High Mortality and Over-representation of Young Women amongst People Who Inject Drugs Admitted with Infective Endocarditis from 2013-2018.

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Background

- The province of Saskatchewan has numerous markers for a high prevalence of injection drug use (IDU), including a unique co-occurring human immunodeficiency virus (HIV) and Hepatitis C epidemic driven by IDU. The rates of Hepatitis C and HIV infections in Saskatchewan are the highest in Canada, roughly double the national rate in 2017[1].
- Infective endocarditis (IE) is a severe and common complication of IDU associated with devastating outcomes, with 30-day mortality estimated to be between 18-23%[2]. For IDU related IE, mortality rates are even higher (20-25%)[2].
- Coupled with the opioid crisis, it is reasonable to assume the rate of IDU-associated infective endocarditis (IE) is high in this province, however no published data exists.
- An assessment of the occurrence, clinical management and outcomes is vital to understand the extent of the burden, as well as identify areas in need of improvement to optimize care and improve outcomes.
- In particular, further research is needed to identify gaps in addictions supports that could further improve outcomes and minimize ongoing risks for subsequent IE

Research Objectives

The main research objectives are to describe the epidemiology of IE over a 6-year study period as well as to characterize the clinical management and outcomes of patients, including their referral to addictions services.

Methods

- We performed a retrospective chart review of adult patients (age > 18) with a diagnosis of infective endocarditis (based on ICD codes) at Regina-area hospitals between January 1, 2013 and December 31, 2018. Patients with either Definite or Possible IE, as defined by Duke's Criteria, were included in the study.
- Data was abstracted in January 2020 by the Health Information Services (HIMS)
- People who inject drugs (PWID) were identified through chart documentation of self-reported IV drug use and physician documentation of substance abuse in the hospital.
- Data was collected from paper charts as well via the electronic health records, (i.e. Sunrise Clinical Manager). Additionally, data regarding the patients' blood-borne infection status was obtained from the Roy Romanow Provincial Laboratory (RRPL)
- Main outcomes include: survival, intensive care unit (ICU) admission, complications, medical vs surgical management, completion of antibiotics and referral to addiction services
- Other descriptive endpoints include: patient demographics, comorbidities, HIV status, valve infected, causative organisms and characteristics of drug abuse
- Clinical outcomes were tabulated using descriptive statistics and then compared using Pearson's Chi-squared or Fisher Exact tests and 95% confidence intervals (95% CI).
- Univariate analysis ($p < 0.20$) was used to pre-filter statistically significant covariates used in PWID comparisons among first IE episodes in this cohort then followed by Chi-squared testing.
- All data was input into the Research Electronic Data Capture (REDCap) tool. For statistical analysis, SPSS Version 22 (IBM, US) was used, with a two-sided p-value <0.05 being considered statistically significant.

Results

Table 1: Baseline characteristics of the patient cohort

Characteristic	N (%)
Number of patients	227
Sex (% female)	**130 (57.3)**
Age (years)	46.0 (IQR; 36.0-64.0)
Homeless	19 (8.4)
HIV Positive Status	15 (6.6)
Predisposition	
IDU	129 (56.8)
Previous Endocarditis	44 (19.4)
Prosthetic Valve	36 (15.9)
Repaired Congenital Heart Disease	7 (3.1)
Comorbidities	
Mental Health Illness	56 (24.7)
Diabetes	45 (19.8)
Liver disease	26 (11.5)
Kidney disease	29 (12.8)
Substances abused (as % of PWID)	
Cocaine	24.6%
Hydromorphone	20.7%
Morphine	15.2%
Methamphetamine	11.2%
Ritalin	10.1%
1-year mortality	**89 (39.2)**

Table 2: Differences in demographics and clinical outcomes between PWID-IE and non-PWID IE

Characteristic	PWID IE	Non-PWID IE	Relative Risk (95% CI)
Age	**38.0** (30.0-45.0)	68.0 (30.0-45.0)	*
Sex			
Male	45.5%	73.7%	0.62 (0.50-0.77)*
Female	**54.4%**	26.3%	2.06 (1.44-3.04)*
Site of infection			
Right	57.6%	6.3%	9.14 (4.74-15.14)*
Left	25.8%	74.7%	0.35 (0.27-0.68)*
Bilateral	2.3%	3.2%	0.91 (1.25-3.50)
ICU Admission	39.4%	29.5%	1.34 (0.89-2.73)
1-year mortality	**37.9%**	41.1%	0.92 (0.75-1.19)
Clinical Management			
Medical only	93.2%	81.0%	1.24 (1.10-3.27)*
Medical and Surgical	6.8%	18.9%	0.36 (0.27-0.77)*

p<0.05 was used to mark significance, as indicated by *.

Table 3: Substance use-related predictors of 1-year mortality.

Independent Variable	Relative Risk (95% CI)	p-value
Substances used		
Hydromorphone	1.63 (0.94-3.57)	0.08
Morphine	0.62 (0.26-1.26)	0.16
Methamphetamines	1.43 (0.62-3.53)	0.37
Ritalin	1.43 (0.62-3.53)	0.37
Cocaine	1.22 (0.54-2.89)	0.60
Receiving addictions treatment	**0.89** (0.34-1.21)	0.051

p<0.05 was used to mark significance, as indicated by *.

Discussion

- Our cohort of IE patients demonstrated a higher-than-expected 1-year mortality of almost 40%, of which 60% was endocarditis-related.
- PWID, which make up the majority of our cohort, were on average 30 years younger and experienced high mortality (37.9%), leading to significant years of life lost.
- Our cohort also demonstrated a low antibiotic completion rate (55%).
- Amongst substances abused by PWID, hydromorphone abuse may be associated with increased mortality.
- PWID-IE was negatively associated with major outcomes including increased ICU admission and less surgical management

Conclusions

- Regarding PWID-IE, women were more commonly affected than men. This is also seen in other blood-borne infections, such as HIV and HCV, in Saskatchewan, indicating higher risk injecting practices.
- Bacteremia-associated complications, such as IE, should be considered a significant part of the impact of IDU, in addition to HIV and HCV infections
- The protective effect offered by addictions services highlights the importance of developing initiatives that target at-risk populations.

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