SURGICAL OUTCOMES IN PATIENTS WITH SUBSTANCE USE DISORDER-ASSOCIATED ENDOCARDITIS IN A RURAL TERTIARY MEDICAL CENTER

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In 2013, more than half a million Americans used heroin, a 3-fold increase from 2007.

From 2015 to 2019, methamphetamine and cocaine use increased 60%.

In August 2020, 13% of respondents in a national survey reported starting or increasing substance use to cope with stress related to the pandemic.
Substance Use Disorder-Associated Infective Endocarditis

- Pathogens introduced into the bloodstream from contaminated needles adhere to leaflets of heart valves leading to infective endocarditis
- Most common pathogens include staphylococcus, streptococcus, and enterococcus species
- Infective endocarditis from IV drug use increased from 15% to 29% of all infective endocarditis cases from 2010 to 2015
Valve Surgery for Infective Endocarditis

- Infective endocarditis from patients who use IV drugs tend to affect the right heart valves, tricuspid and pulmonary, more than patients without history of IV drug use. May affect more than 1 valve at the same time.

- In one study, nearly 50% of patients admitted to the hospital diagnosed with substance use disorder-associated infective endocarditis (SUD-IE) required valvular repair or replacement.

- Other studies have shown inferior outcomes in this patient population.
Clinical Question:
Do patients with substance-use disorder-associated infective endocarditis undergoing valve surgery in eastern North Carolina have worse outcomes than other patients with infective endocarditis undergoing valve surgery?

Hypothesis:
These patients will have higher rates of postoperative complications and higher short- and long-term mortality.
Patient Selection

- Data obtained from the Society of Thoracic Surgeons Adult Cardiac Surgery Database patients undergoing valve repair or replacement due to infective endocarditis at East Carolina Heart Institute from 2000-2021
- Included patients undergoing surgery while inpatient status (non-elective cases)
- Additional patient information acquired through retrospective chart review
- Patients were considered to have substance use disorder-associated endocarditis if they had documentation of IV drug use at the time of diagnosis of infective endocarditis
Outcomes and Methodology

- Primary outcome of interest: 5-year mortality
- Secondary outcomes: Postoperative complications, length of stay, 30-day readmission, and 30-day mortality
- Additional analyses examining outcomes of patients by race and by causative organism
- Regression models controlled for age, sex, race, and history of prior valve surgery
- Kaplan-Meier curve to model risk of 5-year mortality
Results – Demographics and Incidence

- A total of 265 patients available for study inclusion
- 68 patients with documented IV drug use
- 197 patients with other causes of infective endocarditis

Percentage of Infective Endocarditis Cases Associated with IV Drug Use, 2000-2021
Results – Patient Demographics and Affected Valves

Infective Endocarditis Demographics

- **Female**
  - Non-SUD-IE
  - SUD-IE

- **White**
  - Non-SUD-IE
  - SUD-IE

- **≥50**
  - Non-SUD-IE
  - SUD-IE

Involved Heart Valves

- **Right heart valves**
  - SUD-IE
  - Non-SUD-IE
Results – Patient Comorbidities

Comorbidities and History of Valve Surgery

- Chronic Lung Disease
- Coronary Artery Disease
- Atrial Fibrillation
- Hypertension
- Heart Failure
- Congenital Cardiac Defect
- Diabetes
- Immunodeficiency
- Cancer
- Liver Disease
- Renal Disease
- Peripheral Arterial Disease
- Cerebrovascular Disease
- Previous Valve Procedure

SUD-IE (N = 68)  Non-SUD-IE (N = 197)
Results – Blood Cultures by SUD Status

Culture Results in SUD-related Infective Endocarditis
- MRSA
- Non-MRSA Staphylococcus
- Streptococcus
- Enterococcus
- Other/Culture Negative

Culture Results in Non-SUD-related Infective Endocarditis
- MRSA
- Non-MRSA Staphylococcus
- Streptococcus
- Enterococcus
- Other/Culture Negative
Results – Postoperative Complications

In-hospital Complications

Percentage of Patients

- Stroke
- PE
- DVT
- Cardiac arrest
- Liver failure
- Pneumonia
- Renal failure
- Sepsis
- ARDS

SUD-IE (N = 68)  Non-SUD-IE (N = 197)
Results – Postoperative Outcomes

Length of Stay

Total LOS*

Postoperative LOS

30-day Readmission and In-hospital Mortality

30-day readmission
In-hospital mortality

SUD-IE (N = 68)  Non-SUD-IE (N = 197)
Results – Readmission Reasons

Reasons for Readmission, by SUD Status

- Cardiac
- CHF
- Infectious
- Other
- Pain

SUD-IE
Non-SUD-IE
Results – 5-year Mortality by SUD Status

Product-Limit Survival Estimates
With Number of Subjects at Risk

+ Censored
Logrank p=0.6066

Survival Probability

Patient Survival Time (Years)

IVDU No Yes

No 189 60 52 43 33 22
Yes 190 57 146 120 113 105
Results – Outcomes by Race

- No difference in in-hospital complications
- Increased 30-day mortality for white patients (12%) compared with black patients (3%), even after controlling for substance use disorder
- No difference in long-term mortality
Results – Long-term Mortality by Organism
Summary of Findings

- Patients with infective endocarditis associated with IV drug use who undergo valvular surgery have longer length-of-stay and higher rates of readmission compared with other causes of endocarditis.
- Other postoperative complications, as well as short- and long-term mortality rates, are the same.
- Patients with SUD-related infective endocarditis place a higher burden on hospital resources in the short term.
Study Limitations

- Retrospective observational study
- Limited to cases included in our database from 2000 and there may be missing data
- Difficult to confirm if a given case of infective endocarditis is related to IV drug use or not
- Study does not evaluate the outcomes of patients with infective endocarditis of any cause who do not undergo surgical treatment
Conclusions

- Patients with substance use disorder-associated infective endocarditis place an increased burden on healthcare systems in eastern North Carolina.
- SUD-IE patients have longer LOS and higher rates of 30-day readmissions compared with non-SUD-IE patients, but no difference in short- or long-term mortality.
- Clinical implications:
  - Hospital level – Identify and address factors for increased LOS and increased readmission in SUD-IE patients.
  - State/national level – Decrease the health impact of IV drug use.