Conclusion. In this comparative study, the risk for IE was lower among TAVI vs. SAVR recipients, primarily due to the higher risk of IE during the early post-SAVR period. With increasing uptake of TAVI procedures, a better understanding of the temporal occurrence and pathophysiology of IE and application of effective treatment strategies in these patients is required.

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56. Long-Term Cardiovascular Outcomes After Drug-Related vs Non-Drug-Related Infective Endocarditis
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Session: O-12. Endocarditis
Background. Drug use-related infective endocarditis (IE) has nearly doubled in the past two decades in the United States, largely due to the current opioid crisis. Although there are robust data on surgical outcomes for people who use drugs (PWUD) vs. non-PWUD patients after an initial encounter for IE, long-term comparative data on post-IE outcomes are relatively sparse.

Methods. Using data from the TriNetX electronic health records network, we identified (1) a cohort of patients 16 to 64 years old who had a first encounter for IE (captured with ICD-10 codes I33, I38, or I39) and history of drug use (captured with ICD-10 codes F11, F13-F16, F18, F19, O99.32, or T40) preceding the IE episode and (2) a propensity score-matched cohort of patients age 16-64 who had a first episode of IE and no documented drug use. We compared the post-IE incidence of (1) mortality; (2) ischemic stroke; (3) intracranial hemorrhage; (4) myocardial infarction; (5) heart failure; and (6) sudden cardiac death (cardiac arrest or ventricular fibrillation or tachycardia) between the 2 cohorts over a 5-year follow up period. We matched the cohorts for demographic data and clinically relevant medical history. We used Kaplan-Meier estimates and Cox models to compare incidence.

Results. We identified 6,578 PWUD patients and 6,578 matched non-PWUD patients 16-64 years old with a first episode of IE. The baseline characteristics are summarized in Table 1. Standardized mean differences of characteristics were generally < 0.1, indicating adequate matching. The 5-year Kaplan-Meier rates of outcomes of interest are summarized in Table 2. Mortality did not differ between cohorts. However, the incidence of ischemic stroke and intracranial hemorrhage was consistently higher among PWUD throughout the 5-year follow-up. Rates of myocardial infarction were also higher among PWUD; however, the difference was more pronounced later during follow-up. Rates of heart failure and sudden cardiac death did not differ.

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and hemorrhagic stroke were consistently higher among PWUD. Further investigation is needed to elucidate the sources of elevated stroke risk among PWUD and identify targets for intervention.

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57. Evaluation of the 2019 European Heart Rhythm Association International Consensus Document in Patients with Cardiovascular Implantable Electronic Devices Who Develop Staphylococcus aureus Bacteremia

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**Session:** O-12. Endocarditis

**Background.** Cardiovascular implantable electronic device (CIED) implantation has markedly increased over the past two decades. *Staphylococcus aureus* bacteremia (SAB) occurs in patients with CIED and determination of device infection among patients without clinical findings of pocket site infection is often difficult. Our study examined patient demographics, management, and outcomes of SAB in patients living with CIED using 2019 international criteria to define CIED infection.

**Methods.** We conducted a retrospective study of patients with CIED who were hospitalized at Mayo Clinic, Rochester, with SAB from January 1, 2012 to December 31, 2019. Patients who met CIED infection criteria following SAB based on the 2019 European Heart Rhythm Association International Consensus Document were identified. A time-to-event analysis was used to determine the impact, if any, of complete device extraction on outcomes.

**Results.** Overall, 110 patients with CIED developed SAB and 92 (83.6%) of them underwent transesophageal echocardiogram (TEE). Eighty-eight (80%) had CIED infection with 57 (51.8%) and 31 (28.2%) patients meeting criteria for definite and possible CIED infections, respectively. Forty-three (75.4%) patients with definite CIED infection underwent complete device extraction. For possible and rejected CIED infection, the rates of complete device extraction were 35.5% and 27.3%, respectively (p < 0.01 for each). The primary endpoint of a composite of one-year mortality and SAB relapse had a rate that was significantly lower in patients with CIED infection who underwent complete device extraction as compared to that of patients who did not undergo device extraction (25.9% vs. 76.5%, p < 0.01). No significant difference in outcomes was seen in the rejected CIED infection group (33.3% vs. 62.5%, p = 0.27).

**Conclusion.** The rate of CIED infections following SAB was higher than that reported previously. Increased use of TEE and a novel case definition with broader diagnostic criteria were likely operative, in part, in accounting for the higher rate of CIED infections complicating SAB. Complete device removal is critical in patients with either definite or possible CIED infection as defined by the 2019 consensus document to improve one-year mortality and SAB relapse rates.

58. Cost-Effectiveness of Emerging Antibiotic Strategies for the Treatment of Drug-Use Associated Infective Endocarditis

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**Session:** O-12. Endocarditis

**Background.** Drug use-associated infective endocarditis (DUA-IE) is typically treated with 4-6 weeks of in hospital intravenous antibiotics (IV A). Outpatient parenteral antimicrobial therapy (OPAT) and partial oral antibiotics (PO) may be as effective as IV A, though long-term outcomes and costs remain unknown. We evaluated the clinical outcomes and cost-effectiveness of four antibiotic treatment strategies for DUA-IE.

**Methods.** We used a validated microsimulation model to compare: 1) 4-6 weeks of inpatient IV A along with opioid detoxification, *status quo* (SQ); 2) 4-6 weeks of inpatient IV A along with inpatient addiction care services (ACS) which offers medications for opioid use disorder (SQ with ACS); 3) 3 weeks of inpatient IV A with ACS followed by OPAT (OPAT); and 4) 3 weeks of IV A with ACS followed by PO antibiotics (PO). We derived model inputs from clinical trials and observational cohorts. All patients were eligible for either in-home or post-acute care OPAT. Outcomes included life years (LYs), discounted costs, incremental cost-effectiveness ratios (ICERs), proportion of DUA-IE cured and mortality attributable to DUA-IE. Costs (US$) were annually discounted at 3%. We performed probabilistic sensitivity analyses (PSA) to address uncertainty.

**Results.** The SQ scenario resulted in 18.84 LY at a cost of $416,800/person with 77.4% hospitalized DUA-IE patients cured and 5% of the population in the population were attributable to DUA-IE. Life expectancy was extended by each strategy: 0.017y in SQ with ACS, 0.011 in OPAT, and 0.004 in PO. The PO strategy provided the highest cure rate (80.2%), compared to 77.9% in SQ with ACS and 78.5% in OPAT and X in SQ, OPAT was the least expensive strategy at $412,300/person. Compared to OPAT, PO had an ICER of $141,500/LY. Both SQ strategies provided worse clinical outcomes for money invested than either OPAT or PO (dominated). All scenarios decreased deaths attributable to DUA-IE compared to SQ. Findings were robust in PSA.

59. Risk Factors for Recurrent Gram-Negative Bacterial Bloodstream Infections

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**Session:** O-13. GNB bacteremia

**Background.** Gram-negative bacteria bloodstream infections (GNB-BSI) are a significant cause of morbidity and mortality. Recurrent GNB-BSI is an incompletely understood phenomenon. In this study we identify risk factors for recurrent GNB-BSI.

**Methods.** Patients with GNB-BSI have been prospectively enrolled into the Bloodstream Infection Biorepository (BSIB) since 2002. From the BSIB, patients with >1 episode of GNB-BSI with the same bacterial species were identified. Chi-Square, Fisher Exact, and a multivariate linear regression models were used to identify clinical risk factors for recurrent GNB-BSI. Paired isolate samples from the initial and the recurrent episode of GNB-BSI in same patient underwent Pulse Field Gel Electrophoresis (PFGE) to differentiate Relapse (paired isolates identical) from Reinfection (paired isolates different).

**Results.** Among the 1,423 unique patients with GNB-BSI enrolled from 2002-2015, 60 (4.2%) experienced recurrent GNB-BSI with the same bacterial species. Median time to recurrent GNB-BSI was 133 d (IQR: 40-284.75 days). Causes of recurrent GNB-BSI included

- Escherichia coli (38%), Klebsiella species (30%), Pseudomonas aeruginosa (12%), and Serratia marcescens (5%) and did not differ from causes of non-recurrent GNB-BSI (Figure 1).

Risk factors for recurrent GNB-BSI included Black race (OR: 2.45 [CI: 1.40-4.40]), implanted cardiac device (OR: 2.39 [CI: 1.00-5.70]), and admission to surgical service (OR: 2.16 [CI 1.24-3.75]). Forty-eight isolate-pairs from 43 patients with recurrent GNB-BSI underwent PFGE, relapse occurred in 31 (65%) and reinfection in 17 (35%). Risk factors for GNB-BSI relapse included cardiac device (OR: 3.7 [CI: 1.7-8.3]), and admission to surgical service (OR: 3.7 [CI: 1.3-9.4]).

**Figure 1:** Species Breakdown

[Image: Species Breakdown]

**Figure 1:** Proportional comparison of the Gram-negative bacterial species identified in patients with recurrent and non-recurrent bloodstream infections.

**Table 1**

| Treatment | Survival Rate (% | Incremental Cost (US$) | Incremental Effectiveness per QALY | ICER ($) |
|-----------|-----------------|------------------------|-------------------------------------|---------|
| OPAT + ACS | 79.4%            | 94.9%                  | 70.34                               | 401,300 |
| PO + ACS  | 80.3%            | 97.5%                  | 72.74                               | 144,100 |
| SQ        | 77.4%            | 95.2%                  | 73.54                               | 148,800 |
| SQ + ACS  | 77.6%            | 95.6%                  | 73.55                               | 147,100 |

Note: ACS = addiction care services, OPAT = outpatient parenteral antimicrobial therapy, SQ = status quo