Table 1

Table 1. Patient characteristics

| Variable                        | Inpatient MAT N=15 | No Inpatient MAT N=26 | P-value* |
|---------------------------------|-------------------|-----------------------|----------|
| Age, mean (50)                 | 47 (15.3)         | 39 (13.6)             | 0.08     |
| Sex                             |                   |                       |          |
| Male                            | 12/15 (80)        | 19/26 (73)            | 0.62     |
| Female                          | 3/15 (20)         | 7/25 (27)             |          |
| Race                            |                   |                       |          |
| White                           | 3/15 (20)         | 6/26 (23)             |          |
| Black                           | 2/15 (13)         | 7/26 (27)             |          |
| Other/Unknown                   | 10/15 (67)        | 13/26 (50)            |          |
| Ethnicity                       |                   |                       |          |
| Hispanic or Latino              | 5/15 (33)         | 3/26 (12)             | 0.09     |
| Not Hispanic or Latino          | 10/15 (67)        | 23/26 (88)            |          |
| Hepatitis C Status*             |                   |                       |          |
| Positive                        | 14/15 (93)        | 23/26 (88)            | 0.61     |
| Negative or Unknown             | 1/15 (7)          | 3/26 (12)             |          |
| Homeless                        | No                | 8/15 (53)             | 0.01     |
| Yes                             | 7/15 (47)         | 23/26 (88)            |          |
| Opioid injection drug use       |                  |                       |          |
| Active                          | 12/15 (80)        | 26/26 (100)           |          |
| Past (current on MAT)           | 3/15 (20)         | 0/26 (0)              |          |
| Other substance use             |                   |                       |          |
| Methamphetamine                | 10/15 (67)        | 17/26 (65)            | 0.93     |
| Yes                             | 5/15 (33)         | 9/26 (35)             |          |
| No/unknown                      | 5/15 (33)         | 5/26 (19)             | 0.31     |
| Cocaine                         | 10/15 (67)        | 21/26 (81)            |          |
| Yes                             | 5/15 (33)         | 5/26 (19)             |          |
| No/unknown                      | 10/15 (67)        | 21/26 (81)            |          |
| Phencyclidine                   | 2/15 (13)         | 2/26 (8)              | 0.56     |
| Yes                             | 13/15 (87)        | 24/26 (92)            |          |

Disclosures: SD—standard deviation. MAT—Medication assisted treatment. * Chi-squared used for categorical variables and t-test for means † Documented hepatitis C antibody positive or reported history of infection

Table 3

Table 3. Outcomes of 81 distinct hospital admissions involving 41 patients

| Variable                        | Inpatient MAT N=18 admissions | No Inpatient MAT N=63 admissions | P Value | OR (95% CI) |
|---------------------------------|-------------------------------|----------------------------------|---------|-------------|
| Adhered to treatment            |                              |                                  | <0.001  | 7.0 (2.05, 23.93) |
| Yes                             | 14/18 (78)                   | 21/63 (33)                       |         |             |
| No                              | 4/18 (22)                    | 42/63 (67)                       |         |             |
| Left AMA (excluding 3 deaths)   |                              |                                  |         |             |
| Yes                             | 4/18 (22)                    | 39/60 (65)                       | 0.001   | 6.5 (1.9, 22.27) |
| No                              | 14/18 (78)                   | 21/60 (35)                       |         |             |

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Conclusion: Patients with OUD-IE were more likely to adhere to treatment if they receive inpatient MAT.

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708. Infective Endocarditis Complicating Delivery in Pregnancy: Risk Factors, Complications, and Delivery Outcomes

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Session: P-28. Endocarditis

Background: Infective endocarditis (IE) is a rare but serious complication of pregnancy. Its impact on delivery outcomes is unknown. In this study, we used a national administrative database to compare outcomes of deliveries complicated by IE to non-IE deliveries.

Methods: The National Readmissions Database was used to identify discharges between Oct. 2015 and Dec. 2017 for deliveries in patients aged 12 – 55 years with concomitant IE, which were compared to those deliveries without IE. Demographics, comorbidities, and outcomes were obtained. Differences between groups were analyzed using weighted Chi-squared test for categorical variables and weighted linear regression for continuous variables. Weighted multivariate regression models adjusted for demographic, facility, and comorbidity conditions were used to evaluate the association between IE and delivery outcomes.

Results: We identified 88 individuals with IE complicating their delivery hospitalization, corresponding to a national estimate of 162 admissions during the study period, who were compared to 4,401,879 delivery hospitalizations not complicated by IE (weighted national estimate 8,375,536). Patients with IE were more likely to reside in ZIP codes with median incomes in the lowest national quartile (46.3% vs. 28.1%, P = 0.003) and were more likely to be insured by Medicaid (76.5% vs. 42.1%, P < 0.001). Rates of pre-existing cardiac valve disease (39.9% vs. 0.2%, P < 0.001) and congenital heart disease (6.6% vs 0.1%, P < 0.001) were higher in those with IE, as well as drug abuse (69.3% vs. 2.6%, P < 0.001). Unadjusted analyses demonstrated higher rates of in-hospital mortality for IE-associated admissions (12.1% vs. 0.005%), along with high rates of severe maternal morbidity, stillbirth, preterm birth, and cesarean birth, and longer lengths of stay and total hospital costs. These differences persisted despite adjustment using multivariate methods (Table).

Clinical and Resource Utilization Outcomes

Table 4: Clinical and Resource Utilization Outcomes

| Variable                        | Non-IE Admitted (n=4,401,879) | IE Admitted (n=88) | Unadjusted Relative Risk (95% CI) | Adjusted Relative Risk (95% CI) |
|---------------------------------|-------------------------------|-------------------|----------------------------------|-------------------------------|
| In-Hospital Mortality           |                              |                   |                                  |                               |
| Death                           | 440 (0.1)                     | 10 (1.2)          | 2.10 (1.35, 3.20)                | 2.34 (1.57, 3.47)             |
| Severe Maternal Morbidity       | 129 (0.3)                     | 15 (1.8)          | 5.15 (4.30, 6.24)                | 6.67 (5.23, 8.52)             |
| Sepsis                          | 52 (0.1)                      | 5 (0.6)           | 6.74 (5.29, 8.59)                | 8.46 (6.87, 10.75)            |
| NSTEMI                          | 81 (0.2)                      | 10 (1.2)          | 8.1 (5.98, 11.6)                 | 11.6 (8.13, 16.4)             |
| Obstetric Birth                 | 1,976,940 (45.3)              | 81 (9.8)          | 1.92 (1.76, 2.09)                | 2.01 (1.81, 2.23)             |
| Cesarean Birth                  | 1,976,940 (45.3)              | 81 (9.8)          | 1.92 (1.76, 2.09)                | 2.01 (1.81, 2.23)             |

Conclusion: The presence of IE during an admission for delivery is associated with poorer outcomes for both pregnant patients and their fetuses. The occurrence of IE during pregnancy was associated with lower income, a history of cardiac disease, and drug abuse.

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709. Multidisciplinary Drug Use Endocarditis Team (DUET): Results From an Academic Center Cohort

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Session: P-28. Endocarditis
Background: Guidelines recommend multidisciplinary models for the management of infective endocarditis but have failed to incorporate the unique challenges of treating drug-use associated infective endocarditis (DUA-IE). Given the drug use and overdose epidemic with rising cases of DUA-IE, we created a multidisciplinary Drug Use Endocarditis Team (DUET), which convened monthly case conferences among the specialties involved, including Infectious Diseases, Cardiothoracic Surgery, Cardiology and Addiction Medicine. Objective: To conduct a retrospective cohort study of the patients presented at the DUET conferences from August 2018 to February 2020 to (1) assess clinical and demographic characteristics and (2) describe clinical outcomes.

Methods: A retrospective chart review was conducted to analyze 57 patient cases, including descriptive statistical analyses of demographics, clinical characteristics, and outcomes.

Results: Among our DUET cohort, 43.8% represented isolated right-sided endocarditis, and 84% involved native valve. Methicillin-susceptible Staphylococcus aureus was the most common microorganism isolated. ID was consulted in 94.7% of cases and overall 43.9% completed the planned antimicrobial course. The 7 patients who developed relapse/recurrent IE were initially managed medically, and 5 did not complete the initial antimicrobial course. Formal cardiothoracic surgery consultation was obtained in 57.9% and 24.6% were managed operatively. Of the patients managed operatively, 64.3% completed the antimicrobial course. The rate of antibiotic completion was higher among patients managed operatively but did not reach statistical significance (p=0.08). Formal addiction medicine consultation was obtained in 85.9% of cases, with 63.1% discharged on medications for opioid use disorder (MOUD). The rate of MOUD on discharge was not significantly different between patients managed operatively and non-operatively.

Figure 1: Patient Characteristics

| Age (Mean, SD) | N (total =57) | Percentage (%) | Years |
|---------------|--------------|----------------|-------|
| Male          | 32           | 56.1           | 36.1, 9.1 |
| Female        | 25           | 43.9           |       |
| State of Residence |  |  |  |
| Massachusetts | 44           | 77.2           |       |
| New Hampshire | 8            | 14.0           |       |
| Maine         | 2            | 3.5            |       |
| Vermont       | 1            | 1.8            |       |
| Florida       | 2            | 3.5            |       |
| Unstable Housing |  |  |  |
| Yes           | 20           | 35.1           |       |
| No            | 32           | 56.1           |       |
| Unsure        | 5            | 8.8            |       |
| Insurance Type |  |  |  |
| Medicaid      | 41           | 72.9           |       |
| Medicare      | 7            | 12.3           |       |
| Commercial    | 8            | 14.0           |       |
| Uninsured     | 1            | 1.8            |       |
| Urine Toxicology |  |  |  |
| Opium         | 9            |                |       |
| Methadone     | 12           |                |       |
| Benzodiazepine| 14           |                |       |
| Alcohol       | 15           |                |       |
| Cigarette     | 9            |                |       |
| Benzodiazepine and opioids | 20           | 35.1           |       |
| Taking Medication for Opioid Use Disorder (MOUD) On Admission |  |  |  |
| Yes           | 20           | 35.1           |       |
| No            | 37           | 64.9           |       |

Figure 2: Infection Characteristics

| Duke Criteria for Infective Endocarditis | N (total =57) | Percentage (%) |
|----------------------------------------|--------------|----------------|
| Definite                               | 51           | 91.2           |
| Probable                               | 6            |                |
| Valve Involved                         |  |  |  |
| Native                                 | 48           | 84.2           |       |
| Aortic                                 | 9            | 15.8           |       |
| Presence of Conduction Abnormalities on EKG |  |  |  |
| Yes                                    | 5            | 8.8            |       |
| No                                      | 52           |                |       |
| Pathogenic Agent Isolated              |  |  |  |
| Methicillin susceptible Staphylococcus aureus (SSA) | 21           |                |       |
| Methicillin resistant Staphylococcus aureus (MRSA) | 15           |                |       |
| Viridans group streptococci (VGS)      | 8            |                |       |
| Non-albicans Candida sp.               | 3            |                |       |
| Enterococcus faecalis                  | 4            |                |       |
| Candida albicans                       | 2            |                |       |
| Klebsiella pneumonia                   | 2            |                |       |
| Enterococcus faecium                   | 1            |                |       |
| Group A Streptococcus                  | 1            |                |       |
| Group B Streptococcus                  | 1            |                |       |
| Lactobacillus                          | 1            |                |       |
| Pseudomonas                            | 1            |                |       |
| Serratia marcescens                    | 1            |                |       |
| Staphylococcus epidermidis             | 1            |                |       |
| Streptococcus mitis                    | 1            |                |       |
| Monomicrobial infection                | 44           |                |       |
| Polymicrobial infection                | 9            |                |       |
| Culture negative                       | 4            |                |       |

Figure 3: Outcome Analyses
710. Non-invasive Diagnosis of Whipple Endocarditis Using Next-Generation Sequencing for Microbial Cell-free DNA in Plasma

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Session: P-28. Endocarditis

Background: Tropheryma whipplei is a gram-positive bacillus that causes Whipple disease, a protocellulysymptomcomplex characterized by arthralgias, chronic diarrhea, malabsorption, and weight loss. T. whipplei infection has a wide spectrum of clinical manifestations including peptiglouplasmonic disease, skin hyperpigmentation and cardiac infection. Endocarditis has been diagnosed in a small number of patients and may represent an atrypval presentation of T. whipplei infection. Diagnosis can be challenging and has typically been accomplished with histopathology on resected valvular tissue or GI tract biopsy. Next-generation sequencing (NGS) of microbial cell-free DNA (mcfDNA) in plasma offers a rapid, non-invasive means of diagnosis of this rare cause of culture-negative endocarditis and challenging clinical entity.

Methods: McfDNA analysis was performed in a patient with culture negative endocarditis. McDNA was extracted from plasma and NGS was performed by Karius, Inc. (Redwood City, California). Human sequences were removed and remaining sequences were aligned to a curated database of over 1,400 pathogens. Organisms present above a predefined statistical significance threshold were reported and quantified in DNA molecules per microliter (MPM). Chart review was performed for clinical correlation.

Results: A 64-year-old male with history of valve replacement presented with significant deterioration of the mitral valve. An exhaustive infectious workup including extensive serologies were negative. Karius testing detected T. whipplei at 5066 MPM within two days of sample receipt. The normal range for T. whipplei is 0 MPM based on a cohort of 684 healthy individuals. Blood PCR for T. whipplei was confirmatory.

Table 1: Clinical Parameters of Case

| Clinical Parameters of Case of T. whipplei infection diagnosed by NGS of mcfDNA from plasma |
|---|
| Age | 64 |
| Sex | Male |
| Presenting symptoms | Extremity edema |
| Antecedent symptoms | None |
| Temperature at presentation | 99.5°F at time of valvular replacement; 96°F at time of valve removal |
| WBC with % | 84,500 with 9% WBC |
| Platelets | 386,000 |
| PT/PTT | INR 1.6, PT 30.3 |
| ESR and CRP | ESR 49 and CRP 13 |
| Albmin | 3.8 |
| Bleed claret results | 9 men all negative |
| Skin/mucous membranes | None |
| Heart 
| Diaphragm/demolosal pain | Abscess/bowel perforation, weight loss |
| Skin | None |
| Pulmonary | None |
| Systemic | None |
| Imaging results | CT chest/spine was normal |
| Empirical antibiotic | None |
| Antibiotic pretreatment duration prior to Karius Test | 7 days |
| Choice of antibiotics after Karius Test | IV ceftriaxone for 4 weeks |
| Karius Test result | T. whipplei whipplei 766 MPM |
| Karius Test turnaround time from sample receipt | 46 hours |
| Other infectious disease testing, result and turnaround time | T. whipplei blood PCR (SNIP) Positive, turnaround time 36 hours |
| Histoplasma and Blastomyces antigens, CF and ID antibodies, Enzyme assay | None |
| Bartolome qenase PCR, Brucella antibodies, Leptospira antibody | None |
| Biomarkers and Cytokines | All negative |

Conclusion: NGS for mcfDNA in plasma offers a rapid, non-invasive method for identifying T. whipplei and, to our knowledge, the first diagnosis of Whipple disease using NGS of plasma mcfDNA.

Disclosures: Christiara R. de Vries, MD, PhD, Karius (Consultant, Independent Contractor)Stanford University (Employee) Ann Macintyre, DO, Karius (Employee)

1. Stanford, California; 2. Aurora Health Care, Milwaukee, Wisconsin

Conclusion: NGS for microbial cell-free DNA (mcfDNA) has shown utility in diagnosing and monitoring the response to treatment in endocarditis.

Methods: Serial blood samples were obtained prior to and after aortic valve replacement in a patient with culture negative endocarditis. Microbial cDNA was extracted from plasma and NGS was performed by Karius, Inc. (Redwood City, California). Human sequences were removed and remaining sequences were aligned to a curated database of over 1,400 pathogens. Organisms present above a predefined statistical significance threshold were reported and quantified in DNA molecules per microliter (MPM). Chart review was performed for clinical correlation.

Results: A 53-year-old man with history of homelessness, well-controlled HIV infection, and a biprosthetic aortic valve presented with symptomatic severe aortic stenosis and elevated inflammatory markers 3 years following valve surgery. Transesophageal echocardiography showed a paravalvular leak. Bartonella quintana was detected by Karius NGS (in parallel Bartonella henselae serologies were positive). After 4 weeks of parenteral antibiotics, repeat Karius testing demonstrated a 94% (16-fold) decrease in the Bartonella quintana mcfDNA signal to 8813 MPM. He underwent surgical valve replacement; twenty-four hours after removal of the infected valve repeat Karius testing showed a rapid decay of the Bartonella quintana mcfDNA signal to 103 MPM. The patient completed 3 months of oral antibiotics post-operatively, ultimately returning to his former performance status.

Conclusion: Plasma-based next-generation sequencing assays for circulating microbial cell-free DNA offer a unique means of pathogen detection, assessment of infection burden and monitoring of response to both medical treatment and surgical debridement/definitive source control in a case of Bartonella quintana endocarditis.

Disclosures: Asim A. Ahmed, MD, Karius (Employee)

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712. Risk of Infective Endocarditis after Transcatheter Aortic Valve Replacement in Patients with Bloodstream Infection: A Population-Based Study

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Session: P-28. Endocarditis

Background: Transcatheter aortic valve replacement (TAVR) was initially approved as an alternative to surgery for patients at high surgical risk. However, it is now being considered for patients with intermediate and low surgical risk. This will result in the expansion of patient pool for TAVR; hence it is of interest to ascertain risk of bloodstream infection (BSI) and infective endocarditis (IE) following TAVR. We aim to study the incidence, epidemiology, and risk factors associated with IE in patients who underwent TAVR and subsequently developed a BSI.

Methods: A population-based study was conducted in 7 counties in southeastern Minnesota using the expanded Rochester Epidemiology Project (E-REP) for all adult (≥18 years) patients who underwent TAVR from January 1st, 2010 to December 31st, 2018. Transcatheter procedures that included replacement of either the aortic or mitral valve were included. Medical records were screened for development of BSI from time of TAVR until May 15th, 2020. Patients were classified as having BSI only, BSI with IE at outset, or BSI with subsequent development of new IE. Early IE was defined as that occurring < 12 months following TAVR, with subsequent cases defined as ‘late’ IE.

Results: A total of 247 patients underwent TAVR during the study period. There were 24 patients with BSI and 10 (42%) developed IE with an annual incidence of 5 per 1000 patient-years. Median age was 85.4 years. Male gender was affected predominantly (70%). Six developed IE at outset of BSI, while four developed IE subsequent to IE. The median time to development of IE was 791 days following TAVR. There was an equal number of early and late IE cases (n=5). The common pathogen causing IE was viridans group streptococci (n=4) followed by enterococci and coagulase-negative staphylococci with 2 patients each. Mean Charlson comorbidity index was 6.6. Two patients with IE died before resolution of infection (20%).

Conclusion: The incidence of BSI and subsequent IE in patients with TAVR was low in our population. Due to the small number of BSI and IE cases, statistical analysis was not feasible. An analysis of all cases seen at Mayo Clinic is planned since the number of cases would be much higher to investigate potential risk factors associated with BSI and IE.

Disclosures: Larry M. Baddour, MD, Boston Scientific (Consultant) M. Rizwan Sohal, MD, Azrío Biologics (Consultant)Medtronic Inc (Consultant, Research Grant Support)

713. The Clinical Impact of Implementation of a Multidisciplinary Endocarditis Team

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