Table 1

Table 1. Patient characteristics

	Inpatient MAT N=15	No Inpatient MAT N=26	
Variable	No./Total (%)	No./Total (%)	P-value*
Age, mean (SD)	47 (15.3)	39 (13.6)	0.08
Sex			
Male	12/15 (80)	19/26 (73)	0.62
Female	3/15 (20)	7/26 (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)	
Negative or Unknown	1/15 (7)	3/26 (12)	0.61
Homeless			
Yes	8/15 (53)	23/26 (88)	0.01
No	7/15 (47)	3/26 (12)	
Opioid injection drug use			
Active	12/15 (80)	26/26 (100)	
Past (currently on MAT)	3/15 (20)	0/26 (0)	
Other substance use			
Methamphetamines			
Yes	10/15 (67)	17/26 (65)	0.93
No/unknown	5/15 (33)	9/26 (35)	
Cocaine			
Yes	5/15 (33)	5/26 (19)	0.31
No/unknown	10/15 (67)	21/26 (81)	
Phencyclidine			
Yes	2/15 (13)	2/26 (8)	0.56
No/unknown	13/15 (87)	24/26 (92)	

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

	Inpatient MAT N=18 admissions	No Inpatient MAT N=63 admissions	P Value	OR (95% CI)
Variable	No./Total (%)	No./Total (%)		
Adhered to treatment				
Yes	14/18 (78)	21/63 (33)	<0.001	7.0 (2.05, 23.91)
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)		

AMA – Against Medical Advice

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

Disclosures: **All Authors**: No reported disclosures

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 use 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% versus 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: Clinical and Resource Utilization Outcomes

	Not IE-Related (N=4,401,879) ($N_{Weighted}$ = 8,375,536)	IE-Related (N=88) ($N_{Weighted}$ = 162)	Unadjusted Relative Risk (95% Confidence Interval)	Adjusted Relative Risk (95% Confidence Interval)
	N (%)			
In-Hospital Mortality	480 (0.0)	19 (12.1)	2104.12 (1100.09, 4024.50)	348.69 (97.40, 1248.31)
Severe Maternal Morbidity	134,218 (1.6)	133 (82.0)	51.16 (46.39, 56.43)	45.57 (34.83, 59.62)
Stillbirth	52,989 (0.6)	*	7.44 (2.80, 19.79)	3.62 (1.25, 10.48)
Preterm Birth	841,091 (10.0)	96 (59.5)	5.93 (4.92, 7.14)	3.60 (2.42, 5.36)
Cesarean Birth	2,704,948 (32.3)	81 (50.9)	1.55 (1.25, 1.94)	1.57 (1.18, 2.07)
	Mean (Standard Deviation)		Unadjusted Incremental Difference** (95% Confidence Interval)	Adjusted Incremental Difference** (95% Confidence Interval)
Length of Stay (Days)	2.7 (2.3)	29.7 (23.9)	27.0 (21.7, 32.3)	16.0 (11.5, 20.6)
Total Inpatient Costs ($1000s)	5.2 (4.8)	63.2 (48.1)	58.0 (46.5, 69.5)	42.5 (33.0, 52.0)

* N < 10; result cannot be displayed due to data use restrictions
** Incremental Difference is expressed as average among IE-related admissions minus average among non-IE-related admissions

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

	N (total =57)	Percentage (%)	Years
Age (Mean, SD)			(36.1, 9.1)
Male	32	56.1	
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	71.9	
Medicare	7	12.3	
Commercial	8	14. 0	
Uninsured	1	1.8	
Urine Toxicology			
Opiates	9		
Buprenorphine	7		
Fentanyl	11		
Methadone	12		
Oxycodone	3		
Amphetamines	2		
Barbiturates	2		
Benzodiazepines	14		
Cannabinoids	10		
Cocaine	23		
Self-Reported Drug Use			
Injection heroin	45		
Injection fentanyl	21		
Non-injection opioids	7		
Injection cocaine	30		
Non-injection cocaine	14		
Injection Methamphetamine	9		
Non-injection methamphetamine	4		
Alcohol	15		
Benzodiazepines	15		
Cannabis	9		
Cigarettes	28		
Phencyclidine (PCP)	1		
Taking Medication for Opioid Use Disorder (MOUD) On Admission			
Yes	20	35.1	
Methadone	9	45	
Buprenorphine + naloxone	9	45	
Buprenorphine Extended Release	1	5	
Naltrexone Extended Release	1	5	
No	37	64.9	

Figure 2: Infection Characteristics

	N (total =57)	Percentage (%)
Duke Criteria for Infective Endocarditis		
Definite	51	
Probable	6	
Valve Involved		
Tricuspid	33	57.9
Mitral	15	26.3
Aortic	15	26.3
Type of Valve		
Native	48	84.2
Prosthetic	9	15.8
Presence of Conduction Abnormalities on EKG		
Yes	5	8.8
No/Unclear	52	91.2
Pathogenic Agent Isolated		
Methicillin susceptible *Staphylococcus aureus* (MSSA)	21	
Methicillin resistant *Staphylococcus aureus* (MRSA)	15	
Viridans group streptococci (VGS)	8	
Non-albicans Candida sp.	3	
Enterococcus faecalis	4	
Candida albicans	2	
Klebsiella pneumoniae	2	
Enterococcus faecium	1	
Gemella haemolysans	1	
Group A *Streptococcus*	1	
Group B *Streptococcus*	1	
Lactobacillus	1	
Ralstonia	1	
Serratia marcescens	1	
Staphylococcus epidermidis	1	
Stenotrophomonas maltophila	1	
Monomicrobial infection	44	
Polymicrobial infection	9	
Culture negative	4	
Sites of Metastatic Involvement		
Lung	35	
Joint	21	
Central Nervous System (CNS)	16	
Spleen	14	
Kidney	8	
Spine	7	
Coronary Arteries	4	
Eye	3	
Skin (cutaneous emboli)	3	
Liver	2	
Psoas muscle	2	
Pericardium	1	

Figure 3: Outcome Analyses

	N (total =57)	Percentage (%)	Days
Average days remaining in antimicrobial course on day of discharge			24.6
Median days until blood culture cleared			2
Median length of hospital stay			14
Management:			
Antimicrobial treatment alone	43	75.4	
Surgery during admission	14	24.6	
Indication for Surgery (total n=14) ‡			
Systemic Emboli	6		
Difficult to Eradicate Organism	4		
Heart Failure Class NYHA III-IV	5		
Paravalvular Abscess	5		
Vegetation > 1cm	5		
Prosthetic Valve Dysfunction	2		
Hemodynamic Compromise	2		
Type of Surgery			
Mitral Valve Repair	1		
Mitral Valve Replacement	4		
Aortic Valve Replacement	8		
Tricuspid Valve Replacement	4		
Other: Endovascular right atrial thrombus removal	1		
Planned course of antibiotic treatment			
8 weeks	4		
6 weeks	38		
4 weeks	3		
2 weeks	3		
Long Term Access			
PICC	41		
PIV	2		
Finished full antibiotic course			
Yes (non-operative/operative)	16/9 p=0.08		
No/Unsure (non-operative/operative)	27/5		
Other procedures during admission			
Yes	24		
Joint wash out	9		
Tooth extraction	8		
Chest tube placement	3		
Pericardiocentesis	2		
Craniectomy	1		
Coronary artery bypass graft and & patent foramen ovale closure	1		
Pacemaker Placement	1		
Pleural Video Assisted Thoracoscopic Surgery (VATS)	1		
Pustule incision & drainage	1		
Splenic abscess incision & drainage	1		
Splenectomy (laparoscopic)	1		
No	33		

	N (total =57)	Percentage (%)	Days
Discharged with Naloxone			
Yes	21	36.8	
No/Uncertain	36	63.2	
Initiated on Pre-Exposure Prophylaxis (PrEP)			
Yes	1	1.7	
No	56	98.3	
Receiving MOUD Treatment at Discharge			
Yes (non-operative/operative)	30/7 p=0.17	63.1	
Methadone	24		
Buprenorphine + naloxone	11		
Naltrexone/Vivitrol	1		
No (non-operative/operative)	13/7	36.9	
Newly Initiated on MOUD Treatment During Admission	28	49.1	
Buprenorphine + naloxone	8		
Methadone	19		
Discharge Location			
SNF/Rehab	31	54.4	
Left Against Medical Advice (AMA)	10	17.5	
Home to stable housing	6	10.5	
Death	4	7.0	
Transferred back to referring hospital	6	10.5	
Outcomes at 90 days post-discharge ‡			
Readmission to hospital	24	42.1	
Relapse/Recurrence of IE	7	12.2	
Bacteremia (excluding relapse IE)	4	7	
Congestive Heart Failure (CHF)	4	7	
Skin and Soft Tissue Infection (SSTI)	3	5.3	
Hemorrhagic stroke	1	1.7	
Mortality	1	1.7	
Overdose	1	1.7	
Renal Failure	1	1.7	
Loss to Follow Up ‡	14	24.6	

‡ For patients with multiple admissions for Drug Use Associated Infective Endocarditis (DUA-IE), the first admission within the time frame of DUET conferences (Aug 2018-Oct 2019) was chosen for review. One patient in this initial cohort was reviewed during admission for a surgery scheduled after one year of sobriety following their last episode of DUA-IE.

‡ Outcome measurements were limited by loss to follow up after discharge. In addition, patients may have re-presented at hospitals outside of our hospital network system. Due to limited reach within the electronic medical record, these encounters would not be captured in this review.

‡Outcomes including completion of antibiotic course and 90-day post discharge outcomes were unable to be assessed for 14 patients, for whom this information was not discernible from the electronic health record within our hospital system.

Conclusion: ID is nearly universally involved in the care of patients with DUA-IE, but this patient population requires input from numerous sub-specialties. Multidisciplinary care teams provide a promising framework for DUA-IE to enhance and integrate nuanced decision-making.

Disclosures: **Sarah E. Wakeman, MD**, **Celero Systems** (Advisor or Review Panel member)**Optum Labs** (Grant/Research Support)**UpToDate** (Other Financial or Material Support, Author)

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's disease, a protean multisystemic syndrome classically characterized by arthralgias, chronic diarrhea, malabsorption, and weight loss. *T. whipplei* infection has a wide spectrum of clinical manifestations including pleuropulmonary disease, skin hyperpigmentation and cardiac infection. Endocarditis has been diagnosed in a small number of patients and may represent an atypical 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 blood cultures was negative. Karius testing detected *T. whipplei* at 766 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
Male	Male
Presenting symptoms	Exertional dyspnea
Antecedent symptoms	None
Tmax/Fever at presentation	99.8 was Tmax. Otherwise afebrile
Hgb/Hct	8.3/27.5
WBC with %N	8.7 with 83%
Platelets	188,000
PT/PTT	INR 3.3 PT 33.2 No PTT
ESR mm per hr/CRP md per dL	ESR 49 CRP not done
Albumin	3.8
Blood culture result(s)	9 sets all negative
Sites/organ systems involved:	
Joint	none
Diarrhea/abdominal pain/malabsorption/weight loss	none
Central nervous system/ocular	none
Heart	mitral valve degeneration/regurgitation
Skin	none
Pulmonary	none
Systemic	none
Imaging results	CT chest/abd/pelvis showed pulmonary edema and was otherwise negative
Empiric antibiotics	
Antibiotic pretreatment duration prior to Karius Test	vancomycin/ceftriaxone for 4 days
Choice of antibiotics after Karius Test	ceftriaxone/moxifloxacin
Karius Test result	*Tropheryma whipplei* 766 MPM RR (0 MPM)
Karius Test turnaround time from sample receipt	46 hours
Other infectious disease testing, result and turnaround time:	
***T. whipplei* blood PCR (ARUP)**	Positive, turnaround time 37 days
***Histoplasma* and *Blastomyces* antigens, CF and ID antibodies, Fungitell assay, *Coxiella* serology, *Bartonella quintana* PCR, *Brucella* antibodies, *Legionella* antibody, *Rickettsia* antibodies, Blood PCR for CMV, EBV and BKV**	All negative

MPM – molecules of microbial cell-free DNA/microliter
RR – reference range based on the 97.5th %ile in a cohort of healthy individuals

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

711. Rapid, non-invasive detection and monitoring of *Bartonella quintana* endocarditis by plasma-based next-generation sequencing of microbial cell-free DNA

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Session: P-28. Endocarditis

Background: There are up to 50,000 new cases of infective endocarditis each year in the United States, of which approximately 20% are culture negative endocarditis (CNE). In-hospital mortality remains high at 20 to 30%. Despite advances in diagnostic testing, determining the timing of surgery and duration of treatment in CNE are significant challenges for clinicians. Plasma next-generation sequencing (NGS) for circulating 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 cfDNA 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 bioprosthetic 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)

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 blood stream 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 of BSI and 10 (42%) developed IE with an annual incidence of 5 per 1000 persons-years. Median age for patients who developed IE 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 most common pathogen causing IE was viridians 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 Sohail, MD, Aziyo Biologics (Consultant)Medtronic Inc (Consultant, Research Grant or Support)

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

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