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## Background

- Candida* infective endocarditis (IE) is a rare complication of candidemia with high in-hospital mortality.<sup>1,2,3</sup>
- Past studies examining risk factors for mortality among patients with *Candida* IE have been limited by small sample size.<sup>2,3</sup>
- We used the Vizient Clinical Database to gain further insight into the clinical characteristics of this patient population and to identify independent predictors of in-hospital mortality.

## Methods

- This is a multicenter, retrospective cohort study using administrative data from the Vizient Clinical Database. Vizient is a consortium of 117 geographically diverse U.S. academic medical centers and 300 affiliated hospitals.
- Using ICD-10 code B37.6 (Candidal Endocarditis) 703 inpatients were identified at 179 U.S. hospitals from October 2015 through April 2019.
- A univariate logistic regression analysis was performed to test for associations between each of the demographic and clinical variables and the outcome.
- A multivariate logistic regression analysis was then performed using backward selection at a significance threshold of  $p = 0.1$ . We adjusted the final model for age, sex, and race/ethnicity.

## Results

- Among the 703 patients, 114 (16.2%) died during the index encounter.
- Of 703 patients, 402 (57.2%) were male, 421 (59.9%) used tobacco, 213 (30.3%) had documented opiate abuse, 128 (18.2%) had other illicit drug abuse documented, and 190 (27.0%) had documented hepatitis C infection.
- On multivariate analysis, liver failure was the strongest predictor of death (OR 8.4, 95% CI 4.5 – 16.0).
- Female sex (OR 1.8, 95% CI 1.1 – 3.0), transfer from an outside facility (OR 1.7, 95% CI 1.1 – 2.7), underlying aortic valve pathology (OR 2.7, 95% CI 1.5 – 4.9), hemodialysis (OR 2.0, 95% CI 1.0 – 3.9), cerebrovascular disease (OR 2.2, 95% CI 1.2 – 3.8), neutropenia (OR 2.5, 95% CI 1.3 – 4.8) and alcohol abuse (OR 3.0, 95% CI 1.3 – 6.9) were also associated with higher odds of in-hospital death. In the same analysis, opiate abuse was associated with a lower odds of in-hospital death (OR 0.5, 95% CI 0.2 – 0.9).

Factor	Alive at Discharge	Dead at Discharge	p-value
N	589	114	
Age			<0.001
≤30 years	134 (22.8%)	20 (17.5%)	
31-50 years	211 (35.8%)	25 (21.9%)	
51-64 years	130 (22.1%)	31 (27.2%)	
65+ years	114 (19.4%)	38 (33.3%)	
Sex			0.28
Male	342 (58.1%)	60 (52.6%)	
Female	247 (41.9%)	54 (47.4%)	
Race/Ethnicity			0.28
Non-Hispanic White	354 (60.1%)	62 (54.4%)	
Non-Hispanic Black	86 (14.6%)	17 (14.9%)	
Non-Hispanic Other	90 (15.3%)	21 (18.4%)	
Hispanic	40 (6.8%)	6 (5.3%)	
Unknown	19 (3.2%)	8 (7.0%)	
Insurance Payer			0.11
Private	109 (18.5%)	21 (18.4%)	
Medicare	206 (35.0%)	54 (47.4%)	
Medicaid	233 (39.6%)	32 (28.1%)	
Uninsured	20 (3.4%)	4 (3.5%)	
Other	20 (3.4%)	3 (2.6%)	
Length of Stay, median (IQR)	19.0 (10.0, 34.0)	19.5 (10.0, 38.0)	0.52
Patient Origin			<0.001
Non-Facility	277 (47.0%)	33 (28.9%)	
Clinic	33 (5.6%)	7 (6.1%)	
Transfer from Outside Medical Facility	269 (45.7%)	74 (64.9%)	
Other	10 (1.7%)	0 (0.0%)	
Diabetes Mellitus (DM)	165 (28.0%)	36 (31.6%)	0.44
Chronic Kidney Disease (CKD)	170 (28.9%)	49 (43.0%)	0.003
Hemodialysis (HD)	52 (8.8%)	21 (18.4%)	0.002
Cerebrovascular Disease (CVD)	75 (12.7%)	29 (25.4%)	<0.001
Chronic Obstructive Pulmonary Disease (COPD)	58 (9.8%)	16 (14.0%)	0.18
Coronary Artery Disease (CAD)	7 (1.2%)	3 (2.6%)	0.23
Other Underlying Heart Condition	41 (7.0%)	11 (9.6%)	0.32
Vascular Disease	77 (13.1%)	19 (16.7%)	0.31
Chronic Heart Failure	140 (23.8%)	40 (35.1%)	0.011
Peptic Ulcer Disease (PUD)	8 (1.4%)	0 (0.0%)	0.21
Liver Failure	27 (4.6%)	30 (26.3%)	<0.001
Cirrhosis	22 (3.7%)	3 (2.6%)	0.56
Hepatitis B Infection	19 (3.2%)	1 (0.9%)	0.17
Hepatitis C Infection	166 (28.2%)	24 (21.1%)	0.12
Human Immunodeficiency Virus (HIV) Infection	13 (2.2%)	1 (0.9%)	0.35
Connective Tissue or Autoimmune Disease	32 (5.4%)	9 (7.9%)	0.30
Long-term Steroid Use	23 (3.9%)	2 (1.8%)	0.26
Hematologic Malignancy (HM) or related	23 (3.9%)	8 (7.0%)	0.14
Neutropenia/Pancytopenia	57 (9.7%)	20 (17.5%)	0.014
Hematopoietic Stem Cell Transplant (HSCT)	3 (0.5%)	0 (0.0%)	0.45
Solid Tumor	58 (9.8%)	14 (12.3%)	0.43
Malignancy, NOS	22 (3.7%)	6 (5.3%)	0.45
Solid Organ Transplant (SOT)	19 (3.2%)	3 (2.6%)	0.74
Homeless	21 (3.6%)	3 (2.6%)	0.62
Tobacco Abuse	371 (63.0%)	50 (43.9%)	<0.001
Alcohol Abuse	33 (5.6%)	12 (10.5%)	0.049
Other Illicit Drug Use	113 (19.2%)	15 (13.2%)	0.13
Opioid Abuse/Dependence	195 (33.1%)	18 (15.8%)	<0.001

**Table 1:** Patient characteristics

Factor	Odds Ratio	95% C.I.	p-value
Age			
≤30 years	Reference		
31-50 years	0.8	(0.4 - 1.6)	0.454
51-64 years	1.0	(0.5 - 2.1)	0.981
65+ years	1.5	(0.7 - 3.2)	0.274
Sex			
Male	Reference		
Female	1.8	(1.1 – 3.0)	0.011
Race/Ethnicity			
Non-Hispanic White	Reference		
Non-Hispanic Black	1.1	(0.5 – 2.1)	0.885
Non-Hispanic Other	1.1	(0.6 – 2.1)	0.767
Hispanic	0.9	(0.3 – 2.6)	0.889
Unknown	1.7	(0.6 – 4.6)	0.314
Patient Origin			
Inpatient Medical Facility	1.7	(1.1 - 2.7)	0.023
Hemodialysis (HD)	2.0	(1.0 - 3.9)	0.040
Cerebrovascular Disease (CVD)	2.2	(1.2 - 3.8)	0.007
Chronic Heart Failure	1.6	(1.0 - 2.6)	0.060
Liver Failure	8.4	(4.5 – 16.0)	<0.001
Neutropenia/Pancytopenia	2.5	(1.3 - 4.8)	0.004
Alcohol Abuse	3.0	(1.3 - 6.9)	0.010
Opioid Abuse/Dependence	0.5	(0.2 - 0.9)	0.017
Aortic Valve Pathology	2.7	(1.5 - 4.9)	0.001

**Table 2:** Multivariate analysis

## Conclusions

- We found that for patients *Candida* endocarditis inpatient mortality was 16.2%.
- Liver failure was associated with a high risk of death while opiate abuse was associated with a lower risk of death. Further investigation is necessary to better understand these associations.

## Limitations

- This is a retrospective study using administrative data, and therefore, our results may be affected by unmeasured confounding.
- The ICD-10 code B37.6, has not been validated in a study comparing the code to “gold standard” diagnostic criteria.
- We were not able to report which *Candida* species caused infections in our cohort or on their antifungal susceptibilities

## References

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