ORIGINAL ARTICLE

Mental Disorders, Quality of Care, and Outcomes Among Older Patients Hospitalized With Heart Failure

An Analysis of the National Heart Failure Project

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Objective: To evaluate the effect of a mental illness diagnosis on quality of care and outcomes among patients with heart failure.

Design: Retrospective, national, population-based sample of patients with heart failure hospitalized from April 1, 1998, through March 31, 1999, and July 1, 2000, through June 30, 2001.

Setting: Nonfederal US acute care hospitals.

Patients: A total of 53 314 Medicare beneficiaries.

Main Outcome Measures: Quality of care measures, including left ventricular ejection fraction (LVEF) assessment, prescription of an angiotensin-converting enzyme (ACE) inhibitor at discharge among patients without treatment contraindications, and 1-year readmission and 1-year mortality.

Results: Of the patients included in the study, 17.0% had a mental illness diagnosis. Compared with patients without mental illness diagnoses, eligible patients with mental illness diagnoses had lower rates of LVEF evaluation (53.0% vs 47.3%; $P < .001$) but comparable rates of ACE inhibitor prescription (71.3% vs 69.7%; $P = .40$). Findings were unchanged after multivariate adjustment: patients with mental illness had lower odds of LVEF evaluation (odds ratio [OR], 0.81; 95% confidence interval [CI], 0.76-0.87) but comparable rates of ACE inhibitor prescription (0.96; 0.80-1.14). Patients with mental illness diagnoses had higher crude rates of 1-year all-cause readmission (73.7% vs 68.5%; $P < .001$), which persisted after multivariate adjustment (OR, 1.30; 95% CI, 1.21-1.39). Crude 1-year mortality was higher among patients with a mental illness diagnosis (41.0% vs 36.2%; $P < .001$). Presence of a comorbid mental illness diagnosis was associated with 1-year mortality after multivariate adjustment (OR, 1.20; 95% CI, 1.12-1.28).

Conclusions: Mental illness is commonly diagnosed among elderly patients hospitalized with heart failure. This subgroup receives somewhat poorer care during hospitalization and has a greater risk of death and readmission to the hospital.

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Previous studies have reported that patients with mental illness are at increased risk for developing cardiovascular diseases, including heart failure.[1-4] This literature suggests not only an increased risk of incident heart failure but also poorer outcomes after diagnosis. Limited evidence suggests that patients with mental illness and heart failure require more expensive care[5] and experience higher rates of hospitalization and mortality than those without psychiatric comorbidities.[6-15] Such studies are based on patients drawn from single centers, registries, regions, or other selected patient populations.[2,6,7,9-15] Furthermore, although several studies have assessed the effect of depression on heart failure outcomes,[6,7,9-15] comparatively few data are available regarding schizophrenia,[2] substance abuse, and other types of mental illness.[16] Notably absent is an assessment of the specific treatment provided to patients with mental illness and heart failure. Although mental illness is associated with reduced rates of procedure use[17] and quality of care[18] in patients with myocardial infarction, few comparable data exist for patients with heart failure.

To address this issue, we undertook an assessment of a national cohort of Medicare patients hospitalized with heart failure to assess the effect of mental illness on treatment and outcomes. We specifically sought to assess whether mental illness was associated with differences in quality of care during hospitalization or readmission and mortality in the year following hospitalization.

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METHODS

NATIONAL HEART FAILURE PROJECT

The National Heart Failure (NHF) Project was a Centers for Medicare and Medicaid Services initiative to improve quality of care for Medicare beneficiaries hospitalized with heart failure. The NHF sampling and data collection strategy has been described in greater detail previously.[19] Briefly, Medicare fee-for-service beneficiaries hospitalized from April 1, 1998, through March 31, 1999, and July 1, 2000, through June 30, 2001, with a principal discharge diagnosis of heart failure (*International Classification of Diseases, Ninth Revision, Clinical Modification* [*ICD-9-CM*] codes 402.01, 402.11, 402.91, 404.01, 404.91, or 428)[20] were identified and sampled by state. Records were forwarded to 1 of 2 data abstraction centers and underwent detailed abstraction for clinical data, including medical history, comorbidity, findings at admission, in-hospital course, status at discharge, medication and procedure use, and laboratory and other diagnostic evaluations. Trained reviewers, medical record abstraction software, and random record reabstraction were used to optimize data quality.[19]

STUDY COHORT

The initial NHF Project sample included 78 882 medical records. Medical records of patients who had been readmitted (n=3732), those undergoing chronic hemodialysis (n=549), those who left the hospital against medical advice (n=59), and those with no or an invalid Social Security number (n=48) were excluded, in accordance with NHF Project exclusion criteria. Patients younger than 66 years (n=7910), those who arrived by interhospital transfer (n=2419), and those without heart failure at admission (n=5003) were also excluded to ensure examination of a representative cohort of older patients directly admitted with heart failure. In total, 17 707 patients met 1 or more of these exclusion criteria, which left 61 175 patients eligible for analysis.

ADDITIONAL DATA SOURCES

Data from the NHF Project were linked with the American Medical Association Physician Masterfile using the unique physician identification number of the attending physician for each hospitalization.[21] Physician characteristics included self-reported specialty and board certification. Hospital characteristics, including bed size, US Census region, rural location, level of cardiac care facilities, ownership, and teaching status, were obtained by linking data from the 1998 American Hospital Association Survey of Hospitals.[22]

COMORBID MENTAL ILLNESS DIAGNOSIS

Building on previous studies with similar methods,[17,18] a mental illness diagnosis was identified by the presence of an administrative secondary diagnosis code of "any mental disorder" (*ICD-9-CM* codes 295.00-319.99) recorded at admission during the index hospitalization or at any encounter in the previous year. Patients for whom Medicare Part A administrative data were not available (n=2516) were excluded from the analysis. Patients with active dementia, delirium, and other organic psychotic conditions (*ICD-9-CM* codes 290.00-294.99) were also excluded (n=5345) because their diagnoses suggested a possible medical pathogenesis associated with a substantially higher risk of mortality rather than a mental illness. Exclusion of these patients produced the final study cohort of 53 314 patients.

QUALITY OF CARE AND OUTCOMES

The NHF Project's evaluation of patient treatment focused on the evaluation of the left ventricular ejection fraction (LVEF) and the prescription of angiotensin-converting enzyme (ACE) inhibitors, both widely accepted measures of quality of care for patients with heart failure.[19,23] Prescription of ACE inhibitor therapy at discharge was assessed among ideal candidates, defined as patients with left ventricular dysfunction who had no contraindications to ACE inhibitor therapy. To account for the possible use of angiotensin receptor blockers (ARBs) in lieu of ACE inhibitors, we also examined the use of ACE inhibitors or ARBs among ideal candidates for ACE inhibitors. Patients were considered to have undergone LVEF evaluation if their medical record contained an LVEF value measured before admission, their LVEF was measured during hospitalization, or the medical record contained a note of a planned LVEF assessment following discharge. Quality of care indicators are described in the **Box**.

Mortality within 1 year of admission, all-cause readmission, readmission for heart failure, and readmission for mental illness within 1 year of discharge were available for all patients and were assessed using the Medicare Enrollment database and billing records.[24]

STATISTICAL ANALYSIS

Differences in medical history, comorbidities, admission characteristics, and quality indicator eligibility between patients with and without mental illness diagnoses were assessed using χ^2 and Wilcoxon rank sum tests. Crude differences in quality of care and outcomes between patients with and without mental illness diagnoses were evaluated using χ^2 tests. Multivariate analyses were performed to determine whether differences in quality of care or outcomes among patients with mental illness diagnoses were independent of other factors. Logistic regression models adjusted for covariates used in previous studies,[25,26] including patient age, sex, race, medical history (coronary artery disease, diabetes mellitus, hypertension, chronic obstructive pulmonary disease, LVEF, and admission source), admission characteristics (heart rate and serum sodium and creatinine levels), and severity of illness, as measured by a modified version of the Medicare Mortality Prediction System (including age, cancer, mobility, prior congestive heart failure, mean arterial pressure, heart rate, serum urea nitrogen level, white blood cell count, and the Acute Physiology and Chronic Health Evaluation II score).[27] Analyses also adjusted for physician specialty, physician board certification, and hospital characteristics, including number of beds, rural location, US Census region, ownership, teaching status, and level of cardiac care facilities.

Dummy variables were used to denote patients with missing physician or hospital data. Missing continuous variables (heart rate, n=56; serum sodium level, n=982; and serum creatinine level, n=1037) were replaced with the study cohort's median value and a dummy variable indicating the replacement of missing data.

Analyses incorporated probability weights based on the inverse sampling fraction for each state. Statistical analyses accounted for clustering of patients by hospital and were conducted using Stata statistical software, version 8.0 (Stata Corp, College Station, Texas). This study was approved by the Yale University School of Medicine Human Investigation Committee.

RESULTS

Patients with mental illness diagnoses accounted for 17.0% of the study cohort. The most commonly documented mental illness diagnoses were depressive disorder (*ICD-*

Box. *Quality Indicator Eligibility Criteria*

Prescription of ACE Inhibitors[a]

Eligibility
- Patient alive at time of discharge
- Evidence of left ventricular systolic dysfunction during hospitalization, LVEF <40%
- No moderate or severe aortic or bilateral renal artery stenosis
- No physician documentation of any reason for withholding ACE inhibitor therapy
- Patient not enrolled in ACE inhibitor or other clinical trials
- Serum creatinine level <3.0 mg/dL
- Systolic blood pressure ≥70 mm Hg throughout hospitalization
- Serum potassium level <1.79 mEq/L

Quality of Care Measure
- ACE Inhibitor prescribed on discharge

Current LVEF Measurement

Eligibility
- Patient alive at time of discharge

Quality of Care Measure
- LVEF Assessed before hospitalization and noted in medical record
- Patient received LVEF assessment during hospitalization
- Patient scheduled to receive LVEF evaluation after discharge

Abbreviations: ACE, angiotensin-converting enzyme; LVEF, left ventricular ejection fraction.

SI conversion factors: To convert creatinine to micromoles per liter, multiply by 788.4; to convert potassium to millimoles per liter, multiply by 1.0.

[a]Same criteria used to evaluate prescription of ACE inhibitors or angiotensin receptor blockers.

Table 1. Prevalence of Reported Comorbid Mental Illness

Comorbid Mental Illness	*ICD-9-CM* Diagnosis Code	Prevalence[a]
Schizophrenic disorders	295	0.4
Affective psychoses	296	1.4
Paranoid states	297	<0.1
Other nonorganic psychoses	298-299	0.7
Neurotic disorders	300	5.1
Personality disorders	301	<0.1
Sexual deviation and disorders	302	<0.1
Alcohol dependence disorders	303	0.6
Drug dependence	304	<0.1
Nondependent abuse of drugs	305	4.8
Physiological malfunction arising from mental factors	306	<0.1
Special symptoms or syndromes, not otherwise classified	307	0.1
Acute reaction to stress	308	<0.1
Adjustment reaction	309	0.4
Specific nonpsychotic mental disorders following brain damage	310	0.6
Depressive disorder, not elsewhere classified	311	5.6
Disturbance of conduct, not elsewhere classified	312	<0.1
Disturbance of emotions related to childhood and adolescence	313	<0.1
Hyperkinetic syndrome of childhood	314	<0.1
Specific delays in development	315	<0.1
Psychic factors associated with diseases classified elsewhere	316	<0.1
Mental retardation	317-319	<0.1

Abbreviation: *ICD-9-CM*, *International Classification of Disease, Ninth Revision, Clinical Modification*.

[a]Prevalence reported as a weighted percentage of the total study cohort.

9-CM 311), neurotic disorder (*ICD-9-CM* 300), and nondependent abuse of drugs (*ICD-9-CM* 305); most other mental illness diagnoses were documented infrequently (**Table 1**). Compared with patients without mental illness diagnoses, patients with mental illness diagnoses were, on average, younger than patients without mental illness diagnoses and a greater proportion were female; white; had a history of heart failure, chronic obstructive pulmonary disease, or mobility limitations; and were admitted from residential facilities (**Table 2**).

Overall, 98.2% of patients were eligible for LVEF evaluation (98.3% patients with mental illness diagnosis vs 98.2% patients without mental illness diagnosis; $P=.12$) and 16.4% for evaluation of ACE inhibitor prescription (15.3% vs 16.7%; $P=.02$) or ACE inhibitor or ARB prescription rates among patients classified as ideal for ACE inhibitor therapy (**Table 3**).

Among patients classified as ideal for ACE inhibitor prescription, those with and without mental illness diagnoses had comparable crude rates for the end points of ACE inhibitor prescription (69.7% vs 71.3%, respectively; $P=.40$) and ACE inhibitor or ARB prescription (78.5% vs 79.7%; $P=.47$). Patients with mental illness diagnoses had lower rates of LVEF evaluation than did patients with no mental illness diagnoses (47.3% vs 53.0%; $P<.001$). These patterns of care were unchanged after multivariate adjustment. Patients with mental illness diagnoses were less likely to undergo LVEF evaluation (adjusted odds ratio [OR], 0.81; 95% confidence interval [CI], 0.76-0.87) but had comparable odds of being prescribed an ACE inhibitor (adjusted OR, 0.96; 95% CI, 0.80-1.14) or an ACE inhibitor or ARB (adjusted OR, 0.95; 95% CI, 0.78-1.17) (Table 3).

Patients with mental illness diagnoses had higher crude rates of 1-year all-cause readmission (73.7% vs 68.5%; $P<.001$), 1-year heart failure readmission (65.2% vs 60.6%; $P<.001$), and 1-year mental illness readmission (31.1% vs 7.7%; $P<.001$) than did patients without mental illness diagnoses. After multivariate adjustment, patients with mental illness diagnoses had a persistently higher likelihood of 1-year all-cause readmission (adjusted OR, 1.30; 95% CI, 1.21-1.39), 1-year heart failure readmission (1.23; 1.15-1.32), and 1-year mental illness readmission (5.13; 4.73-5.56). Patients with mental illness diagnoses had a higher 1-year mortality rate than did patients without mental illness diagnoses (41.0% vs 36.2%; $P<.001$). Presence of a comorbid mental illness diagnosis continued to be associated with 1-year mortality after multivariate adjustment (adjusted OR, 1.20; 95% CI, 1.12-1.28) (**Table 4**).

Table 2. Patient, Hospital, and Physician Characteristics[a]

Characteristic	Overall	Mental Illness		*P* Value[b]
		No	Yes	
Patients	100	83.0	17.0	NA
Age, mean (SD), y	79.5 (0.1)	79.8 (0.1)	78.1 (0.1)	<.001
Female	58.7	58.2	61.5	<.001
Nonwhite race	14.4	14.9	12.2	<.001
Admission Characteristics				
Systolic blood pressure, mean (SD), mm Hg	146.7 (0.2)	147.0 (0.2)	145.5 (0.4)	.005
Diastolic blood pressure, mean (SD), mm Hg	77.6 (0.1)	77.7 (0.1)	77.1 (0.3)	.03
Heart rate, mean (SD), beats/min	89.8 (0.1)	89.6 (0.2)	90.6 (0.3)	.004
Peripheral edema	73.8	74.3	71.1	<.001
Cardiac arrest	1.6	1.6	1.3	.17
Medical History				
Congestive heart failure	72.8	72.2	75.3	<.001
Left ventricular ejection fraction				
≥40%	34.6	35.0	32.4	<.001
<40%	31.3	31.4	30.4	
Unknown	34.2	33.6	37.2	
Prior myocardial infarction	29.6	29.6	29.3	.66
Prior coronary disease	59.8	59.7	60.3	.45
Angina	17.9	18.1	16.8	.03
Hypertension	65.3	65.8	62.7	<.001
Diabetes mellitus	41.1	41.6	38.3	<.001
Prior coronary bypass graft surgery	24.3	24.7	22.4	<.001
Prior angioplasty	10.4	10.3	10.6	.47
Prior cerebrovascular disease	17.9	17.8	18.4	.33
Chronic obstructive pulmonary disease	35.0	32.5	47.0	<.001
Mobility				
Independent ambulation	29.8	30.4	26.9	<.001
Dependent	38.9	38.7	39.9	
Unknown	31.4	31.0	33.2	
Urinary continence				
Continent	51.6	52.2	48.6	<.001
Incontinent	12.5	12.2	13.9	
Unknown	36.0	35.6	37.6	
Admission source				
Home	69.2	69.6	66.8	<.001
Skilled nursing or other facility	8.7	7.9	13.0	
Outpatient setting	15.6	16.1	12.8	
Other	6.6	6.4	7.5	
Admission Laboratory Findings				
Serum sodium level, mean (SD), mEq/L	138.4 (0.1)	138.4 (0.1)	138.2 (0.1)	.002
Serum creatinine level, mean (SD), mg/dL	1.46 (0.01)	1.47 (0.01)	1.39 (0.01)	<.001
Hospital Characteristics				
Ownership				
Public	13.3	13.2	13.4	.38
Not-for-profit	73.8	73.9	73.0	
For-profit	13.0	12.8	13.7	
Teaching status				
Council of Teaching Hospitals member	12.8	12.9	12.5	.06
Residency-affiliated	20.1	20.4	18.9	
Nonteaching	67.0	66.7	68.6	
No. of beds, mean (SD)	298.0 (6.5)	299.0 (6.6)	293.0 (6.6)	.14
Cardiac care facilities				
Cardiac surgery suite	44.3	44.5	43.2	.17
Cardiac catheterization laboratory	24.2	24.3	24.0	
No invasive facilities	31.5	31.2	32.7	
US Census region				
Northeast	20.8	21.3	18.5	<.001
Midwest	41.6	41.2	43.5	
South	26.8	26.8	27.0	
West	10.8	10.8	10.9	
Physician Characteristics				
Specialty				
Cardiology	24.7	25.6	20.6	<.001
Internal medicine	49.1	48.6	51.6	
Family practice	22.7	22.3	24.3	
Other	3.5	3.5	3.4	

Abbreviation: NA, not applicable.
SI conversion factors: To convert creatinine to micromoles per liter, multiply by 788.4; to convert sodium to millimoles per liter, multiply by 1.0.
[a] Data are presented as the percentage of participants unless otherwise indicated.
[b] Test statistics were obtained using χ^2 tests for categorical variables and Wilcoxon rank sum tests for continuous variables.

Table 3. Eligibility and Treatment by Quality Indicators[a]

	Overall	Mental Illness		*P* Value
		No	Yes	
Patients classified as ideal candidates				
Prescribed ACE inhibitors[b]	16.4	16.7	15.3	.02
Documentation of left ventricular systolic function	98.2	98.2	98.3	.12
Treatment among ideal candidates				
Prescribed ACE inhibitors	71.0	71.3	69.7	.40
Prescribed ACE inhibitors or ARBs	79.5	79.7	78.5	.47
Documentation of left ventricular systolic function	52.0	53.0	47.3	<.001
Adjusted odds of treatment among ideal candidates				
Prescribed ACE inhibitors	. . .	1 [Reference]	0.96 (0.80-1.14)	.61
Prescribed ACE inhibitors or ARBs	. . .	1 [Reference]	0.95 (0.78-1.17)	.64
Documentation of left ventricular systolic function	. . .	1 [Reference]	0.81 (0.76-0.87)	<.001

Abbreviations: ACE, angiotensin-converting enzyme; ARB, angiotensin receptor blocker.
[a] Data are presented as the percentage of participants and as adjusted odds ratios (95% confidence intervals) for receipt of quality indicator among patients with mental illness compared with patients without mental illness.
[b] Same cohort for the evaluation of the prescription of ACE inhibitors or ARBs.

Table 4. Mental Illness, Mortality, and Readmission at 1 Year[a]

	Overall	Mental Illness	
		No	Yes
Crude[b]			
All-cause readmission	69.4	68.5	73.7
Heart failure readmission	61.3	60.6	65.2
Mental illness readmission	11.6	7.7	31.1
Mortality	37.0	36.2	41.0
Adjusted			
Readmission	. . .	1 [Reference]	1.30 (1.21-1.39)
Heart failure readmission	. . .	1 [Reference]	1.23 (1.15-1.32)
Mental illness readmission	. . .	1 [Reference]	5.13 (4.73-5.56)
Mortality	. . .	1 [Reference]	1.20 (1.12-1.28)

[a] Data are given as the percentage of participants and as odds ratios (95% confidence intervals) for odds of readmission or mortality among patients with mental illness compared with patients with no mental illness.
[b] $P<.001$ for all comparisons.

COMMENT

In a large, nationally representative sample of elderly patients hospitalized with heart failure in the United States, nearly 1 in 6 had a secondary diagnosis of mental illness. Patients with a mental illness diagnosis received poorer to comparable quality of care, were more likely to be readmitted within the year following discharge, and had an increased mortality risk. Our findings identify areas of concern in the treatment and outcomes of patients with heart failure and mental illness.

The quality of medical care for patients with mental illness diagnoses presents a mixed picture, with no significant differences in ACE inhibitor prescription but less frequent left ventricular systolic function evaluation. All patients in the study cohort had Medicare insurance and, by being hospitalized, had demonstrated access to the health care system, thus diminishing the explanatory role of these factors. Physicians may be referring patients with mental illness for LVEF assessment at a lower rate than those without mental illness. Possible reasons for lower referral rates may range from less aggressive management of heart failure in patients with mental illness to a more insidious bias arising from the stigma associated with mental illness.[28] It is also possible that patients with mental illness may be unable or unwilling to undergo LVEF assessment.

Consistent with the results of previous studies,[9,10,13,15] we identified a notably higher risk of all-cause readmission among patients with mental illness, as well as increased risks of readmission for heart failure, even after adjustment for a variety of comorbid conditions. There are several possible mechanisms underlying the increased risk of readmission for heart failure among patients with mental illness. Patients with mental illness may be less adherent to treatment recommendations, including medication and rehabilitation regimens, thereby increasing their likelihood of readmission.[29,30] Differences in heart failure symptom recognition may result in patients with mental illness deferring care until initial problems are sufficiently advanced that hospitalization is required. Mental illness may also cause patients with heart failure to underestimate their functional status, particularly for patients with depressive symptoms,[31] thereby precipitating readmission when it may not be clinically necessary. Patients with mental illness were disproportionately women and admitted from residential facilities, characteristics associated with lower levels of social support.[8] Poor social support after hospital discharge may diminish mentally ill patients' abilities to cope with heart failure and thereby predispose them to readmission. Mental illness may also be a proxy for other unmeasured characteristics, including lower socioeconomic status and greater functional impairment, which are also associated with high rates of heart failure readmission.[32] However, without detailed information concerning the quality of processes of care after discharge, it is unclear whether mental illness is independently associated with readmission or reflects poorer quality of care after discharge.

Heart failure readmission and mental illness readmissions may arise from a synergy of common processes underlying exacerbations of both conditions. For example, sympathetic nervous system activation has been ob-

served in patients with depression.[33] Augmentation of the sympathetic nervous system is also associated with the pathogenesis of heart failure and decompensation among patients with heart failure.[34] Therefore, enhanced sympathetic nervous system activity in patients with heart failure may act to worsen depression and vice versa, thereby producing deterioration in both disease conditions.

Our findings of an increased risk of mortality associated with mental illness in patients with heart failure are consistent with previous reports of increased harm.[2,6-9,11-15] Some of the same mechanisms, which may account for higher rates of readmission in patients with mental illness and heart failure, likely also contribute to higher mortality, including poorer adherence after discharge and poorer access to follow-up care. Neurohumoral alterations and autonomic dysfunction associated with mental illness may also serve as more proximal antecedents of excess mortality,[35] particularly for patients with heart failure.[36] However, the magnitude of the mental illness–associated adjusted 1-year mortality risk (OR, 1.20) is notably lower than previously published estimates of the mortality risk conferred by mental illness in patients with heart failure.[6-9,13-15] The attenuated mortality hazard associated with mental illness observed in our cohort is similar to that reported in a previous study of the effect of a mental illness diagnosis on elderly patients with myocardial infarction.[18] Studies finding higher mortality rates typically used diagnostic interviews rather than physician diagnoses to identify mental disorders,[6-9,13-15] which may identify persons with more acute symptoms or those who are untreated. The advanced age common to both studies suggests that the decreased mortality risk may reflect survivorship bias whereby patients with mental illness who survive to older age represent a healthier cohort than patients without mental illness in ways that are unmeasured in this study. Concerns of such selection bias are heightened by the shorter life expectancies associated with most mental illnesses.[37]

The NHF Project constitutes the largest national, contemporary evaluation of elderly patients hospitalized with heart failure. The use of quality-of-care indicators and detailed clinical data represents significant methodological improvements on prior assessments of heart failure treatment patterns. However, our study has certain limitations that merit consideration. Administrative data produced from a single hospital encounter may not adequately identify all patients with mental illness.[38] We sought to limit this effect by also evaluating administrative data for the full year preceding hospitalization. Nevertheless, mental illness remains markedly underdiagnosed by physicians in the community and the hospital setting.[39] As such, our findings should not be seen as an estimate of the true prevalence of mental illness in elderly patients with heart failure but rather as an assessment of physician-recognized mental illness and its effects on patient treatment.

We restricted our analysis to Medicare patients 66 years and older who were hospitalized with heart failure; therefore, our findings may not be applicable to patients younger than 66 years or those not enrolled in fee-for-service Medicare. However, more than 80% of heart failure patients in the United States are 65 years or older[40] (although this proportion may be smaller for patients with mental illness, who have an earlier median age of heart failure onset), and patients enrolled in Medicare managed care constitute less than 15% of Medicare beneficiaries,[41] suggesting that both exclusions may result in only a minor loss in study generalizability. Our findings may not be applicable to patients who are not hospitalized or to practice patterns in the ambulatory setting. However, acute exacerbations of heart failure requiring hospitalization are common, particularly among elderly patients.[42]

CONCLUSIONS

Patients with mental illness diagnoses are a notable subgroup of elderly persons hospitalized with heart failure in the United States. As a group, these patients receive poorer to comparable quality of care during hospitalization and are more likely to be rehospitalized or die in the year following discharge than patients without mental illness. Greater efforts are needed to improve quality of care and reduce rehospitalization for elderly patients with heart failure and mental illness.

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