Infective Endocarditis and Medication Assisted Treatment in Opioid Use Disorder

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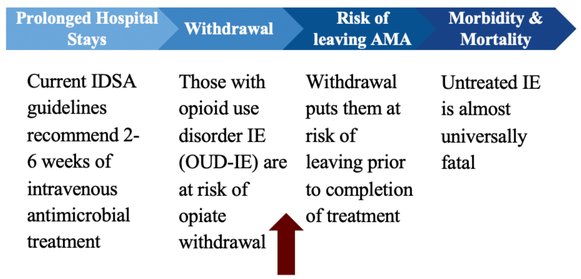
Background

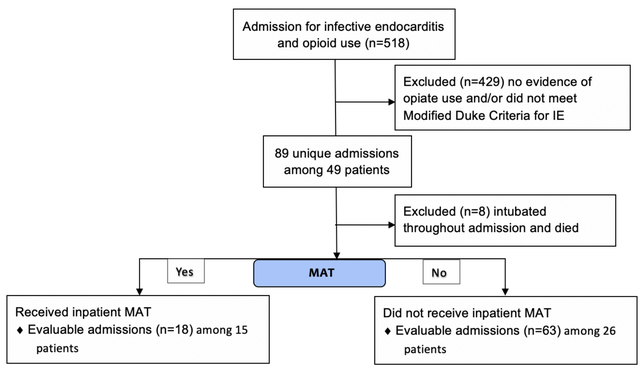
- The opioid epidemic and its associated complications are on the rise, including injection drug use-associated infective endocarditis (IDU-IE).[1]
- IE is often associated with prolonged hospital stays due to its associated complications, as well as the inherent duration and route of treatment. Those with opioid use disorder-associated IE (OUD-IE, a major subset of IDU-IE) often experience withdrawal in the hospital, putting them at risk of leaving prior to completion of IE treatment.
- Our study examined the role of inpatient initiation of medication assisted treatment (MAT) with buprenorphine or methadone for treatment of opioid withdrawal and opioid use disorder in those with IE.
- We hypothesized that patients with OUD-IE who were initiated on MAT would be more likely to adhere to IE treatment and less likely to leave against medical advice compared to those were not initiated on MAT.

Figure 1



Study Design

- Retrospective chart review conducted at the Los Angeles County-University of Southern California Medical Center (LAC+USC), a 600-bed public teaching hospital.
- Participants included adults with OUD-IE admissions between 10/2015 - 09/2019. Vizient clinical database was used to identify as admissions associated with OUD-IE using *ICD-9-CM* and *ICD-10-CM* codes and were confirmed with manual chart review of electronic medical records (EMR).
- We assessed group differences on two outcomes; 1) adherence to IE treatment, defined as completion of treatment while inpatient or transferred to a recuperative care or acute care facility for completion of treatment, and 2) leaving against medical advice prior to completion of treatment for infective endocarditis.
- Chi-square and t tests examined differences between the groups. Odds ratios (OR) with 95% confidence intervals (CI) evaluated the influence of MAT on targeted outcomes.



Results

Table 1: Demographic and Clinical 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
Homelessness			
Yes	8/15 (53)	23/26 (88)	0.01
No	7/15 (47)	3/26 (12)	
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 2: Endocarditis Characteristics

Variable	No./Total (%)
Modified Duke Criteria	
Microorganism in vegetation	3/49 (6)
Pathologic lesion	6/49 (12)
Blood cultures positive for infective endocarditis	45/49 (92)
Predisposing heart conditions or injection drug use	49/49 (100)
Fever	36/49 (74)
Vascular phenomenon	16/49 (33)
Immunologic phenomenon	1/49 (2)
Microbiological evidence	0/49 (0)
Definite	41/49 (84)
Possible	8/49 (16)
Vegetation seen on TTE	
Yes	28/49 (57)
No	21/49 (43)
Vegetations seen on TEE	
Yes	13/49 (27)
No	5/49 (10)
Not complete	31/49 (63)
Valve involved (if known)	
Tricuspid	18/35 (51)
Pulmonic	1/35 (3)
Mitral	10/35 (29)
Aortic	10/35 (29)
Organism	
Methicillin-sensitive Staphylococcus aureus	10/49 (20)
Methicillin-resistant Staphylococcus aureus	18/49 (16)
Coagulase-negative staphylococci	4/49 (8)
Viridians group streptococci	13/49 (27)
Streptococci (non-viridians group)	4/49 (8)
Enterococci	2/49 (4)
Finegoldia magna	1/49 (2)
Culture negative	3/49 (6)
Infective Endocarditis Complication	
Septic Arthritis	4/49 (8)
Spinal Epidural Abscess	5/49 (10)
Brain Abscess	2/49 (4)
Septic Pulmonary Emboli	17/49 (35)
Stroke	3/49 (6)
Splenic Infarction	3/49 (6)
Septic Shock	13/49 (27)
Renal Infarct	2/49 (4)
Heart Failure	7/49 (14)
Cardiac Abscess	3/49 (6)
Cardiac Conduction Abnormality	6/49 (12)
Cardiac valvular Surgery	10/49 (20)
Inpatient Death	11/49 (22)

TTE – transthoracic echocardiogram. TEE – Transesophageal echocardiogram.

Table 3: Outcomes among 81 unique hospital admissions involving 41 unique 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

- **MAT with buprenorphine or methadone was associated with a significant increase in adherence to treatment and decrease in leaving AMA in those with OUD-IE.**

Conclusions

- Our findings demonstrate that inpatient initiation of MAT with buprenorphine or methadone is associated with improved adherence to treatment of infective endocarditis in patients with OUD-IE.
- Despite this, the majority of individuals with OUD-IE in our study did not receive inpatient MAT, which demonstrates a significant need for improvement. This is consistent with national studies that show the majority of individuals discharged from hospitals are not started on MAT for OUD even after hospitalizations for opioid overdose.[2]
- Devising institutional screening tools for OUD and withdrawal, as well ensuring prescribing capabilities for inpatient MAT with methadone or buprenorphine, would likely improve outcomes in those with IE-OUD.
- Limitations of our study include its retrospective study design, small sample size, and completion at a single-center urban public hospital which may limit its generalizability to other patient populations.

References

1. Fleischauer AT, Ruhl L, Rhea S, Barnes E. Hospitalizations for Endocarditis and Associated Health Care Costs Among Persons with Diagnosed Drug Dependence - North Carolina, 2010-2015. MMWR Morb Mortal Wkly Rep 2017;66(22):569-73 doi: 10.15585/mmwr.mm6622a1[published Online First: Epub Date]|

2. Larochelle MR, Bernson D, Land T, et al. Medication for Opioid Use Disorder After Nonfatal Opioid Overdose and Association With Mortality: A Cohort Study. Ann Intern Med 2018;169(3):137-45 doi: 10.7326/M17-3107[published Online First: Epub Date]|.