Disclosures

Acknowledgments

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Major Depression and Anxiety Among Patients Hospitalized With Heart Failure

Several studies have shown that major depression and anxiety are prevalent among heart failure (HF) patients and are associated with reduced quality of life and increased mortality.[1] In this study, we sought to assess the temporal trends and the sex differences in the prevalence of major depression and anxiety among patients hospitalized for HF.

The National Inpatient Sample (NIS) database was queried between 2008 to 2017 to identify primary HF hospitalizations using International Classification of Disease (ICD-9 and ICD-10) codes. NIS is the largest all-payer US inpatient database containing data from about 8 million hospital stays per year and covering more than 95% of the United States population. The ICD-9 and 10 codes used for major depression were 2962x, 2,963x,311, F32x and F33x and the codes utilized for anxiety disorder were 3,000x and F41x. These codes have been used previously by policymakers and researchers for estimates.[2] Mood disorders and anxiety disorders due to specific fears or known physiological conditions were excluded. Multiple logistic regression analysis for yearly trends was conducted. The annual percent change in the odds was estimated as equal to (odds ratio-1) x 100 and was reported along with p-*trend* to provide quantitative estimation of trends. Stata v14.2 MP (college station, Texas) was used to perform all the statistical analysis.

During the 10-year analysis period, there were 9,206,283 hospitalizations with primary diagnosis codes for HF, among which 690,471 (7.5%) had major depression and 533,964 (5.8%) had anxiety documented. A temporal increase in both major depression and anxiety was observed in the overall cohort (major depression: 6.2% in 2008 vs 9.1% in 2017, p-trend <0.001; anxiety: 3.3% in 2008 vs 8.4% in 2017, p-trend <0.001) (Figure 1). The temporal increase was observed in both men and women (major depression: 4.8% vs 7.5% in 2008; 6.9% vs 11.4% in 2017 respectively, p-trend <0.001; anxiety: 2.2% vs 4.3% in 2008; 6.0% vs 11.0% in 2017 respectively, p-trend <0.001). Both major depression (9.3% vs 5.8%, p < 0.001) and anxiety (7.6% vs 4.1%, p < 0.001) were more prevalent in women compared with men, and the temporal trend in major depression was more pronounced in women compared with men (p-interaction <0.001).

Among a contemporary cohort of hospitalized HF patients in the US from 2008 through 2017, prevalence of anxiety has approximately tripled, with major depression also steadily increasing. The majority of HF research has focused on pharmacological drugs/devices development and implementation with little emphasis on mental health interventions targeting the psychological needs of HF patients. While selective serotonin reuptake inhibitors have not shown to improve outcomes in HF patients, several knowledge gaps exist.[3] Thus, there is an urgent need for a paradigm shift to a comprehensive assessment of HF patients which includes addressing their psychological and social health, in addition traditional medical endpoints.

In contrast to the hospitalized HF cohort, the crude prevalence of anxiety disorders in the US general population aged >50 years has not changed significantly in the same time period (3.60% in 2008, and 3.70% in 2017). As of 2017, the prevalence of anxiety amongst hospitalized HF patients is considerably higher compared with the general population.[4] Similarly, there has been no significant change in the crude prevalence of depression from 2005 (4.2%) to 2015 (4.8%) in the US general population aged >50 years.[5] This suggests that the increase in
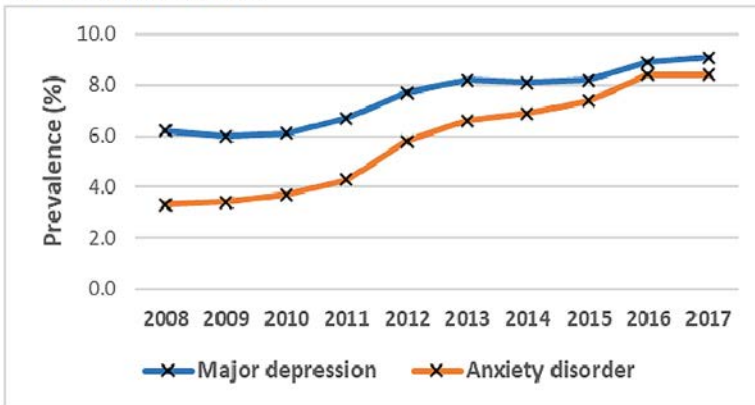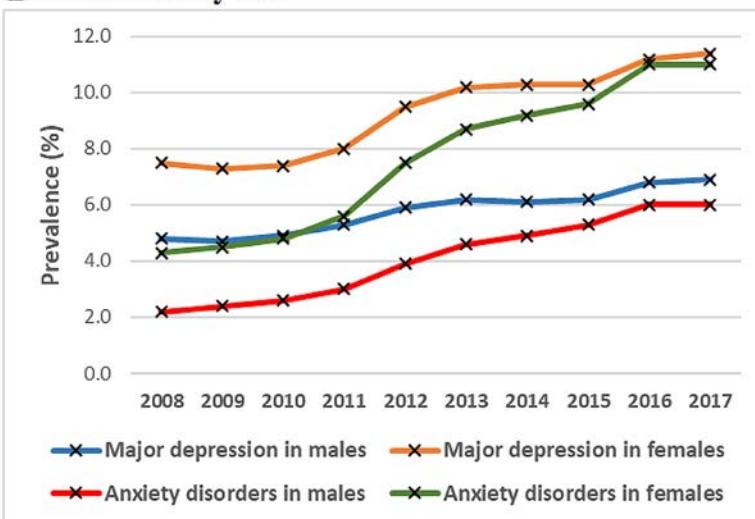
Figure 1. Temporal trends in the prevalence of major depression and anxiety among heart failure patients.

prevalence of anxiety and depression among hospitalized HF patients does not simply represent a changing prevalence in the general population.

Though major depression and anxiety were found to temporally increase in both men and women, women had a higher burden of major depression and anxiety with approximately double the prevalence. This is consistent with previous data from the general population.[4] The higher numbers may be explained by biological factors, such as hormonal changes; however, lifestyle factors, coping style, level of social support, and cultural stressors due to sex disparity may play an important role as well. It is critical to emphasize that both depression and anxiety in HF patients are common and treatable. Clinicians must pay

greater attention to the psychological correlates of a chronic illness like HF, especially in women, to improve patient centered outcomes and reduce HF hospitalizations.

This study is limited by the retrospective nature of the analysis and an administrative database as the source of information. NIS does not account for repeat admissions and therefore the same patient may be represented in more than one hospitalization episode. Furthermore, this database relies primarily on ICD- coding. It is more likely that major depression and anxiety may be under-coded rather than over-coded in patients hospitalized for HF. Future research is warranted to identify focused strategies and health care policies that can effectively address the increasing burden of major depression

and anxiety among HF patients to improve overall quality of life and long-term cardiovascular outcomes.

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Trends in Microbiology Data and Association With Mortality in Infective Endocarditis (2002-2017)

Infective endocarditis (IE) is rising in incidence not only in the US but also worldwide.[1] Very few contemporary studies have evaluated the microbiology and related outcomes in IE. In this study we aim to look at the trends of causative organisms of IE in the US and their association with outcomes.

We used the National Inpatient Sample data from year 2002 to 2017.[2] International Classification of Diseases (ICD)-9 and ICD-10 codes were used to identify all hospitalizations with IE and age > 18 years. Patients with no microbiology data were excluded.

A total 421,881 weighted admissions were identified where microbiological data was available. Staphylococcus related IE was the most common (213,287, 50.6%), followed by Streptococcus (105,692, 25.1%), Enterococcus (40,712, 9.7%), and Gram-negative related IE (25,762, 6.1%). Patient with Staphylococcus IE were the youngest (57 years, interquartile range [IQR] [42 to 72]) whereas patients with Enterococcus IE were the oldest (67 years, IQR [53 to 77]) see Table. Co-morbid conditions associated with Staphylococcus IE were end stage renal disease (17.3%) and drug abuse history (21.0%) whereas cancers (6.4%) and cardiac devices (8.9%) were noted in Enterococcus IE. Overall 46,678 (11.1%) patients died during the hospitalization. Mortality was highest in Staphylococcus IE (13.8%) followed by Gram-negative IE (11.0%). Septic shock and long-term intubation (>96 hours) were more common in Staphylococcus (14.0% and 10.3%) and Gram-negative IE (14.4% and 10.5%). Similarly, Staphylococcus and Gram negative IE had longest length of stay (11 days, IQR [7 to 20] and 11 days, IQR [6 to 20]) and highest adjusted cost of stay (USD 23,928, IQR [12.845 to 48,095] and USD24,358, IQR [12,950 to 50,561]) respectively. Patients with Streptococcus and Enterococcus IE were more likely to have valve replacement (14.9% and 13.5%). Multivariate analysis showed Staphylococcus IE had higher mortality and higher odds of sepsis. Streptococcus infections were more likely to undergo valve replacement. Over the years a rise in Enterococcal IE was noted whereas a decline in Staphylococcal and Streptococcal IE was seen.

In this study, Staphylococcal IE had highest mortality, longer length of stay and higher cost. Previous studies showed similar increased in-hospital mortality with Staphylococcal IE both in the operative and nonoperative cohorts.[3] Despite the higher incidence of septic shock, Staphylococcal IE was associated with decreased surgical intervention. The presence of multiorgan failure, sepsis, and deemed futility could be factors associated with decreased surgical intervention.[4] Enterococcus was the third leading cause of IE in our study with a rising incidence. Enterococcal IE was associated with older age and lower in-hospital mortality compared with Staphylococcal IE—an observation that was also noted in a prospective cohort study.[5] The reasons for uptrend in Enterococcal IE needs further study with aging

Table

Baseline characteristics and outcomes of infective endocarditis based on microbial organism. Pearson's chi-square and Kruskal Wallis test used for statistical testing

Variable	Microbial organism isolated in infective endocarditis in the US				
	Staphylococcus (213,287, 50.6%)	Streptococcus (105,692, 25.1%)	Enterococcus (40,712, 9.7%)	Gram-negative (25,762, 6.1%)	Polymicrobial (36,426, 8.6%)
Age (Years), Median (IQR)	57 (42−72)	63 (49−76)	67 (53−77)	61 (47−75)	62 (47−76)
Female	90,607 (42.5%)	36,337 (34.4%)	13,451 (33.0%)	12,468 (48.4%)	16,096 (44.2%)
White	130,638 (61.2%)	68,257 (64.6%)	27,445 (67.4%)	15,260 (59.2%)	23,050 (63.3%)
Black	31,121 (14.6%)	10,411 (9.9%)	4,582 (11.3%)	4,212 (16.3%)	5,071 (13.9%)
Hispanic	15,249 (7.1%)	7,861 (7.4%)	2,375 (5.8%)	1,936 (7.5%)	2,565 (7.0%)
Diabetes mellitus	58,726 (27.5%)	23,403 (22.1%)	11,668 (28.7%)	7,181 (27.9%)	9,891 (27.2%)
ESRD	36,996 (17.3%)	5,417 (5.1%)	4,183 (10.3%)	3,590 (13.9%)	4,097 (11.2%)
Drug Abuse	43,866 (21.0%)	9,290 (9.0%)	4,320 (11.3%)	3,378 (13.4%)	5,082 (14.4%)
Cancer	8,769 (4.1%)	5,725 (5.4%)	2,597 (6.4%)	1,351 (5.2%)	2,094 (5.7%)
Pacemaker/ ICD	10,212 (4.8%)	5,879 (5.6%)	3,609 (8.9%)	1,269 (4.9%)	2,132 (5.9%)
Mortality	29,274 (13.8%)	8,123 (7.7%)	2,468 (6.1%)	2,820 (11.0%)	3,993 (11.0%)
Nursing home discharge	95,740 (45.0%)	41,087 (39.0%)	20,373 (50.2%)	11,711 (45.6%)	17,815 (49.0%)
Single valve surgery	15,569 (7.3%)	12,134 (11.5%)	4,198 (10.3%)	2,217 (8.6%)	3,360 (9.2%)
Multiple valve surgery	3,139 (1.5%)	3,631 (3.4%)	1,300 (3.2%)	480 (1.9 %)	821 (2.3%)
Septic shock	29,823 (14.0%)	8,092 (7.7%)	1,465 (3.6%)	3,701 (14.4%)	4,337 (11.9%)
Cost of stay in US dollar, Median, (IQR)	23,928 (12,845-48,095)	18,246 (10,283-39,667)	18,984 (10,743-39,713)	24,358 (12,950-50,561)	22,999 (12,264-49,304)

All p values in the above univariate analysis were <0.05. IQR: interquartile range, ICD: implantable cardioverter defibrillator, ESRD: end stage renal disease.