using serological test. The prevalence of bacteraemia/fungemia was reported in 11.8%, 9.4%, 8.7%, 9.2%, and 8.3% of cases and pulmonary infections were reported in 24.6%, 16.9%, 13.9%, 12.9%, and 10.3% of cases in the study periods A, B, C, D, and E, respectively. The incidence of Gram-negative bacteraemia was significantly lower in period E compared with the periods A, B, and C (2.0% vs. 4.9%, 3.7%, and 2.4%, respectively).

The proportion of Gram-positive bacteraemia and pulmonary aspergillosis was higher in period E than in the periods A-D. This trend was possibly due to the wide use of fluoroquinolone prophylaxis in neutropenic patients and high performance of the serological test for aspergillosis. Sufficient monitoring for Gram-positive bacterial infection and mold infection is therefore essential during RI chemotherapy for AML.

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1019. Treatment Outcomes for Enteroococcus faecium Bacteremia in Solid-Organ Transplant Patients: Implications for Daptomycin
Nicholas J. Mercuro, PharmD1,2; Rachel M. Kenney, PharmD2; George Alangaden, MD, FIDSA3; and Susan L. Davis, PharmD2,3; Pharmacy Practice, Wayne State University, Detroit, Michigan; 1Henry Ford Health-System, Detroit, Michigan; 2Wayne State University School of Medicine, Detroit, Michigan

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Background. Optimal antimicrobial therapy for Enteroococcus faecium (EFM) bacteremia in the solid-organ transplant (SOT) population is not well defined. Antimicrobial resistance, immunosuppression, and high mortality associated with EFM infections pose serious threats. The purpose of this study was to describe the pharmacotherapy and outcomes of EFM bacteremia in SOT patients.

Methods. This was a single-center retrospective cohort of SOT patients with EFM bloodstream infection from 2013 to 2018. Susceptibility of ampicillin (AMP), vancomycin (VAN), linezolid (LZD), and daptomycin (DAP) against EFM were reported as MIC, when available. The primary outcome, 30-day all-cause mortality, was assessed in bivariate analysis to identify potential risk factors. Secondary outcomes included inpatient mortality and development of DAP nonsusceptibility (DNS).

Results. Forty-four unique cases representing 40 patients were included in the analysis. The median age was 62.5 years and liver (65.9%), intestine (20.5%), and kidney (11.4%) were the most common organs transplanted. The MIC of VAN, DAP, and LZD of initial isolates collected were 32 mg/L, 4 mg/L, and 2 mg/L, respectively; all were AMP resistant. The median durations of hospitalization and intensive care stay were 29 days and 17.5 days, respectively. Most patients had indwelling central lines at the time of bacteremia; intra-abdominal abscesses/fluid collections were present in 45.5% of patients and 9.1% had endocarditis. The most common definitive antimicrobial regimens were DAP plus β-lactam (45.5%), DAP monotherapy (18.2%), and LZD 600 mg Q12H (25.0%). The mean initial and definitive DAP doses were 8.9 ± 1.6 and 8.1 ± 1.6 mg/kg actual body weight, respectively. Among subjects that received DAP, 21.9% developed DNS. Inpatient mortality was 39.5% and 30-day mortality was 27.3%. Mortality at 30 days was greater in patients with high-grade bacteremia (40.7% vs. 5.9%, P = 0.01) and receipt of DAP <10 mg/kg as the first active antibiotic (42.9% vs. 13.0%, P = 0.03).

Conclusion. Inadequate DAP dosing for EFM bacteremia may be associated with mortality in the SOT population. Larger, matched analyses are necessary to determine the impact of optimized pharmacodynamics.

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1020. Injection Drug Use-Associated Staphylococcus aureus Bacteremia in a Large Urban Hospital in Atlanta, Georgia
David P. Serota, MD, Colleen Kelley, MD, MPH; Jesse T. Jacob, MD; Susan M. Ray, MD, FIDSA; Marcos C. Schechter, MD and Russell Kemper, MD, MSc; Division of Infectious Diseases, Emory University School of Medicine, Atlanta, Georgia

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Background. Infectious complications of injection drug use (IDU) have increased with the expanding opioid epidemic in the southeast. We assessed the incidence, clinical presentation, and treatment outcomes of IDU-associated Staphylococcus aureus (SA) bacteremia (SAB).

Methods. We created a retrospective cohort of all adults with community acquired (CA) SAB over 5 years presenting to Grady Memorial Hospital, a 1,000-bed urban county hospital in Atlanta, GA. Charts were reviewed by infectious diseases physicians to obtain clinical and laboratory characteristics, including substance use disorder (SUD), and determine if SAB was IDU-associated. The study period was divided into five periods (P1 = March 2012–January 2014, P2 = January 2014–December 2015, P3 = December 2015–November 2017) to evaluate changes in the incidence of IDU-SAB over time using Poisson regression.

Results. Among 321 patients with a first episode of CA-SAB, 24 (7.5%) were IDU-SAB. The number of IDU-SAB cases in each period increased (P1 = 4, P2 = 7, and P3 = 13 [P = 0.07 for trend]). The median age of IDU-SAB patients was 38 (IQR 31–57), 11 (46%) were black, and 15 (63%) had chronic hepatitis C virus infection. Heroin was the most common injected drug (92%) followed by cocaine (25%); multiple drugs were injected in periods in 2014 (2%). All but two patients (98%) had a complication of SAB, most commonly endocarditis (50%) and septic pulmonary emboli (38%). The median hospitalization was 23 days (IQR 19.5–37.5) and 5 patients (12%) left the hospital against medical advice (AMA). Readmission for persistent or recurrent SA infection during the study period was common (42%), and three (13%) died 16 months from initial presentation, including two with prior discharge AMA. Half of the discharge summaries did not mention SUD as a hospital problem. Outpatient SUD treatment was recommended to eight (33%) patients and a recommendation of abstinence was the intervention for 12 (50%).

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1021. Repeat Infective Endocarditis (rIE) in Persons Who Inject Drugs (PWID)
Glen Huang, DO1; Erin Barnes, MD2, and James Peacock, MD; 1Internal Medicine, Wake Forest Baptist Med Ctr (WFBMC), Winston Salem, North Carolina; 2Infectious Diseases, Wake Forest Baptist Med Ctr (WFBMC), Winston Salem, North Carolina

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Background. Injection drug use (IDU) is a major risk factor for infective endocarditis (IE). Rates of IE have recently increased in the US concurrent with the opioid crisis. Although IDU-related IE is well described, few data exist on repeat IE (rIE) in persons who inject drugs (PWID).

Methods. Patients 21 years and older seen at Wake Forest Baptist Medical Center from 2004–2017 with an ICD-9 or -10 diagnosis of IE who met Duke criteria for IE and who self-reported IDU in the 3 months prior to admission were identified. The subset of PWID who developed rIE, defined as another episode of IE at least 10 weeks after the diagnosis of the first episode, was then reviewed.

Results. Of the 94 PWID with IE, 22 (23.4%) experienced rIE (19 re-infections, three relapses). All patients were Caucasian, 50% were male, and 68.2% lived in rural areas; the median age was 30. All 22 patients resumed IDU after their first episode of IE. The mean duration from completion of antibiotics for the prior IE episode to another IE with rIE was 257.5 ± 433.9 days. Twenty-six patients had rIE involving S. aureus (57.4%), 12 patients had rIE involving S. epiecus (25.5%), and four had rIE involving other microorganisms (8.5%). Six patients had rIE involving another species that was previously identified. rIE is more common in PWID with most episodes occurring within 1 year of the initial episode. Reinfection is more frequent than relapse. The microbiology of rIE is more varied than first episode IE in PWID with S. aureus being less frequently isolated. Illness severity is high, hospitalizations are prolonged, and 1-year mortality is significant. More effective strategies for preventing rIE in PWID are needed.

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1022. Rising Rates of Injection Drug Use Associated Infective Endocarditis in Virginia With Missed Opportunities for Injection Drug Use Disorder Treatment Referral: A Retrospective Cohort Study
Megan Gray, MD, Elizabeth Rogawski, PhD, MSPhD;4 Michael W. Scheld, MD, FIDSA, and Rebecca Dillingham, MD, MPH; 1Infectious Diseases, University of Virginia, Charlottesville, Virginia; 2University of Virginia, Charlottesville, Virginia; 3University of Virginia School of Medicine, Charlottesville, Virginia; 4Division of Infectious Diseases and International Health, DaptoV University of Virginia, Charlottesville, Virginia

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Background. Injection drug use disorder (IDU) is a growing public health threat in Virginia, although there is limited knowledge of related morbidity. The purpose of
this study was to describe the temporal, geographic, and clinical trends and characteristics of infective endocarditis associated with IDD (IDD-IE) and to identify opportunities for better-quality care of people with IDD.

Methods. We reviewed charts for all admissions coded for both IE and drug use disorders at the University of Virginia Medical Center (UVA) from January 2000 to July 2016. A random sample of 30 admissions coded for IE per year were reviewed to evaluate temporal trends in the proportion of IDD associated IE cases.

Results. There were a total of 76 patients with IDD-IE during the study period, with a 7-fold increase in cases of IDD-IE from the early 2000s to 2016. The proportion of IE that was IDD-associated increased by nearly 10% each year (prevalence ratio of IDD per year: 1.09, 95% CI: 1.05–1.14). Patients with IDDIE had longer hospital stays [median days (interquartile range)]; IDD-IE: 17 (10–29); non-IDD-IE: 10 (6–18); \( P = 0.001 \) with almost twice the cost of admission as those without IDD [median (interquartile range)]; IDD-IE: $47,899 ($24,578–74,144); non-IDD-IE: $26,460 ($10,220–60,059); \( P = 0.001 \). In 52% of cases, there was no documentation of any discussion regarding addiction treatment.

Conclusion. IDD-IE cases are increasing in Virginia leading to higher morbidity and healthcare costs. IDD-IE may provide an opportunity for the delivery of IDD treatment, counseling, and harm reduction strategies.

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1023. A Controlled-Release Prescription Oral Opioid Can Prolong S. aureus Survival in Injection Drug Preparation Equipment and Potentially Increase Bacteremia Risk

Katherine Kaper, PhD;1 Iswarya Manoharan, MD;2 Dresden Glockler-Lauf, MPH;3 Laura Ball, BSc, MPH;4 Brian Hallam, BA;1 Sharon Koivu, MD;5 John McCormick, PhD and Michael Silverman, MD, FRCP, FACP;1 Schulich School of Medicine and Dentistry, London, ON, Canada;2 Schulich School of Medicine and Dentistry, London, ON, Canada;3 Western University, London, ON, Canada;4 Schulich School of Medicine and Dentistry, London, ON, Canada;5 Schulich School of Medicine & Dentistry at Western University, London, ON, Canada.

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Background. S. aureus is the most common pathogen associated with injection drug use-associated endocarditis (IDUAE). Our center has a high incidence of IDUAE and the opiate of choice in our population is hydromorphone-controlled release (HCR). A prescribed oral opiate is widely used in Canada and Europe. The complex technique for preparation for injection provides multiple opportunities for contamination of the solution and the controlled-release preparation contains several excipients (carboxylates, protein, and iron), which could enhance Staphylococcal survival. A large amount of drug remains in the injection drug preparation equipment (IDPE) after subsequent reuse by adding more water and then injecting the solution intravenously.

Methods. Used IDPE was collected from active PWID, rinsed with sterile water, aspirated into a syringe in a technique which mimicked reuse of equipment by PWID, and then plated on Mannitol salt agar (MSA). Bacterial isolates from local bacteremic PWID were rated into a syringe in a technique which mimicked reuse of equipment by PWID, and then plated on MSA and Blood agar. Techniques similar to that of local PWID and then plated on MSA and Blood agar. We reviewed charts for all admissions coded for IE and drug use (IDD) from March 2017 to March 2018. S. aureus was detected in 15/94 (16%) IDPE samples that had been spiked in vitro with IDPE containing HCR solutions spiked with IDPE containing HCR solutions spiked with S. aureus when compared with sterile water vehicle control (Figure 1). There was a 2-log reduction in the number of viable S. aureus when IDPE containing HCR solutions spiked with S. aureus was tested to the survival of S. aureus (MRSA and MSSA) and S. pyogenes on unused IDPE with HCR or hydromorphine immediate release (HIR). The solutions were aspirated using techniques similar to that of local PWID and then plated on MSA and Blood agar.

Results. A total of 109 used IDPE samples were collected between March 2017 and March 2018. S. aureus was detected in 15/94 (16%) IDPE samples that had been used for injection of HMC (seven MRSA, seven MSSA, and two borderine resistant [one sample contained both MRSA and MSSA]), but 0/15 (0%) samples used for injection drug use-associated endocarditis (IDD-IE). Many patients do not perform valvular surgery on these patients due to concerns about poor outcomes.

Methods. Retrospective cohort study comparing PWID patients to non-PWID patients presenting between February 2007 and March 2016 in London, Ontario, among adult (18+) inpatients with first episode IE.

Results. In 370 first episode IE cases, 53.9% occurred in PWIDs. PWID patients were younger (35.4 SD 10.0 vs. 59.4 SD 14.9) (\( P < 0.001 \)), more likely to have right-sided infection (125/202 (62%), vs. 16/168 (9.5%) (\( P < 0.001 \)), and more often due to S. aureus (156/202 (77.3%) vs. 54/168 (32.1%), \( P < 0.001 \)). Myocardial and aortic root abscesses were less common in PWIDs (17/202 (8.4%) vs. 50/168 (30%) (\( P < 0.01 \)). There was no difference in the frequency of noncardiac complications. In total, 36.5% of patients were treated surgically with PWID patients less likely to undergo surgery (39/202 (19.3%) vs. 98/168 (58%) (\( P < 0.001 \)). Cox regression analysis identified the protective effect of cardiac surgery with regards to survival in all patients, with a hazard ratio of 0.49 (95% CI 0.31–0.76, \( P < 0.001 \), as well as among PWIDs (HR 0.39, 95% CI 0.16–0.87, \( P = 0.02 \)). Among all patients, lower survival was associated with older age (HR 1.03, 95% CI 1.00–1.05, \( P = 0.001 \), injection drug use (HR 2.72, 95% CI 1.52–4.88, \( P < 0.001 \)), bilateral infection (HR 3.48, 95% CI 2.01–6.03, \( P < 0.001 \)), and opioid use (HR 3.19, 95% CI 1.45–7.01, \( P = 0.004 \)). The lower survival of left-sided infection (HR 4.01, 95% CI 1.97–8.18, \( P < 0.001 \)) or bilateral infection (HR 6.94, 95% CI 2.39–20.2, \( P < 0.001 \)) was re-demonstrated in PWIDs.

Conclusion. This study identifies important clinical differences between PWIDs and nondrug users with respect to valve involvement, causative organism, complications, and management strategies. Our results highlight the important role of surgical treatment in a carefully selected PWID patient population.

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1025. Microbial Epidemiology of Infectious Endocarditis in the Intravenous Drug Abuse Population: A Retrospective Study in East Tennessee

William Lorson, DO;1 Avi Das, MD;2 R. Eric Heide, Phd;3 Mahmoud Shorman, MD;4 PhD5;6 Department of Medicine, The University of Tennessee Graduate School of Medicine, Knoxville, Tennessee,5 Department of Surgery, The University of Tennessee Graduate School of Medicine, Knoxville, Tennessee.

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Background. Infective endocarditis (IE) is one of the most serious infections affecting intravenous drug users (IVDU). IVDU have a higher incidence of IE compared with the general population. There are a limited number of reports on the epidemiology of this infection from the South Eastern United States. We determined the prevalence, and the microbial epidemiology, of IE cases at our institution. We then compared this to data from other geographical regions. This was done to help aid physicians with choosing empiric treatment regimens, for IE, pending culture results.

Methods. A retrospective cohort of 299 cases of IE was analyzed between January 2011 and July 2017 at a university hospital in East Tennessee. Demographic, microbiologic, intravenous substance use status, radiographic, and echocardiographic data were collected.

Results. Of the 299 cases, 184 (61.5%) were IVDU and 115 cases (38.5%) were non-IVDU. IVDU and non-IVDU positive cultures rates were similar at 87% and 86%, respectively. Methicillin-resistant Staphylococcus aureus (MRSA) was more likely to occur in IVDU (OR 2.8, P = 0.001) and was the most common pathogen at 77 out of the 184 cases (42%). Twenty-three of the 115 (20%) cases grew MRSA in the non-IVDU population. Methicillin-sensitive Staphylococcus aureus was the second most common bacteria for IVDU with 36 out of 184 cases (19.6%). IVDU patients were more likely infected with Pseudomonas aeruginosa (OR 3.384, P = 0.017), which occurred in 20 out of the 184 cases (10.9%). IVDUs also experienced more right heart involvement vs. left sided involvement (OR 2.19, P = 0.004).

Conclusion. S. aureus was the most common pathogen for IE in IVDU followed by P. aeruginosa. Data from this study solidify that in IVDU, or if there is suspicion of intravenous drug use, first-line broad-spectrum antibiotics with excellent MRSA and P. aeruginosa coverage is essential to empirically cover for IE. Extra attention for right-sided heart involvement should also be made on IVDU with imaging modalities.