113. Understanding the Changes in Infective Endocarditis Admission in Pennsylvania During the Opioid Crisis

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Background. Nationwide, there has been a rise in cases of infective endocarditis (IE) correlating with the rise of the opioid crisis. Pennsylvania (PA) has the third highest rate of drug overdose deaths in the country, with Allegheny and Philadelphia counties having the highest rates in the country. With this study, we evaluated how IE has changed in the face of the opioid crisis with respect to the population impacted and associated healthcare utilization in PA.

Methods. We performed a retrospective cohort study of all adults admitted to an acute care hospital in PA between January 2013 and March 2017 with a diagnosis of IE. Patients were identified through the Pennsylvania Health Care Cost Containment Council (PHC4) via billing codes. Exposed patients were those with drug use-associated IE (DU-IE); the unexposed group was those with non-DU-IE. We determined the number of admissions and geographical distribution of IE and DU-IE in the state. We then assessed for differences in hepatitis C (HCV) and HIV serostatus, length of stay (LOS), insurance status, total hospital charges, and rates of valve surgery between the two groups.

Results. There were 17,224 admissions for IE in PA during the study period, of which 11.2% were DU-IE. In Allegheny and Philadelphia counties, 14.4% and 20.5% were from DU-IE, respectively. DU-IE cases increased from 6% in 2013 to 17% in 2017, $P < 0.001$. We found several significant differences between the DU-IE and non-DU-IE groups: DU-IE group was younger (median 33 vs. 69 years old, $P < 0.001$); the LOS was longer in the DU-IE group (10 vs. 7 days, $P < 0.001$); the percentage of patients leaving Against Medical Advice was higher in DU-IE group (15.7% vs. to 1.1%, $P < 0.001$); a higher proportion of the DU-IE group were HCV and HIV seropositive (27.1% vs. 3.3% for HCV, 2.4% vs. 0.74% for HIV, $P < 0.001$). See figures for complete results.

Conclusion. Pennsylvania had an increase in the number of IE cases over the last 4 years, driven by the opioid crisis, with Philadelphia and Alleghany counties being the most impacted areas. While this study is limited by the use of claims data, it demonstrates the downstream effects of the opioid crisis on the patient population at risk and the healthcare system due to longer and costlier hospital stays. This study supports the need for innovative and integrative care models to support them.

Table 1: Demographics

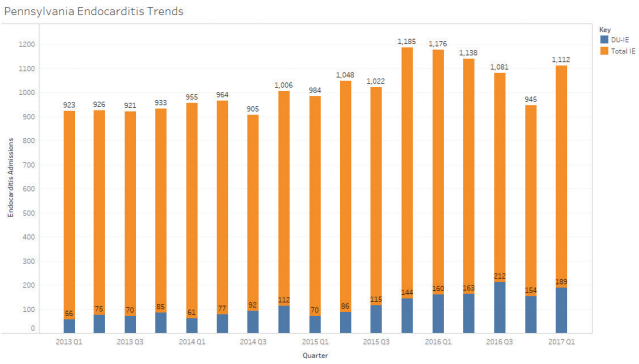
Characteristic	Non-DU-IE (n= 15,303)	DU-IE (n= 1,921)	P value
Median age (IQR)	69 (56 - 80)	33 (27 - 45)	P < 0.001
Gender- Female (n, %)	6,737 (44%)	909 (47.3%)	P < 0.001
Race (n, %)			
White	12747 (83.3%)	1573 (81.9%	P < 0.001
Black	1780 (11.6%	180 (9.4%	
Asian	101 (0.7%)	2 (0.1%)	
American Indian	12 (0.08%)	0 (0%	
Biracial	12 (0.08%)	4 (0.2%)	
Other	243 (1.6%	87 (4.5%)	
Unknown	236 (1.5%)	75 (3.9%)	
Ethnicity (n, %)			
Hispanic	280 (1.8%)	97 (5.05%)	P < 0.001
Non-Hispanic	15,016 (98.2%)	1824 (95%)	
Insurance (n, %)			
Medicare	10,020 (65.5%)	218 (11.4%)	P < 0.001
Medicaid	2,043 (13.4%)	1,312 (68.3%)	
Commercial	2,898 (19%)	290 (15.1%)	
Unknown	72 (0.47%)	12 (0.6%)	
Uninsured	143 (0.9%)	70 (3.7%)	
HIV positive (n, %)	114 (0.7%)	46)2.4%)	P < 0.001
Hepatitits C seropositive (n, %)	503 (3.3%)	521 (27.1%)	P < 0.001
Congenital Heart Disease (n, %)	1,994 (13%)	237 (12.3%)	P = 0.394
Hypertension (n, %)	2,740 (18%)	83 (4.32%)	P < 0.001
Coronary Artery Disease (n, %)	10,947 (71.5%)	1,486 (77.4%)	P < 0.001
Prosthethic Valve (n, %)	1,140 (7.5%)	105 (5.5%)	P = 0.02
Pacemaker (n, %)	21 (0.14%)	0 (0%)	P = 0.104

Table 2: Outcomes

Outcomes	Non-DU-IE (N 15,303)	DU-IE (N1,921)	P value
Median Charges $ (IQR)	66,802 (30,880 - 162,498)	86,622 (37,894 - 210,258)	P < 0.001
Median Length of Stay, days (IQR)	7 (4 - 13)	10 (4 - 21)	P < 0.001
Discharge Status (n, %)			
In-hospital mortality	1,307 (8.5%	87 (4.5%)	P < 0.001
SNF/Facilities	6659 (43.5%)	744 (38.8%)	
Home with services	3,237 (21.2%)	168 (8.8%)	
Home	3,094 (20.2%)	518 (27%)	
AMA	162 (1.1%)	302 (15.7%)	
Valve Replacement (n, %)	1,255 (8.2%)	217 (11.3%)	P < 0.001
Multiple valve	854 (68%)	117 (53.9%)	P = 0.361
Tricuspid	65 (5.2%))	66 (30.4%)	P < 0.001
Pulmonic	18 (1.4%)	3 (1.4%)	P = 0.648
Mitral	670 (53.4%)	78 (35.9%)	P = 0.519
Aortic	602 (48%)	86 (39.6%)	P = 0.252
Unspecificied	825 (68%)	112 (51.6%)	P = 0.424

Table 3: County level Characteristics

Characteristic	Philadelphia DU-IE (N=451)	Alleghany DU-IE (N=283)
Median age (IQR)	34 (29 - 47)	34 (20 - 46)
Gender- Female (n, %)	206 (45.7%)	158 (55.8%)
Race (n, %)		
White	294 (65.2%)	239 (84.5%)
Black	87 (19.3%)	38 (13.4%)
Asian	0 (0%)	1 (0.35%)
American Indian	0 (0%)	0 (0.%)
Biracial	0 (0%)	0 (0.%)
Other	52 (11.5%)	0 (0.%)
Unknown	18 (4%)	5 (1.8%)
Ethnicity (n, %)		
Hispanic	34 (7.5%)	0 (0%)
Non-Hispanic	417 (92.5%)	283 (100%)
Insurance (n, %)		
Medicare	46 (10.2%)	39 (13.8%)
Medicaid	375 (83.2%)	186 (65.7%)
Commercial	18 (4%)	38 (13.4%)
Unknown	1 (0.2%)	2 (0.7%)
Uninsured	10 (2.2%)	18 (6.4%)
HIV positive (n, %)	23 (5.1%)	4 (1.4%)
Hepatitits C seropositive (n, %)	155 (34.4%)	70 (24.7%)
Median Charges $ (IQR)	108,528 (43895 - 252086)	89,997, (39,528 - F26211,734)
Median Length of Stay, days (IQR)	12 (5 - 21)	11 (4 - 23)
Discharge Status (n, %)		
In-hospital mortality	16 (3.6%)	11 (3.9%)
SNF/Facilities	177 (39.2%)	121 (42.8%)
Home with services	25 (5.5%)	26 (9.2%)
Home	115 (25.5%)	61 (21.6%)
AMA	92 (20.4%)	56 (19.8%)
Valve Replacement (n, %)	33 (7.3%)	43 (15.2%
Multiple valve	21 (63.6%)	25 (58%)
Tricuspid	15 (45.5%)	16 (37.2%)
Pulmonic	1 (3.03%)	0 (0.%)
Mitral	9 (27.3%)	17 (39.5%)
Aortic	12 (36.4%)	16 (37.2%)
Unspecificied	19 (57.6%)	22 (51.2%)



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114. Chorioretinal Lesions in Persons Who Inject Drugs and Are Hospitalized with Bloodstream and Related Infections

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Background. Eye infection is one of the many potential sites of infection in persons who inject drugs (PWID). The purpose of this study was to determine the prevalence of chorioretinal (CR) lesions, identify causative organisms, and correlate symptoms with ophthalmic involvement in PWID hospitalized with bloodstream infection (BSI) and/or related metastatic foci of infection (MFI).

Methods. Actively using PWID 18 years or older admitted to Wake Forest Baptist Med Ctr with documented BSI or MFI related to injection drug use (IDU) were prospectively enrolled after providing informed consent. All patients, whether or not they had eye symptoms, received a dilated retinal examination as soon as feasible after admission. Ocular symptoms, visual acuity, and ocular examination findings were recorded and fundus photos were obtained as indicated. Patients could be re-enrolled if re-admitted with a different infection.

Results. Fifty-three PWID with 55 episodes of disseminated infection related to IDU underwent ophthalmic exams at a median of 7 days post-admission. Mean age was 33.4 years and 51% were female. Twenty (38%) patients had HCV viremia but none had active HIV infection. Heroin was the injection drug of choice in 55% of patients. Of the 55 episodes of systemic infection, 33 were classified as infective endocarditis (IE), 6 were BSI only, 10 were BSI with MFI, and 5 were MFI without active BSI. Nine (17%) patients had CR involvement on examination but only 33% (3/9) were

symptomatic. Of those with ocular involvement, 1 had fungal endophthalmitis due to *Candida albicans*. Single or multifocal subretinal infiltrates were found in 5/9 patients (MSSA 2, MRSA 2, *H. parainfluenzae* 1), 2/9 had cotton wool spots (*S. mitis* 1, MRSA 1), and 7/9 had intraretinal or white-centered hemorrhages (MSSA 3, MRSA 2, *S. mitis* 1, *H. parainfluenzae* 1). Of the 9 patients with CR lesions, 7 had IE. Interestingly, 3.8% (3/53) had old multifocal CR scars, possibly related to prior disseminated infection.

Conclusion. PWID admitted with BSI or MFI may have ophthalmic involvement even in the absence of ocular symptoms, especially in the setting of IE. Further study is needed to characterize the epidemiology of these infections, to identify risk factors for ocular involvement, and to optimize diagnosis and management.

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115. Evaluation of the Clinical Impact of the T2MR for the Diagnosis of Bloodstream Infections

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Background. The EK-189 study evaluates the clinical impact of T2 magnetic resonance (T2MR) for rapid detection of bloodstream infections (BSI) caused by ESKAPE-pathogens (Enterococcus faecium, Staphylococcus aureus, Klebsiella pneumoniae, Acinetobacter baumanii, Pseudomonas aeruginosa, and Escherichia coli) compared with blood culture (BC). Here we present preliminary results from this ongoing study.

Methods. Patients newly admitted to an infectious diseases department with suspected blood stream infection with ESKAPE pathogens (based on predefined criteria) are included and randomized into BSI diagnosis with (a) T2MR and blood culture or (b) blood culture alone. Routine diagnostic workup including chest X-ray, complete laboratory workup (including blood count, C-reactive protein, interleukin-6) is performed in all patients. Antibiotic regimens are selected empirically based on suspected pathogens and are switched to targeted therapy at the discretion of the treating physician once a pathogen is detected. Outcome parameters include time to targeted (predefined) antibiotic therapy and time to discharge. Test characteristics of the T2MR compared with BC are also assessed.

Results. So far 44 patients were included (22 in each group). In 9/22 patients (41%) in the T2MR-group a pathogen was detected (4 *Escherichia coli*, 2 *Klebsiella pneumoniae*, 1 *Staphylococcus aureus*, 1 *Pseudomonas aeruginosa* and 1 *Acinetobacter baumanii*) and in 3/22 (14%) patients in the BC-group (all *E. coli*). The comparison of T2MR vs. BC is depicted in Table 1. Sensitivity and specificity of T2MR in comparison to BC were 100% and 64.7%. All positive results in T2MR were considered true positive results. The days until clinical improvement, the need for admission at ICU and the in-hospital mortality were similar in both groups.

Conclusion. The results from this preliminary analysis show that in patients with suspected BSI with ESKAPE pathogens, T2MR detects more pathogens than BC and potentially provides a quicker detection and shorter time to targeted therapy. Further analyses of this ongoing study with a larger sample size are needed to evaluate the impact of the use of T2MR on patient's outcome

	T2MR (n=22)	BC (n=22)	p-value
Any pathogen detected	9 (41%)	3 (14%)	
Time admission to positive result (median hours, range)	6.9 (6.34.0-14.3)	66.2 (67.7,46.1-85.5)	0.01
Change of antibiotic therapy	2 (9%)	2 (9%)	
Time admission to targeted antibiotic therapy (median hours, range)	6.6 (6.6,6.4-6.7)	77.7 77.7 (62.3-93.1)	
Time admission to discharge (median days, range, standard deviation)	10.6 (10, 3-24)	13 (10.5, 3-28)	0.85

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116. Risk Factors and Clinical Outcomes of Carbapenem Non-Susceptible Gram-Negative Bacteremia in Patients with Acute Myelogenous Leukemia

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Background. Early administration of susceptible antibiotics is crucial in Gram-negative bacteremia (GNB), especially in immunocompromised patients. We aimed to explore risk factors and clinical outcomes of carbapenem non-susceptible (Carba-NS) GNB in patients with acute myelogenous leukemia (AML).

Methods. Cases of all GNB during induction or consolidation chemotherapy for AML in a 15-year period in a tertiary hospital were retrospectively reviewed. Independent risk factors for Carba-NS GNB were sought and its clinical outcomes were compared with those of carbapenem susceptible (Carba-S) GNB.

Results. Among 485 GNB cases from 930 patients, 440 (91%) were Carba-S and 45 (9%) were Carba-NS GNB. Frequent Carba-NS isolates were *Stenotrophomonas maltophilia* (n = 23), *Pseudomonas aeruginosa* (n = 11), and *Acinetobacter baumannii* (n = 10). Independent risk factors for Carba-NS GNB were carbapenem use at the onset of GNB (aOR [95% CI], 78.6 [24.4–252.8]; $P < 0.001$), the isolation of imipenem-resistant *A. baumannii* in the prior 1 year (aOR [95% CI], 14.6 [2.7–79.9]; $P = 0.002$), time interval from chemotherapy to GNB ≥20 days (aOR [95% CI], 4.7 [1.7–13.1]; $P = 0.003$), and length of hospital stay ≥30 days (aOR [95% CI], 3.4 [1.3–9.1]; $P = 0.013$). Except breakthrough GNBs which occurred during carbapenem treatment, the frequency of Carba-NS GNB was 48% (19/40) in cases having ≥2 risk factors other than carbapenem use. 30-day overall mortality (Carba-NS, 36% vs. Carba-S, 6%; $P < 0.001$) and in-hospital mortality (Carba-NS, 47% vs. Carba-S, 9%; $P < 0.001$) were significantly higher in Carba-NS GNB.

Conclusion. Carba-NS GNB in AML patients was independently associated with the use of carbapenem, the past isolation of resistant organism, and late onset of GNB, and its clinical outcomes were poorer than those of Carba-S GNB. Carba-NS organisms should be considered for antibiotic selection in AML patients having these risk factors.

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117. Hospitalized Burn Patients with Fever and Leukocytosis: Blood Culture or Not?

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Background. Fever and leukocytosis are very common in patients with burn injury. Many patients had to do blood cultures frequently during their hospitalization given the concern of bacteremia. We opt to utilize the clinical characters of the patients to evaluate the risk for bacteremia and avoid unnecessary blood culture.

Methods. The adult patients (≥18 years) with burn injury were selected from the Nationwide Inpatient Sample database (2005–2014). Using ICD-9 codes, we further identified bacteremia, total body surface area (TBSA) of burn, inhalation injury, pneumonia, urinary tract infection, wound infection, escharotomy, placement of central venous line, indwelling urinary catheter, gastrostomy tube (G-tube), intubation, and total parenteral nutrition (TPN). The risk factors for bacteremia were evaluated by Logistic regression. A risk-adjusted model to predict the occurrence of bacteremia was developed by discriminant analysis.

Results. In total, 241,323 hospitalized patients with burn injury were identified. The incidence of bacteremia was 1.1% (n = 2,634). Comparing with the patients without bacteremia, those with bacteremia were older (51.1 vs. 46.7 year old, $P < 0.001$), had more severe burn injury (50.7% vs. 12% with burn TBSA over 20%, $P < 0.001$) and comorbidities (22.7% vs. 14.9% with Charlson index ≥2, $P < 0.001$), higher in-hospital mortality (5.6% vs. 3.7%, $P < 0.001$), longer hospital stay (26 vs. 5 days, $P < 0.001$) and more hospital charges ($206,028 vs. $30,339, $P < 0.001$). When the age, sex, race, and Charlson index of the patients were adjusted by Logistic regression, it was found that the factors of inhalation injury (OR = 1.25, 95% CI 1.03–1.51), intubation (OR = 1.62, 95% CI 1.44–1.82), TPN (OR = 1.56, 95% CI 1.16–2.11), placement of central venous line (OR = 1.86, 95% 1.57–2.01), and G-tube (OR = 2.04, 95% CI 1.60–2.60) were associated with increased risk for bacteremia. A risk-adjusted model composed of the patient's age, Charlson index, burn TBSA, inhalation injury, intubation, TPN, placement of central venous line, and G-tube could predict the occurrence of bacteremia with an accurate rate of 85.4% (Table 1).

Conclusion. The risk factors and risk-adjusted model for bacteremia may assist to decide whether a blood culture is needed in the hospitalized burn patients.

Table 1 Risk-adjusted model for predicting bacteremia of hospitalized burn patients

Factors	Functions *
Age† (X_1) Charlson index† (X_2) Burn TBSA†† (X_3) Inhalation injury††† (X_4) Central venous line††† (X_5) Intubation††† (X_6) Total parenteral nutrition††† (X_7) Gastrostomy tube††† (X_8)	Bacteremia= $0.154 \times X_1 - 0.14 \times X_2 + 0.98 \times X_3 + 0.669 \times X_4 + 2.307 \times X_5 + 1.322 \times X_6 + 1.083 \times X_7 + 1.239 \times X_8 - 5.75$ No bacteremia= $0.149 \times X_1 - 0.328 \times X_2 + 0.336 \times X_3 + 0.108 \times X_4 + 0.144 \times X_5 + 0.023 \times X_6 - 0.596 \times X_7 - 1.046 \times X_8 - 4.193$

†The age and Charlson index are the actual values of the patient.
†† TBSA: Total body surface area. The values assigned to burn TBSA include "less than 10% = 0", "11%~20% =1 ", "21%~30%=2", "31%~40%=3", "41%~50%=4", "51%~60%=5", "61%~70%=6", "71%~80%=7", "81%~90%=8" and "over 90%=9".
††† Occurrence the risk factor is assigned a value of "1", whereas nonoccurrence is assigned as "0".
*The predictive model included 2 functions corresponding to a "bacteremia" discriminant score and a "no bacteremia" discriminant score, respectively. Both functions should be used simultaneously to predict whether the bacteremia occurs or not. The occurrence of bacteremia or not predicted by the model is determined by which function is found to have a higher discriminant score.

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