Table1. Baseline demographic data of all 43 patients with *S.suis* endocarditis

Characters	N=43 n (%)
Male gender	35 (81%)
Age (years), median (min,max)	52 (20, 85)
Underlying conditions	
None	34 (79%)
Pre-existing structural heart diseases	5 (12%)
Cardiovascular diseases	2 (5%)
Neuro (CVA/TIA/Dementia)	2 (5%)
Liver diseases	2 (5%)
Diabetes mellitus	3 (7%)
Occupation	
Rice or vegetable farmers	14 (32%)
Livestock farmers/ butcher/ chef	5 (12%)
Unemployed	3 (7%)
Others or missing	26 (61%)
History of exposure	
Consumption of raw pork	15 (35%)
Contact with pig	2 (5%)
Unknown history of exposure	26 (60%)
Living area	
Urban	20 (46%)
Sub-urban	23 (53%)

Table2. Presenting signs/symptoms, prediction score and laboratory data on admission

Characters	N=43
Presenting signs/symptoms	
Fever (symptoms), n (%)	34 (79 %)
Fever (> 37.5 C) on admission, n (%)	18 (42%)
Temperature on admission(°C), median (min,max)	38.4 (37.5, 39.2)
Dyspnea, n (%)	30 (70%)
Clinical heart failure, n (%)	31 (72%)
Clinical meningitis, n (%)	2 (5%)
Septic joints, n (%)	8 (19%)
Prediction scores on admission	
qSOFA score, median (min,max)	0 (0, 3)
NEWS score, median (min,max)	3 (0, 14)
Pitt Bacteremia Scores*, median (min,max)	0 (0, 10)
Laboratory data	
White blood count, median (min,max)	13250 (3800, 32800)
Serum creatinine, median (min,max)	1.05 (0.6, 6.6)

*only applicable to 28 patients with bacteremia

Presenting signs/symptoms, prediction score and laboratory data on admission

Table 3. Univariate and multivariate analysis of factors associated with morbidity and mortality

	Univariate			Multivariate		
	Odd Ratio	95%CI	*p-value*	Odd Ratio	95%CI	*p-value*
Age >60 years	1.50	(0.30, 7.49)	*0.621*			
Male	1.75	(0.18, 16.65)	*0.626*			
Fever (>37.5 C) on admission	0.80	(0.16, 3.88)	*0.782*			
Clinical findings						
Systemic embolism	17.50	(1.90, 161.11)	*0.012*	12.65	(1.30, 123.53)	*0.029*
Left ventricular failure	1.31	(0.26, 6.48)	*0.741*			
Echo findings						
Moderately severe/ severe regurgitation	0.13	(0.02, 0.73)	*0.021*	0.25	(0.04, 1.70)	*0.156*
Vegetation size >10 mm**	0.60	(0.12, 2.92)	*0.527*			
Perivalvular abscess	1.15	(0.23, 5.65)	*0.863*			
Valvular complication	0.31	(0.06, 1,54)	*0.153*			
Surgical treatment						
No cardiac operation	7.75	(1.37, 43.87)	*0.021*	4.04	(0.59, 27.87)	*0.156*

** Vegetation was not well visualized in 1 patient

Conclusion. *S. suis* endocarditis had high rate of valvular damage with complications and resulting systemic embolism. Surgery is required in majority of the patients. Embolism was associated with disability or death.

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690. High Mortality and Over-representation of Young Women Amongst People Who Inject Drugs Admitted with Infective Endocarditis in Saskatchewan, Canada from 2013-2018.

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Session: P-32. Endocarditis

Background. The province of Saskatchewan has had the highest rates of HIV and Hepatitis C in Canada for over 10 years, the majority of which is related to People who inject drugs (PWID) and with higher proportion of young women. However, the most severe complications of injection drug use (IDU) are infective endocarditis (IE) and its associated sequelae. While high rates of IE have been noted, no data exists to show the burden of infective endocarditis and its clinical outcomes. Thus, we looked to determine the mortality and impact of IE amongst PWID and also establish the epidemiology while comparing to non-PWID IE.

Methods. This is a retrospective chart review of consecutive adult patients (age > 18) admitted for IE, as defined by Duke's IE Criteria, at tertiary care hospitals in Regina, the capital city of Saskatchewan, between January 1, 2013 and December 31, 2018. PWID were identified through chart documentation of self-reported IV drug use. Outcomes included 1-year mortality, surgical intervention and referral to addiction services.

Results. Of the total 227 patients in our cohort, 130 (57.3%) were female, and the 1-year mortality was 39.2%. PWID related IE comprised 132 (58.1%) of the cohort. In comparison to non-PWID related IE, PWID were younger (median age 38.0, compared to 68.0 for non-PWID), more likely to be female (RR 2.06; 95% CI [1.44-3.04]; p< 0.001), to suffer right-sided disease (RR 9.14; 95% CI [4.74-15.14]; p< 0.001) and less likely to receive surgical management (RR 0.30; 95% CI [0.27-0.77]; p< 0.001). Surgical management was associated with lower mortality (RR 0.40; 95% CI [0.11-0.65]; p< 0.001). Addiction support and treatment also was protective (RR 0.89; 95% CI [0.34-1.21]; p=0.051).

Conclusion. This cohort study of IE episodes shows for the first time the devastating impact of IDU in Saskatchewan and identifies PWID as having a 39% mortality at 1 year, which coupled with their younger age translates into an enormous years of life lost. Additionally, the over-representation of young women amongst PWID IE is consistent with the higher percentage of young women with HIV and HCV infections, and identifies them as a group that is particularly vulnerable to complications of IDU. Targeted programs for PWID, particularly towards young women at risk are urgently needed.

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691. Infective Endocarditis with an Indication for Cardiac Surgery in a Tertiary Care Educational Hospital: Does Cardiac Surgery Improve Outcomes?

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Background. In this retrospective cohort study, it was aimed to compare the clinical characteristics and outcomes of IE cases without and with an indication for cardiac surgery in terms of whether they have been operated or not, in a tertiary-care educational hospital.

Methods. Patients that were followed up for definite IE (diagnosed according to modified Duke criteria between March 2007 and November 2020) with an indication for cardiac surgery according to European Society of Cardiology Guidelines, comprised the study group. Subjects were evaluated in terms of whether these cases have been operated or not, demographic features, underlying diseases, risk factors, clinical and laboratory findings, therapy responses, complications, and mortality. The timing of surgery is defined as emergency; surgery performed within 24 hours, urgent; within a few days, elective; after at least one-two weeks of antibiotic therapy. Statistical analysis was performed via Chi square and Student T tests and a p value < 0.05 was considered significant.

Results. A total of 90 patients with an indication for surgery, 33.3% patients in underwent surgery, 66.6% patients in not underwent surgery group fulfilled the study criteria. The most frequently seen complaints in patients were fever (91.1%), cold-shiver (56.6%), weight-loss (27.7%), dyspnea (25.5%), and tachycardia (20%). Heart murmur was detected during cardiac auscultation of 44 patients. Mean blood leukocyte count, C-reactive protein and erythrocyte sedimentation rate were 12324 ± 6558/mm^3 (1408-30330), 11.46 ± 8.38 mg/dl (0.18-34.6) and 61.43 ± 33.4 mm/h (2-130), respectively. There was no significant difference between two groups in terms of cardiac/non-cardiac risk factors, age, gender, etiologic agents, laboratory findings, septic embolisms and complaints (Table 1). In total IE with an indication for surgery mortality was 27.7%. Mortality rate was significantly less and heart murmur was significantly higher in cases who underwent surgery than those did not undergo surgery (p: 0.0447).

Table 1. Comparison of basic characteristics of patients in the two operated / unoperated cohorts.

Variable		Underwent surgery (n=30)	Not underwent surgery (n=60)	p
Age	Mean+/-sd (years)	53.9+/-14.7	56.08+/-16.81	0.083
	Female	13	18	0.243
Cardiac risk factors	Rheumatic heart disease	2	2	0.598
	Congenital heart disease	3	3	0.396
	Heart valve replacement	5	17	0.301
	Pacemaker	2	3	1
Non-cardiac	Central IV lines	2	8	0.486
	Hemodialysis	2	8	0.486
	IV drug use	1	2	1
Complaints	Fever	26	56	0.433
	Weight-loss	11	14	0.216
	Dyspnea	9	14	0.609
	Tachycardia	5	13	0.780
Heart murmur		20	24	0.024
Laboratory findings (Mean+/-sd)	Blood leukocyte count	12620 +/-7417	12190 +/- 6229	0.772
	C-reactive protein	12.28 +/-8.3	11.12 +/-8.46	0.538
	Erythrocyte sedimentation rate	66 +/-31.1	59.3 +/- 34.6	0.373
Surgical indication	Heart failure	3 (10%)	0 (0%)	0.034
	Uncontrolled infection	11 (36.6%)	24 (40%)	0.821
	Prevention of embolism	16 (53.3%)	36 (60%)	0.651
Microorganism	Blood culture positive	23	50	0.568
	S.viridans	9	9	0.103
	S.aureus	7	13	1
	E.faecalis	3	6	1
	Fungi	1 (Aspergillus spp)	4 (One mold, 3 *C.albicans*)	0.260
Septic embolisms	Intracranial	4	5	0.474
	Splenic	1	5	0.658
	Pulmonary	0	3	0.548
	Renal	0	1	1
Mortality		4/30 (13.3%)	21/60 (35%)	0.0447

(IV= intravenous)

Conclusion. These data support the importance of the guidelines' criteria for cardiac surgery in the management of IE. Assuming that only 1/3 of the surgery needing cases received surgery, more interventions are needed to decrease the barriers against surgery.

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692. *Coccidioides sp.* Infective Endocarditis: A Review of the Literature

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Session: P-32. Endocarditis

Background. Despite the endemic nature of *Coccidioides* sp. to the American Southwest, the incidence *Coccidioides sp.* infective endocarditis (CIE) is rare. Following successful treatment of a patient with CIE at our institution, we reviewed the literature to identify trends in disease presentation, patient characteristics, and outcomes.

Methods. We reviewed all cases of CIE reported since 1938. Details including patient demographics, underlying immunodeficiency, time to diagnosis, treatment, and outcome were collected for analysis of diagnostic challenges and survival.

Results. Including ours, we identified 11 published cases of CIE. The majority (7) occurred in men. 5 patients were of either African American or Hispanic descent. Of the 10 patients with reported ages, the median age was 35.5 years (range 3 weeks – 61 years). 5 patients had a previous diagnosis of coccidioidomycosis and only 3 had an immunocompromising condition. These comprised pregnancy, heart transplant, and juvenile inflammatory arthritis. Three cases had multi-valvular involvement, but the majority affected the mitral (5) and the aortic (4) valves. Only 2 of the 11 cases involved a prosthetic valve. Of the 8 cases with reported blood cultures, only 2 were positive. Ten of the 11 cases had extra-cardiac disease. Complement fixation (CF) titers were heterogenous with a median of 1:32 and a range of 1:1 to 1:2048. There was no obvious correlation between a patient's CF titer and their survival. Average time to diagnosis was 3.5 months (range 2.5 – 36 months). Diagnosis was made post-mortem in 4 of the 11 cases. 6 patients (54%) did not survive. Notably, 2 of the fatal cases preceded the discovery of amphotericin B (1969) and 4 occurred prior to the discovery of fluconazole (1990). Of the five patients that survived, four required surgical intervention in addition to azole therapy.

Conclusion. CIE is a diagnostic and therapeutic challenge. The diagnosis itself is rare, culture incubation times are long, and the symptoms are often non-specific thus delaying definitive therapy. The introduction of azole therapy appears to have had significant impact on rates of survival. Despite this, successful management of CIE still requires concurrent surgical intervention with aggressive, indefinite anti-fungal therapy.

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693. Performance of ICD Code Versus Discharge Summary based Query for Endocarditis Cohort Identification

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Session: P-32. Endocarditis

Background. Studies on infective endocarditis (IE) have relied on International Classification of Diseases (ICD) codes to identify cases but few have validated this method which may be prone to misclassification. Examination of clinical narrative data could offer greater accuracy and richness.

Methods. We evaluated two algorithms for IE identification from 7/1/2015 to 7/31/2019: (1) a standard query of ICD codes for IE (ICD-9: 424.9, 424.91, 424.99, 421.0, 421.1, 421.9, 112.81, 036.42 and ICD-10: I38, I39, I33, I33.9, B37.6 and A39.51) with or without procedure codes for echocardiogram (93303-93356) and (2) a key word, pattern-based text query of discharge summaries (DS) that selected on the term "endocarditis" in fields headed by "Discharge Diagnosis" or "Admission Diagnosis" or similar. Further coding extracted the nature and type of valve and the organism responsible for the IE if present in DS. All identified cases were chart reviewed using pre-specified criteria for true IE. Positive predictive value (PPV) was calculated as the total number of verified cases over the algorithm-selected cases. Sensitivity was the total number of algorithm-matched cases over a final list of 166 independently identified true IE cases from ID and Cardiology services. Specificity was defined using 119 pre-adjudicated non-cases minus the number of algorithm-matched cases over 119.

Results. The ICD-based query identified 612 individuals from July 2015 to July 2019 who had a hospital billing code for infective endocarditis; of these, 534 also had an echocardiogram. The DS query identified 387 cases. PPV for the DS query was 84.5% (95% confidence interval [CI] 80.6%, 87.8%) compared with 72.4% (95% CI 68.7%, 75.8%) for ICD only and 75.8% (95% CI 72.0%, 79.3%) for ICD + echo queries. Sensitivity was 75.9% for the DS query and 86.8-93.4% for the ICD queries. Specificity was high for all queries >94%. The DS query also yielded valve data (prosthetic, tricuspid, pulmonic, aortic or mitral) in 60% and microbiologic data in 73% of identified cases with an accuracy of 94% and 90% respectively when assessed by chart review.

Table 1. Test Characteristics of Three Electronic Health Record Queries for Infective Endocarditis

	Positive Predictive Value 95% CI	Sensitivity 95% CI	Specificity 95% CI
ICD code only	**72.4%** (443/612) 68.7%, 75.8%	**93.4%** (155/166) 88.5%, 96.3%	**94.1%** (112/119) 88.4%, 97.1%
ICD code + ECHO	**75.8%** (405/534) 72.0%, 79.3%	**86.8%** (144/166) 80.8%, 91.1%	**94.1%** (112/119) 88.4%, 97.1%
Discharge Summary	**84.5%** (327/387) 80.6%, 87.8%	**75.9%** (126/166) 68.9%, 81.8%	**98.3%** (117/119) 94.1%, 99.5%

CI, confidence interval.

Conclusion. Compared to traditional ICD-based queries, text-based queries of discharge summaries have the potential to improve precision of IE case ascertainment and extract key clinical variables.

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694. Prediction Tool for Infective Endocarditis in Beta-hemolytic Streptococcal Bacteremia

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Session: P-32. Endocarditis

Background. Although beta-hemolytic streptococci (BHS) is a rare causative pathogen of infective endocarditis (IE), IE is a serious condition and it is important to predict IE in BHS bacteremia (BHS-IE). The purpose of this study was to develop a predictive score for BHS-IE.

Methods. We conducted a retrospective study comparing the clinical features of BHS-IE and BHS-non infective endocarditis (BHS-nIE) in adult patients with BHS bacteremia at a 520-bed tertiary hospital in Tokyo, Japan from 2004 to 2020. IE was diagnosed according to modified Duke's criteria, and both "Definite" and "Possible" were included. Univariate and multivariable analyses were conducted using logistic regression.

Results. Among 250 patients with BHS bacteremia, 47 (19%) were diagnosed with BHS-IE. The median (IQR) patient age was 71 (59, 84) years and 121 (68%) were male. The proportions of A, B, C/G groups were 14%, 38.4%, and 47.6%, respectively. Five predictors, either independently associated with BHS-IE or clinically relevant, were used to develop the prediction score: C-reactive protein ≥ 10 mg/dl (2 points); Group B Streptococci (1 point); Auscultation of heart murmur (1 point); Platelet count < 150 /μl (1 point); and Hypotension (systolic blood pressure < 90 mmHg or on vasopressor) (1 point). In a receiver operating characteristic analysis, the area under the curve was