4977  |
| Female                               | 37 (37%)    | 19 (38%)              | 18 (36%)               | 0.8399  |
| Comorbidities                        |             |                       |                        |         |
| Immunosuppression                    | 34 (35%)    | 20 (41%)              | 14 (28%)               | 0.2837  |
| Chronic obstructive- pulmonary disease/ pulmonary failure | 11 (11%) | 7 (15%) | 4 (8%) | 0.1997  |
| Coronary artery disease/ congestive heart failure | 39 (38%) | 17 (36%) | 22 (44%) | 0.4124  |
| Stroke-like episode                   | 13 (12%)    | 8 (16%)               | 5 (10%)                | 0.5336  |
| Diabetes                             | 36 (35%)    | 18 (37%)              | 18 (36%)               | 0.8132  |
| Chronic kidney disease               | 48 (49%)    | 22 (46%)              | 26 (53%)               | 0.3000  |
| Cirrhosis                            | 9 (9%)      | 4 (8%)                | 5 (10%)                | 1.0000  |
| Source of infection                  |             |                       |                        |         |
| Urinary                              | 32 (32%)    | 15 (31%)              | 17 (34%)               | 0.3854  |
| Intra-abdominal                      | 21 (21%)    | 10 (20%)              | 11 (22%)               | 0.1212  |
| Respiratory                          | 8 (8%)      | 4 (8%)                | 4 (8%)                 | 0.9500  |
| Skin and soft tissue                 | 8 (8%)      | 3 (6%)                | 5 (10%)                | 0.3600  |
| Diabetes-associated                  | 6 (6%)      | 3 (6%)                | 3 (6%)                 | 1.0000  |
| Central nervous system               | 1 (1%)      | 1 (1%)                | 0 (0%)                 | 1.0000  |
| Primary                              | 16 (16%)    | 7 (14%)               | 9 (18%)                | 0.3000  |
| Multiple                             | 3 (3%)      | 2 (4%)                | 1 (2%)                 | 1.0000  |
| Other                                | 9 (9%)      | 4 (8%)                | 5 (10%)                | 1.0000  |
| Organ                                |             |                       |                        |         |
| Streptococcus pneumonia              | 2 (2%)      | 1 (2%)                | 1 (2%)                 | 1.0000  |
| Streptococcus spp.                   | 13 (13%)    | 7 (14%)               | 6 (12%)                | 0.2837  |
| Staphylococcus aureus(MRSA)          | 8 (8%)      | 4 (8%)                | 4 (8%)                 | 0.9500  |
| Staphylococcus aureus( MSSA)         | 10 (10%)    | 6 (12%)               | 4 (8%)                 | 1.0000  |
| Enterococcus faecalis                | 2 (2%)      | 1 (2%)                | 1 (2%)                 | 1.0000  |
| Enterococcus faecalis                | 13 (13%)    | 6 (12%)               | 7 (14%)                | 0.3000  |
| Enterococcus spp.                    | 3 (3%)      | 1 (2%)                | 2 (4%)                 | 1.0000  |
| Escherichia coli                     | 34 (34%)    | 18 (36%)              | 16 (32%)               | 0.4000  |
| Klebsiella spp.                      | 19 (19%)    | 10 (20%)              | 9 (18%)                | 0.3000  |
| Serratia spp.                        | 2 (2%)      | 1 (2%)                | 1 (2%)                 | 1.0000  |
| Proteus spp.                         | 6 (6%)      | 3 (6%)                | 3 (6%)                 | 1.0000  |
| Pseudomonas aeruginosa               | 4 (4%)      | 2 (4%)                | 2 (4%)                 | 1.0000  |
| Other                                | 4 (4%)      | 2 (4%)                | 2 (4%)                 | 1.0000  |
| EOR - intregall, MSSA – methicillin-susceptible | 3 (3%) | 1 (2%) | 2 (4%) | 1.0000 |

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138. Prognosis Following Valve Replacement Surgery for Infective Endocarditis Among Persons Who Inject Drugs

Sean Bullis, MD; 1 Krystine Spiess, DO; 2 and W. Kemper Alston, MD, MPH; 1

1University of Vermont Medical Center, Burlington, Vermont; 2PeaceHealth St. Joseph Medical Center, Bellingham, Washington

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Background. Infective endocarditis (IE) is a major cause of morbidity and mortality among persons who inject drugs (PWID) and rates have increased during the current opioid epidemic. Severe cases may require valve replacement surgery (VRS). These patients are typically younger with comorbidities than those who undergo VRS for other indications. This study was designed to examine the prognosis for these cases.

Methods. The University of Vermont Medical Center is a 562-bed academic medical center. A retrospective cohort included all cases of IE among PWID who underwent VRS between November, 2009 and December, 2015. The cohort intentionally included surgeries performed prior to 2016 in order to provide sufficient follow-up time. Outcomes included survival, readmission, complications, adherence to follow-up, length of stay, rate of repeat VRS, microbiology, and recurrent bloodstream infections.

Results. The cohort included 31 patients, 80% were male and the median age was 31. The valves replaced or repaired included 18 aortic, 10 mitral, 9 tricuspid, and 1 pulmonic (7 patients had two valves involved). Organisms included Staphylococcus aureus (48%), Streptococcus spp. (22%), and Enterococcus (13%). The median length of stay for the index admission was 35 days. To date, at least 38% of the cohort has died. The median survival for those who died was 337 days (0–2,224). Adherence with initial outpatient follow-up visit was only 50%, with others either canceling or missing appointments. 39% followed up with infectious diseases and 39% with cardiac/thoracic surgery: 29% never followed up. The readmission rate was 51%, and 22% of the cohort was readmitted more than three times. 48% had a repeat bloodstream infection, 73% of which were with a different organism than the index infection. The rate of repeat VRS was 31%.

Conclusion. Our observational data reveal a high mortality rate with poor adherence to follow-up and a high rate of readmission among this rural cohort of PWID who have VRS for IE. The major limitation of this work is the passive follow-up from the medical record. The high mortality and morbidity of this disease suggests that more intensive, multispecialty post-operative care is needed for PWID who are treated surgically.

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139. The Morbidity and Financial Burden of Infective Endocarditis in Persons Who Inject Drugs in the Deep South

Danielle deMontigny, Avila, MD; Rachael A. Lee, MD; Joshua Radney, BS and Ellen Eaton, MD; University of Alabama at Birmingham, Birmingham, Alabama

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Background. In the context of the opioid epidemic, infective endocarditis (IE) poses an economic challenge in Alabama. The objective of this proposal is to analyze the outcomes and financial burden of IE in persons who inject drugs (PWID) at The University of Alabama at Birmingham (UAB) Hospital, the largest tertiary referral center in this rural, Southern state. We hypothesized that those with the most severe substance use disorder would be most costly.

Methods. This is a retrospective study of PWID receiving care for IE at UAB Hospital from October 1, 2016 to March 1, 2019. IE was defined by Infectious Diseases consultation. Clinical data were obtained from the electronic medical record (EMR). Deaths were obtained from both the EMR and the regional medical examiner. Hospital costs (direct costs, overall charges) were obtained from financial accounts. To stratify patients by severity of substance use disorder, we used a 9-item risk assessment for PWID (see table). We then evaluated the association between clinical factors and...
outcomes (death, cost) using parametric and nonparametric tests when appropriate. A P-value < 0.05 was considered significant.

Results. A total of 69 persons met criteria (Table 1). The average length of stay was 30.8 days. Thirty-four (52%) had documentation of antibiotic completion (in or outpatient). Seventeen received surgery: 16 with valve replacement and one device removal. Overall, 30.8 days. Thirty-four (52%) had documentation of antibiotic completion (in or outpatient).

Conclusions. PWID with IE at a hospital serving a rural, Southern population have a greater length of stay, discharges against advice, surgical interventions, and costs than other regions, relative to existing literature. The lack of association between 9-item risk and outcomes suggests that death and high costs are attributable to factors beyond substance use. Costs of providing care for this population are exorbitant and likely devastating for rural county hospitals within the context of the current public health and payment framework, including Medicaid non-expansion.

Table 1. Demographics and Hospital Outcomes for PWID with IE (n=69) receiving care at the University of Alabama at Birmingham (UAB)

| Age          | Mean (SD) | Median (IQR) |
|--------------|-----------|--------------|
| Male, N (%)  | 31 (45)   |              |
| Race         |           |              |
| White        | 64 (93)   |              |
| Black        | 3 (6)     |              |
| Asian        | 1 (1)     |              |
| Insurance    | N (%)     |              |
| Public       | 21 (30.4) |              |
| Private      | 9 (13.0)  |              |
| Uninsured    | 29 (42.3) |              |
| Surgery      | 17 (24.6%)|              |
| Left AMA     | 12 (17.9%)|              |
| LOS          |           |              |
| Mean (SD)    | 30.8 days (21.1) | 19 (13.9) range: 4-103 |
| Median (IQR) |            |              |
| Readmission  | 13 (17.9%)|              |
| Death        | 14 (20.3%)|              |
| Treatment completed | 34 (52%) |              |
| VAT score    | Mean (SD) | Median (IQR) |
| Mean (SD)    | 4.97 (1.30) | 5 (2) |
| Median (IQR) |            |              |
| Initial hospitalization cost data | | |
| Total charges | Mean (SD) | Median (IQR) |
| Mean (SD)    | 5225.61±70 (238,113.86) | 1428.493 (323,295) |
| Median (IQR) |            |              |
| Direct Costs | Mean (SD) | Median (IQR) |
| Mean (SD)    | 454.20±19 (76,612,44) | 521,421 (80,18,93) |
| Median (IQR) |            |              |

Figure 1. Frequency of infection by causal pathogens, as defined by growth on blood or heart valve culture

Figure 2. Comparison of infected valve, in PWID with IE at UAB

Table 2. Intravenous Antibiotics and Addiction Team (IVAT) 9-Point Risk Assessment (Eaton et al., Clinical Infectious Diseases, 2018)

| Risk Factor          | Score (0-1) |
|----------------------|-------------|
| 1. Cravings          |             |
| 2. Unstable home environment |             |
| 3. Dual Psychiatric diagnosis |             |
| 4. History of drug overdose |             |
| 5. History of multiple relapses |             |
| 6. Polysubstance abuse |             |
| 7. Family history of addiction |             |
| 8. History of Trauma |             |
| 9. Limited willingness to change |             |

One point is given for each of the above risk factors
Low risk is defined as a total score of 4 or less
High risk is defined as score of 5 or greater

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140. Trends of Infective Endocarditis at a Northern New England Academic Medical Center, From 2011 to 2017: A Case for Improved Methods to Reliably Identify Associated Substance Use

Martha T. DeSbiens, MD, MPH1; David de Gijsel, MD, MS, MPH; Benjamin P. Chan, MD, MPH2; Elizabeth A. Talbot, MD; Stephen Conn, BA3 and David Laffamme, PhD, MPH1; 1Dartmouth Hitchcock Medical Center, New London, New Hampshire; 2Dartmouth-Hitchcock Medical Center, Lebanon, New Hampshire; 3NH Department of Health and Human Services, Concord, New Hampshire; 4Geisel School of Medicine at Dartmouth, Lebanon, New Hampshire; 5Geisel School of Medicine at Dartmouth College, Hanover, New Hampshire

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Background. Infective endocarditis (IE) is a morbid and often lethal complication of injection drug use. There is an urgent need for accurate surveillance for IE related to substance use (SU) to support control strategies.

Methods. We conducted a retrospective comparative analysis of 3 datasets evaluating patients aged ≥16 years admitted to an academic medical center in New England with an ICD-9/10 discharge diagnosis of IE from April 2011 to December 2017. The 3 datasets included the hospital’s electronic medical record (EMR), the hospital’s Outpatient Parenteral Antibiotic Therapy (OPAT) program dataset; and the New Hampshire Uniform Hospital Discharge Data Set (UHDDS). We analyzed the number of admissions for IE per year, stratified by SU. We developed a SU composite measure by incorporating multiple sources of data from the EMR, and then verified accuracy of both the SU and IE diagnoses through manual chart review.

Results. The EMR documented 472 hospital admissions for IE, representing 385 unique patients. The median age was 56 years and 59% were men. Admissions increased 67%, from 56 in 2012 to 84 in 2017. SU was coded as a discharge diagnosis in 27% of admissions; however, based on our composite measure of SU, 45% IE admissions were possibly associated with SU. The proportion of IE patients who had evidence of SU increased from 20% in 2011 to 49% in 2017 (P ≤ 0.002). Patients with SU compared with those without were younger (40.5 vs. 65.2 years, P < 0.001) and more likely to be on Medicaid (59% vs. 8%, P < 0.001). They had higher average charges ($146,633 vs. $107,223, P < 0.002) and lengths of stay (19.1 vs. 13.4 days, P < 0.001). The UHDDS and EMR datasets identified a similar numbers of patients with a diagnosis of IE; however, manual chart review revealed that IE was over-coded in one-fifth of admissions.

Conclusion. The rate of IE in our hospital increased dramatically between 2011 and 2017, with a rising proportion associated with SU. Despite these trends, we found that discharge diagnosis coding alone substantially underestimated associated SU and overestimated IE disease burden. Our findings suggest public health administrative datasets, such as the UHDDS, can contribute to surveillance of IE disease burden with consideration of these important limitations, especially for assessing disease trends.

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141. Use of Rapid Diagnostic Testing in Gram-negative Bloodstream Infections with and without Antimicrobial Stewardship

Kimberly C. Cleave, PharmD1; Emily Heil, PharmD, BCIDP2; Nora Loughery, BA3; Sanjay Chainani1; J. Kristie Johnson, PhD, D(ABMM)3 and Surbhi Leekha, MBBS, MPH1; 1School of Pharmacy – Baltimore, University of Maryland, Baltimore, Maryland; 2University of Maryland School of Pharmacy; University of Maryland Medical Center, Baltimore, Maryland; 3School of Medicine, University of Maryland – Baltimore, Baltimore, Maryland; 4Department of Pathology, University of Maryland, Baltimore, Maryland; 5Department of Epidemiology and Public Health, University of Maryland, Baltimore, Maryland

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Background. Verigene Blood Culture Gram-Negative (VBC-GN) is a rapid diagnostic test (RDT) that can detect key GNs and resistance within hours from