Increased Awareness Needed for Inpatient Substance Use Disorder Treatment in Drug Use–Associated Infective Endocarditis

Alexandra E. Mihm, PharmD¹ , Mary C. Cash, PharmD Candidate², Sarah A. Nisly, PharmD^{1,3}, and Kyle A. Davis, PharmD¹

¹Department of Pharmacy, Wake Forest Baptist Medical Center, Winston-Salem, NC, USA; ²Eshelman School of Pharmacy, University of North Carolina, Chapel Hill, NC, USA; ³School of Pharmacy, Wingate University, Wingate, NC, USA.

J Gen Intern Med 35(7):2228–30

DOI: 10.1007/s11606-019-05607-1

© Society of General Internal Medicine 2019

INTRODUCTION

The incidence of drug use–associated infective endocarditis (DUA-IE) has increased in the USA, with North Carolina witnessing an extreme 12-fold increase in cases over the past decade.¹ While patients are at increased risk of morbidity and mortality, inpatient IE management primarily focuses on treating the acute infection, leaving the underlying substance use disorder unaddressed.^{1, 2} Utilization of substance abuse resources, including medication-assisted treatment (MAT), during inpatient treatment may prevent further abuse; minimize recurrent infections, readmissions, and mortality; and reduce healthcare costs.^{2, 3} Much remains unknown surrounding patient characteristics and resources offered during hospitalization for DUA-IE and the impact of resources on patient outcomes. The objective of this study was to describe and evaluate substance abuse resources offered during inpatient DUA-IE treatment.

METHODS

We report an IRB-approved retrospective study of adult patients with active intravenous drug use (IVDU) admitted to Wake Forest Baptist Medical Center between January 1, 2012, and May 21, 2018, with a primary diagnosis of possible or definite IE.⁴ Baseline demographics, consulting services and substance abuse resources, antibiotic course, discharge destination, and 1-year readmission and mortality were collected.

Descriptive statistics were used to describe the population and resources provided. A stepwise logistic regression was performed to identify risk factors associated with 1-year readmission.

Prior presentations: Poster presented at the American Society of Health-System Pharmacists Midyear Clinical Meeting in December 2019.

Received October 16, 2019

Revised October 25, 2019

Accepted December 6, 2019

Published online January 2, 2020

RESULTS

One hundred thirteen patients were included (Table 1). Forty-four percent of patients received care coordination services, while consultation to addiction and psychiatric services was provided for 10% and 11% of patients, respectively. Thirteen percent of patients were initiated on MAT during admission, while 6% had an appointment for MAT at discharge. One-year readmission rates were 46% and 1-year mortality was 22%. Differences in substance abuse resources and characteristics for patients experiencing 1-year readmission or mortality are noted in Table 2. Discharge destination, receiving substance abuse resources, and completing antibiotics while hospitalized were identified for inclusion in the univariate regression analysis. However, no factors were associated with 1-year readmission.

DISCUSSION

Consistent with previous smaller studies, use of substance abuse resources during inpatient DUA-IE treatment was sparse.^{2, 5} Services provided by care coordination, including educational materials, addiction treatment center referrals, and outpatient appointments, were the most employed resources. Although utilized to a lesser degree, acute pain, psychiatry, and addiction counseling service consults were also observed. The infrequent use of resources is particularly concerning. All published research has been conducted in tertiary academic medical centers, where consult and referral services are likely more abundant. This underscores the need for massive coordination efforts for substance use disorder treatment in urban and rural areas alike.

In our study, MAT was initiated in less than 15% of encounters, with fewer prescriptions and follow-up appointments at discharge, despite most providers documenting IVDU on admission and discharge. However, this is still higher than prior reports of 7.8% of patients with MAT at discharge.² The low initiation rate is not unexpected considering the minimal engagement of the aforementioned services traditionally responsible for prescribing therapy. The lack of resources may be attributable to providers' unfamiliarity with

Table 1 Patient Characteristics (n = 113)

Patient characteristic	
Age (years), median [IQR]	31 [25–42]
Race, n (%)	
Caucasian	105 (93)
African American	6 (5)
Other	2 (2)
Male, n (%)	61 (54)
HIV status, n (%)	
Positive	3 (3)
Negative	104 (92)
Unknown	6 (5)
Hepatitis B positive, n (%)	8 (7)
Hepatitis C status, n (%)	
Positive	91 (80)
Negative	19 (17)
Unknown	3 (3)
Payer source, n (%)	
Uninsured	60 (53)
Medicaid	33 (29)
IVDU documented on admission problem list, n (%)	79 (70)
Drug(s) of abuse documented on admission, n (%)	
Amphetamines	23 (20)
Barbiturates	1 (1)
Benzodiazepines	26 (23)
Cocaine	21 (18)
Heroin or opioids	42 (37)
Cannabinoids	19 (17)
Unknown	2 (2)
Multiple substances abused, n (%)	65 (58)
Resources provided during admission, n (%)	
Acute pain service consult	13 (12)
Addiction service consult	11 (10)
Cardiothoracic surgery consult	86 (76)
Care coordination services (case manager and/or social worker)	49 (44)
Psychiatry consult	12 (11)
Antibiotics completed during hospitalization, n (%)	17 (15)
Medication-assisted treatment	
Inpatient use, n (%)	15 (13)
Buprenorphine	5 (25)
Buprenorphine/naloxone	0 (0)
Methadone	15 (75)
Prescription provided on discharge, n (%)	9 (8)
Day supply provided, average	15
Appointment made for MAT on discharge, n (%)	7(6)
Discharge destination, n (%)	
Home	28 (25)
Facility	17 (15)
Against medical advice	15 (13)
Outside hospital	38 (34)
Inpatient mortality	15 (13)
IVDU documented on discharge summary, n (%)	111 (98)
Previous hospital encounter for substance abuse-related problem, n (%)	24 (21)
Resources provided at previous encounter, n (%)	
Acute pain service consult	6 (5)
Addiction service consult	1 (0.8)
Cardiothoracic surgery consult	6 (5)
Care coordination services	9 (8)
MAT prescribed	3 (2.6)
Psychiatry consult	5 (4.4)
Readmission within 1 year after discharge, n (%)	52 (46)
IVDU documented on readmission, n (%)	34 (66)
Days to first readmission, median [IQR]	37 [5.25–87.75]
Mortality within 1 year after discharge, n (%)	25 (22)

IVDU, intravenous drug use; MAT, medication-assisted treatment

Table 2 Substance Abuse Resources and Characteristics for Patients Experiencing 1-Year Readmission or Mortality

	1-year readmission (n = 52)	1-year mortality (n = 25)
History of IE prior to admission, n (%)	12 (23)	7 (28)
Time of last IVDU, n (%)		
< 1 week	39 (75)	18 (72)
1–2 week	1 (2)	1 (4)
2–3 week	3 (6)	2 (8)
3–4 week	3 (6)	3 (12)
> 4 week	6 (11)	1 (4)
Resources provided during admission, n (%)		
Acute pain service consult	6 (11.5)	3 (12)
Addiction service consult	5 (9.6)	0 (0)
Cardiothoracic surgery consult	32 (61)	20 (80)
Care coordination services	24 (46)	6 (24)
Psychiatry consult	7 (13.5)	0 (0)
Antibiotics completed during admission, n (%)	5 (9.6)	1 (4)
Inpatient MAT use, n (%)	10 (19)	5 (20)
Prescription for MAT on discharge, n (%)	3 (6)	0 (0)
Appointment for MAT on discharge, n (%)	4 (7.6)	2 (8)
Discharge destination, n (%)		
Home	11 (21)	3 (12)
Facility	11 (21)	3 (12)
Against medical advice	12 (23)	1 (4)
Outside hospital	18 (35)	3 (12)
Death	0 (0)	15 (60)

IE, infective endocarditis; IVDU, intravenous drug use; MAT, medication-assisted treatment

Gray et al. reported only 8% of patients were provided with pain management, psychiatry, or chronic pain services.⁵ Similar to readmissions reported by Rosenthal et al., nearly one-half of our study population was readmitted within 1 year, with two-thirds of those patients reporting continued IVDU.² This is particularly concerning considering the increased treatment costs of DUA-IE compared with non-DUA-IE and the high proportion of Medicaid and uninsured patients in our study.⁵ However, we are the first to conduct a regression analysis for factors associated with a reduction in readmission. Interestingly, no factors impacted 1-year readmission. This could be due to the sparsity of services offered and high rate of readmissions in the DUA-IE population.

Our analysis supports the continued effort to increase awareness of addiction resources for DUA-IE patients. As front-line practitioners, internists and hospitalists are uniquely positioned to facilitate development of robust inpatient intervention programs and promote resource utilization in patients with DUA-IE. Future analysis should continue to evaluate the association of resource utilization and outcomes in this critical patient population.

Acknowledgments:

Contributors: No additional contributors to report.

Corresponding Author: Alexandra E. Mihm, PharmD; Department of Pharmacy, Wake Forest Baptist Medical Center, Winston-Salem, NC 27157, USA (e-mail: aefoster@wakehealth.edu).

addiction treatment, reluctance to initiate treatment in the inpatient setting, or stigma surrounding addiction.

We report the findings of the largest retrospective analysis of DUA-IE and addiction resources to date. Our findings share several similarities with published reports. In a similar cohort,

Compliance with Ethical Standards:

Conflict of Interest: The authors declare that they do not have a conflict of interest.

REFERENCES

1. **Schranz AJ, Fleischauer A, Chu VH, Wu LT, Rosen DL.** Trends in drug use-associated infective endocarditis and heart valve surgery, 2007 to 2017. *Ann Intern Med.* 2019;170(1):31–40.
2. **Rosenthal ES, Karchmer AW, Theisen-Toupal J, Castillo RA, Rowley CF.** Suboptimal addiction interventions for patients hospitalized with injection drug use-associated infective endocarditis. *Am J Med.* 2016;129(5):481–485.
3. **Bates MC, Annie F, Jha A, Kerns F.** Increasing incidence of IV-drug use associated endocarditis in southern West Virginia and potential economic impact. *Clin Cardiol.* 2019;42(4):432–437.
4. **Li JS, Sexton DJ, Mick N,** et al. Proposed modifications to the Duke criteria for the diagnosis of infective endocarditis. *Clin Infect Dis.* 2000;30(4):633–638.
5. **Gray ME, Rogawski McQuade ET, Scheld WM, Dillingham RA.** Rising rates of injection drug use associated infective endocarditis in Virginia with missed opportunities for addiction treatment referral: a retrospective cohort study. *BMC Infect Dis.* 2018;18(1):532.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.