chart review, we established that in fact 86 of these 163 cases (52.8%) had evidence of substance abuse.

Conclusion. Misclassification due to use of ICD codes is a well-established challenge to epidemiological research. However, the extent of misclassification in this analysis was greater than expected. If prior research on IDU and infective endocarditis has relied on medical record data alone without verification through manual chart review, the observed epidemiological trends may not be accurate.

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198. Chart Validation of an Algorithm for Identifying Patients with Intravenous Drug Use-Associated Endocarditis Using Administrative Code Data

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Background. Studies using administrative data have described increasing rates of intravenous drug use (IVDU)-associated infective endocarditis (IE) in the United States. These studies used International Classification of Disease (ICD) diagnosis codes to identify hospitalized patients with IE and any illicit drug use (i.e., opioid, amphetamine, cocaine or sedative), but were hindered by absence of specific ICD codes for IVDU. We reviewed charts to determine the positive predictive value (PPV) of ICD codes for identifying patients with IE and IVDU.

Methods. We examined national Veterans Affairs (VA) administrative data from January 2010 to December 2017 to identify patients hospitalized for a first episode of potential IVDU-associated IE based on inpatient ICD 9 and 10 codes for both IE and any illicit drug use, the algorithm used to identify IVDU-IE in most prior studies. We randomly selected 100 of these patients nationally and reviewed hospital charts to confirm clinical documentation of: (1) IE, (2) any illicit drug use, and (3) current or past IVDU.

Results. We identified 340 patients with concurrent ICD codes for IE and drug use, increasing from 28 in 2010 to 51 in 2017 (82% increase). In chart review of 100 randomly selected patients, the PPV of ICD codes was 93% (95% CI 88–98%) for a documented clinical diagnosis of IE; 96% (95% CI 92–100%) for documented drug use by any route; and 63% (95% CI 53–73%) for documented IVDU. Among the 37% of patients without clinically documented IVDU, 30% (i.e.,11% of total patients) had clinical documentation stating that drug use was only by non-IV routes, 59% (22% of total) had documented drug use without mention of route of use, and 11% (4% of total) had clinical documentation that patients denied any drug use.

Conclusion. The incidence of first hospitalization for IE among patients with ICD codes for drug use increased by 82% from 2010 to 2017 in VA care. Concurrent ICD codes for illicit drug use had moderate PPV for identifying IVDU in setting of IE, largely due to identification of patients using drugs without documented intravenous use. There is a need to develop more accurate case-finding algorithms for identifying patients with IVDU-associated endocarditis, for both epidemiologic surveillance and quality improvement applications.

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199. Infections in VADers: A True Villain of the Force

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Background. Ventricular assist devices (VADs) are increasingly used for the management of end-stage heart failure, but infection is a complication that has not been thoroughly studied. The purpose of our study was to compare patients who had surgical debridement vs. medical therapy alone for VAD-related/specific infections.

Methods. We performed a retrospective chart review on patients at Duke University Hospital (DUH) from 2015 to 2017. Patients with VAD-related/specific infections were included, per 2011 ISHLT definitions. We reviewed electronic medical records for demographics, VAD implantation data, infectious episodes, surgical debridements and mortality. Descriptive statistics compared patients with and without debridement and compared with and without relapse.

Results. We found 94 infections in 72 patients. Descriptive statistics of the cohort and comparisons with and without debridement can be seen in Table 1. Sixty-one cases (65%) included debridement and 5 (5%) required pump exchange. Notably, patients with fever or bacteremia were more likely to undergo debridement. Of the patients that had a preoperative CT, sensitivity for deep infection (pump, pocket, or deep to the muscle) was 38%, yet specificity was 95%. For superficial infections (involving the driveline or superficial to the muscle), preoperative CT sensitivity was 95%; specificity 65%. Table 2 shows intraoperative culture data. When the preoperative driveline culture grew Staphylococcus species or *Pseudomonas aeruginosa* there was strong correlation with intraoperative organism (matched in >75% of cases). Table 3 compares treatments among patients with and without infective relapse. Relapse rate appeared the same if patients received 2, 4, or ≥6 weeks of intravenous antibiotics.

Conclusion. We present a large single-center cohort [DCWM1] examining VAD-related/-specific infections. While patients chosen for debridement may be sicker, these patients had a longer hospital stay and relapsed more often. Preoperative CT should be used with caution as it underestimates the extent of disease. However, preoperative driveline cultures correlated strongly with intraoperative cultures for most common pathogens. There was no association between initial intravenous therapy duration and infection relapse.

Table 1. demographic characteristics of total cohort and comparisons among patients who underwent debridement for treatment of infection and patients who did not undergo debridement for treatment of infection

Characteristic	Debridement (N=61) N (%)	No debridement (N=33) N (%)	p-value
Age (mean, std)	58.2 (12.1)	56.0 (15.7)	0.48*
Female	18 (29.5)	10 (30.3)	0.94†
BMI (IQR 25-75)	31 (27-40)	33 (26-41.5)	0.45‡
Etiology			0.13†
Ischemic	22 (36.1)	18 (54.6)	
Non-ischemic	39 (72.2)	15 (45.4)	
Device Type			0.02†
Heartware	9 (14.75)	1 (3.03)	
HM2	49 (80.33)	31 (93.94)	
HM3	3 (4.92)	1 (3.03)	
Diabetes	27 (44.3)	16 (48.5)	0.69†
Hypertension	55 (90.2)	30 (90.9)	0.91†
COPD	18 (29.5)	6 (18.2)	0.32†
Prior sternotomy	25 (41.0)	14 (42.4)	0.89†
Prior valve replacement	19 (31.2)	9 (27.3)	0.81†
Days from LVAD until infection (median, Q25-Q75)	528 (245-903)	551 (300-1,082)	0.25‡
VAD-specific infections			
Pump	3 (5.4%)		
Pocket	2 (3.6%)		
Driveline	48 (85.7%)		
VAD-related infections	9 (14.8%)	4 (12.1%)	0.08*
Fever at diagnosis	21 (34.4)	3 (9.1)	0.007†
Mortality (only out of 72 unique patients)	25 (50%)	11 (42.3%)	0.31†
Hospital LOS (days)	11 (8-17)	4 (1-14)	0.0007‡
Number of admits within 6 months	0 (0-1)	0 (1-0)	0.41‡
Relapse	41 (67.2%)	15 (26.8%)	0.04‡

*unpaired T-test, † Fisher's exact test, ‡ Wilcoxon rank-sum test

Table 2. Organisms found intraoperatively and the number of organisms found preoperatively that are the same as the intraoperative cultures

Intraoperative Culture Organism		Preoperative Cultures that identify the same Organism as Intraoperative Cultures
MSSA	22 (36%)	17 (77.3%)
MRSA	6 (10%)	6 (100%)
CoNS	4 (7%)	3 (75%)
Pseudomonas aeruginosa	6 (10%)	5 (83%)
Non-Pseudomonal GNR's	5 (8%)	
Other (fungi, mycobacterium)	4 (7%)	
Polymicrobial	6 (10%)	
No Culture Done	2 (3%)	
Negative	6 (10%)	

*A total of 38 preoperative cultures identified the same organism as the intraoperative cultures

Table 3. Comparing treatment and cultures in patients who suffered an infection relapse

Treatment	Relapse (N=56)	No Relapse (N=38)	p-value
Debrided	41 (73.2%)	20 (52.6%)	0.04*
Debrided + Pre-hospital antibiotics	18 (43.9%)	6 (30.0%)	0.4*
Debrided + IV antibiotics			0.23*
2 weeks	1 (2.4%)	3 (15.0%)	
4 weeks	8 (19.5%)	3 (15.0%)	
≥6 weeks	32 (78.1%)	14 (70%)	
Oral long-term suppressive antibiotics	32 (57.1%)	9 (23.7%)	0.001*
Intraoperative Culture			0.19*
MSSA	15 (26.8%)	7 (18.4%)	
MRSA	5 (8.9%)	1 (2.6%)	
Coagulase negative staphylococcus species	3 (5.4%)	1 (2.6%)	
Pseudomonas	3 (5.4%)	3 (7.9%)	

*Fisher's exact Test

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200. Real-World Experience with Dalbavancin for Complicated Gram-Positive Infections: A Multicenter Evaluation

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Background. Dalbavancin (DAL) received Food and Drug Administration (FDA) approval for the treatment of acute bacterial skin and skin structure infections (ABSSSI) caused by Gram-positive organisms including Methicillin-resistant *Staphylococcus aureus* (MRSA). Due to its unique activity and dosing schedule, use in non-FDA approved indications has been increasing. We evaluated the clinical and safety outcomes of patients treated with DAL for various infections.

Methods. A multicenter, retrospective observational study was conducted from April 2017 to February 2019. We included adult patients who received 1 dose of DAL for any indication. The primary outcome was clinical success defined as 30-day survival from DAL initiation, resolution of signs and symptoms of infection, and absence of therapy escalation/change. Reasons for DAL therapy selection were also investigated.

Results. A total of 30 patients were included. The median age was 49 (35–58) years, 50% were female and 93.3% were Caucasian. Median APACHE II score was 9 (5–12). Persons who inject drugs (PWID) comprised 50%. Common DAL indications were bacteremia (53.3%), bone and joint infections (33.3%) and ABSSSI (26.7%). Pathogens were MRSA (43.3%), coagulase-negative Staphylococci (23.3%) and methicillin-susceptible *S. aureus* (MSSA) (13.3%). Previous antibiotics were administered in 93.3% of patients for a median of 9 (7–15) days and (13.3%) received combination antibiotic therapy with DAL. In a subgroup of patients with confirmed microbiological eradication (73.3%), DAL was initiated at a median of 8 days (4–14) after clearance. Clinical success was achieved in 80% of patients and 10% were de-escalated to oral therapy. Rash/pruritus and hypotension occurred in two and one patient, respectively. DAL was selected because of ease of administration (60%), inability to be discharged with a line (43.3%), poor candidacy for outpatient therapy (36.7%), and/or inadequate adherence (30%).

Conclusion. DAL appears to be well tolerated and results in high clinical success. Larger studies with longer follow would be valuable to more precisely define the role of DAL in complicated Gram-positive infections, particularly in comparison to other long-acting lipoglycopeptides.

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201. Safety and Effectiveness of Daily vs. Every Other Day Dosing of Daptomycin in Patients with Renal Insufficiency

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Background. Daptomycin administered at 48-hour (q48h) intervals is recommended in patients with renal impairment. Our institution utilizes daily dosing (q24h) of daptomycin in patients with renal impairment to theoretically optimize the area under the curve (AUC) in each 24-hour interval. However, the safety and effectiveness of this approach are unknown.

Methods. This retrospective descriptive analysis evaluated outcomes of comparable daptomycin dosing schemes administered q24h vs. q48h in patients with renal impairment (estimated creatinine clearance < 30 mL/minute). Inpatient adults ≥18 years old were included if they had at least one creatinine phosphokinase (CPK) obtained during admission and received either a q24h or q48h renally-adjusted daptomycin dose from May 2014 through December 2018. High-dose daptomycin therapy was defined as >3 mg/kg q24h or >6 mg/kg q48h. The primary outcome was difference in CPK elevations in the q24h vs. q48h dosing groups. Secondary outcomes included clinical and microbiological response, mortality, and hospital length of stay.

Results. Thirty-seven patients met inclusion criteria [23 (62%) q24h vs. 14 (38%) q48h]. Median treatment duration was 5 (7 vs. 4) days. Twenty-two (59%) patients had enterococcal infections [17 (73%) q24h vs. 5 (35%) q48h]. Twenty-two (59%) patients received high-dose daptomycin therapy [18 (82%) vs. 4 (18%)]. Nine patients [7 (19%) vs. 2 (5%)] received a statin during daptomycin therapy. One (3%) patient developed a CPK elevation (statin and q24h group). No daptomycin dose was discontinued due to CPK elevation, or rhabdomyolysis. Median hospital length of stay was 10 days in both dosing groups. Clinical response [9 (64%) vs. 16 (69%)] and microbiological response [9 (64%) vs. 15 (65%)] were similar between the two dosing groups. However, 30-day mortality [5 (35%) vs. 4 (17%)] and 90-day mortality [6 (42%) vs. 5 (21%)] were higher in the q48h dosing group. The difference in effectiveness outcomes was greatest in the subset of patients with enterococcal infections (Table 1).

Conclusion. A daily daptomycin dosing strategy in patients with renal insufficiency was well tolerated and may be associated with improved effectiveness outcomes, particularly for enterococcal infections. Additional investigations of this approach are warranted.

Table 1: Effectiveness outcomes for patients with enterococcal infections receiving high-dose daptomycin

	4-8 mg/kg q24h (n = 14)	7-10 mg/kg q48h (n = 3)
Clinical response – n (%)	9 (64)	0
Microbiological response – n (%)	8 (57)	0
30-day mortality – n (%)	3 (21)	2 (67)
90-day mortality – n (%)	4 (29)	3 (100)

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202. The effectiveness of combination therapy of anti-methicillin-resistant Staphylococcus aureus agents and β-lactam agents in patients complicated with febrile neutropenia after bone marrow transplantation

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Background. Febrile neutropenia (FN) is one of the most frequent and serious complications of hematopoietic stem cell transplantation such as bone marrow transplantation (BMT). Anti-Pseudomonas agents should be initiated in all patients complicated with FN without delay, while anti–methicillin-resistant Staphylococcus aureus (MRSA) agents are exclusively recommended in the case of central venous (CV) line infection. Most BMT patients have the potential risk of catheter-related blood stream infection because of long-lasting catheterization including indwelling CV line. Therefore, the patients may also be received anti-MRSA agents empirically in addition to anti-Pseudomonas agents. So far, there are little reports that verify the effectiveness of the combination therapy under FN condition after BMT. The purpose of this study was to address the effectiveness.

Methods. BMT was performed at Yokohama City University Medical Center between April 2012 and March 2018, and 44 patients who developed FN after BMT were enrolled. We analyzed patient information retrospectively. We used the duration of fever to evaluate the additive effect of anti-MRSA agents to β-lactam anti-Pseudomonas agents. We classified the patients during FN period into two groups whether anti-MRSA agents were administered (Ad group; 34 patients) or not (non-Ad group; 10 patients). Fever is defined as a single axillary temperature measurement of over 37.5 Celsius degrees. The study design and protocol were approved by the ethics committee at the Review Board of our hospital (ID：D1602011).

Results. Baseline characteristics were similar between the two groups. Blood cultures were performed onset of FN in all cases, in which five showed positive (11.4%). Bacteria requiring administration of anti-MRSA drugs were detected in the four cases. Nonetheless, duration of fever was not significantly shorten (6.8 ± 4.0 vs. 5.2 ± 2.5, $P = 0.171$) and there was no difference in the hospitalization period. The renal dysfunction was significantly higher in Ad group and the cost of anti-MRSA agents totaled about $ 36,000.

Conclusion. Our study indicates that no use of empirical combination therapy of anti-MRSA agents in addition to anti-Pseudomonas agents under FN condition after BMT, even if CV line is inserted.

		all (n=44)	Ad (n=34)	non Ad (n=10)	p value
Age		47.4±12.3	48.3±11.2	44.5±15.9	0.674
Gender, Male		31 (70.5)	24 (68.6)	7 (70.0)	1
PS					0.548
	0	41 (93.2)	32(94.1)	9 (90.0)	
	1	3 (6.8)	2 (5.9)	1 (10.0)	
Diagnosis					0.306
	Acute myeloid leukemia	14 (31.8)	12 (35.3)	2 (20.0)	
	Acute lymphoblastic leukemia	7 (15.9)	6 (17.6)	1 (10.0)	
	Non−Hodgkin lymphoma	1 (2.3)	1 (2.9)	0 (0)	
	Hodgkin lymphoma	1 (2.3)	0 (0)	1 (10.0)	
	Myelodysplastic syndromes	9 (20.5)	7 (20.6)	2 (20.0)	
	Aplastic anemia	3 (6.8)	1 (2.9)	2 (20.0)	
	その他	9 (20.5)	7 (20.6)	2 (20.0)	
Preparative regimen					0.0613
	Fludarabine+Melphalan+TBI	16 (36.4)	10 (29.4)	6 (60.0)	
	Fludarabine+Busulfan	4 (9.1)	3 (8.8)	1 (10.0)	
	Cyclophosphamide+TBI	18 (40.9)	17 (50.0)	1 (10.0)	
	Fludarabine+Cyclophosphamide	3 (6.8)	1 (2.9)	2 (20.0)	
	other	3 (6.8)	3 (8.8)	0 (0)	
MASCC					1
	<21	2 (4.5)	2 (5.9)	0 (0)	
	>21	42 (95.5)	32 (94.1)	10 (100)	
Preventive antibacterial agent					0.698
	Levofloxacin	19 (43.2)	34 (100)	10 (100)	
	Tazobactam / piperacillin	3 (6.8)	2 (5.9)	1 (10.0)	
	Cefepime	19 (43.2)	12 (35.3)	2 (20.0)	
	Meropenem	2 (4.5)	17 (50.0)	6 (60.0)	
	Doripenem	1 (2.3)	5 (14.7)	2 (20.0)	
Preventive antiviral agent					
	Aciclovir	44 (100)	15 (44.1)	4 (40.0)	
Preventive antifungal agent					1
	Itraconazole	14 (31.8)	14 (41.2)	5 (50.0)	
	Fluconazole	23 (52.3)	2 (5.9)	0 (0)	
	Micafungin	7 (15.9)	1 (2.9)	0 (0)	
CVC		44 (100)	34 (100)	10 (100)	