

Rodolfo Alpizar-Rivas, MD, Javier Balda, MD, Salwa Elarabi, PharmD, Bertrand L. Jaber, MD, MS, Claudia Nader, MD

Background

Despite advances in diagnosis and management, infective endocarditis (IE) is associated with considerable morbidity and mortality. Given the emergence of drug-resistant organisms in the community, it is unclear whether this change has impacted the characteristics and outcomes of IE among intravenous drug users (IDUs) and non-IDUs.

Study Design and Participants

We conducted a retrospective cohort study at an acute care facility. Records of hospitalized adults with a diagnosis of IE by ICD-9/ICD-10 CM codes were identified over 8 years (2011-2018). Patients with “definitive” or “possible” IE based on the modified Duke criteria were included. IRB approval was obtained.

Methods

The baseline demographic, microbiologic, and echocardiographic variables were extracted from the index hospitalization, and the outcome variables were obtained from all available hospitalizations. Characteristics and outcomes of IDUs and non-IDUs were compared using the Student's t-test for continuous variables, and by the Chi square test for categorical variables. Univariate and multivariable logistic regression analyses were performed to examine factors associated with mortality, including intravenous drug use status and age.

Results

306 patients were identified of which 244 met criteria for IE. 112 (45.9%) patients were IDUs. IDUs with IE were significantly younger (mean age 36 vs. 64 years, $p < 0.001$) and more likely to be women (50.9% vs. 34.1%, $p = 0.008$).

Both MSSA (44.6% vs. 23.5%, $p < 0.001$) and MRSA (29.5% vs. 13.6%, $p = 0.002$) associated IE were significantly more prevalent in IDUs compared to non-IDUs. Streptococcus species (22.7% vs 11.6%, $p = 0.02$) and coagulase-negative Staphylococcus (12.1% vs 1.8%, $p = 0.002$) were significantly more prevalent in non-IDUs.

IDUs were significantly more likely to have tricuspid valve vegetations (56.3% vs. 13.6%, $p < 0.001$), whereas non-IDUs were significantly more likely to have mitral valve (39.4% vs. 25%, $p = 0.02$) and aortic valve vegetations (46.2% vs. 15.2%, $p < 0.001$). 46 (19%) patients with IE underwent valve replacement within 6 months, and 42 (17%) died within 90 days. In a multivariable model that included age, gender, and IDU status, age was the only variable that remained independently associated with 90-day mortality (adjusted odds ratio 1.031; 95% CI 1.006, 1.057; $p = 0.01$).

Table 1. Characteristics and outcomes of hospitalized patients with infective endocarditis according to intravenous drug use status

	IDUs (n = 112)	Non- IDUs (n = 132)	P value
Demographic characteristics			
Mean age (years)	36 ± 11.	64 ± 17	0.001
Women, n (%)	57 (50.9)	45 (34.1)	0.008
Co-existing viral infections			
HIV, n (%)	7 (7.8)	2 (7.1)	0.91
HCV RNA detected, n (%)	45 (55.6)	3 (8.8)	0.001
Hep Bs antigen positive, n (%)	8 (8.5)	0 (0)	0.03
Presence of central venous catheters, n (%)	3 (2.7)	18 (13.6)	0.002
Port-A-Cath, n (%)	0 (0)	5 (3.8)	0.04
Tunneled venous catheter, n (%)	0 (0)	5 (3.8)	0.04
Peripherally inserted center catheter, n (%)	3 (2.7)	7 (5.3)	0.30

ABBREVIATIONS:

MSSA, methicillin sensitive staphylococcus aureus; MRSA, methicillin-resistant staphylococcus aureus; HIV, human immunodeficiency virus; HCV, hepatitis C virus; HBV, hepatitis B virus

	IDUs (n = 112)	Non- IDUs (n = 132)	P value
Microorganism type			
MSSA, n (%)	50 (44.6)	31 (23.5)	0.001
MRSA, n (%)	33 (29.5)	18 (13.6)	0.001
Streptococci species, n (%)	13 (11.6)	30 (22.7)	0.02
Enterococcus faecalis, n (%)	13 (11.6)	23 (17.4)	0.20
Enterococcus faecium, n (%)	1 (0.9)	1 (0.8)	0.91
Candida species, n (%)	8 (7.1)	4 (3.0)	0.14
Coagulase negative Staphylococci, n (%)	2 (1.8)	16 (12.1)	0.002
Diphtheroid species	0 (0.0)	1 (0.8)	0.36
Micrococcus, (n%)	0 (0.0)	3 (2.3)	0.11
Non-HACEK Gram-negative rods, n (%)	5 (4.5)	5 (3.8)	0.79
HACEK, n (%)	1 (0.9)	2 (1.5)	0.66
Presence of vegetations			
Tricuspid valve, n (%)	63 (56.3)	18 (13.5)	0.001
Pulmonary valve, n (%)	2 (1.8)	1 (0.8)	0.47
Mitral valve, n (%)	28 (25)	52 (39.1)	0.02
Aortic valve, n (%)	17 (15.2)	61 (45.9)	0.001
Intra-cardiac complications			
Valvular abscess, n (%)	9 (8.0)	13 (9.8)	0.62
Valvular perforation, n (%)	9 (8.0)	6 (4.5)	0.55
Intra-cardiac fistula, n (%)	3 (2.7)	8 (6.1)	0.21
Cardiac surgery			
During index hospitalization, n (%)	12 (10.7)	27 (20.45)	0.04
Within 6 months, n (%)	18 (16)	28 (21.2)	0.93
Death			
During index hospitalization, n (%)	11 (9.9)	24 (18.2)	0.07
Within 90 days, n (%)	9 (8.0)	33 (25)	0.001

Conclusion

In this single-center experience conducted in a modern era, we found that MSSA was the dominant organism among IDUs and non-IDUs, while MRSA was significantly more prevalent among IDUs. This is likely related to an increase in the prevalence of colonization with this resistant organism in the community, in particular among IDUs. Despite the shift in prevalence of MRSA among IDUs, there was no increased 90-day mortality risk among IDUs after adjustment for age and gender.