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ORIGINAL ARTICLE

Outcomes in heart failure patients discharged to skilled nursing facilities with delirium

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Abstract

Aim Heart failure (HF) outcomes are disproportionately worse in patients discharged to skilled nursing facilities (SNF) as opposed to home. We hypothesized that dementia and delirium were key factors influencing these differences. Our aim was to explore the associations of dementia and delirium with risk of hospital readmission and mortality in HF patients discharged to SNF.

Methods and results The study population included Veterans hospitalized for a primary diagnosis of HF and discharged to SNFs between 2010 and 2015. Pre-existing dementia was identified based on International Classification of Diseases-9 codes. Delirium was determined using the Minimum Data Set 3.0 Confusion Assessment Method algorithm. Proportional hazard regression analyses were used to model outcomes and were adjusted for covariates of interest. Patients (n = 21 655) were older (77.0 ± 10.5 years) and predominantly male (96.9%). Four groups were created according to presence (+) or absence (−) of dementia and delirium. Relative to the dementia−/delirium− group, the dementia−/delirium+ group was associated with increased 30 day mortality [adjusted hazard ratio (HR) = 2.2, 95% confidence interval (CI) = 1.7, 3.0] and 365 day mortality (adjusted HR = 1.5, 95% CI = 1.3, 1.7). Readmission was highest in the dementia−/delirium+ group after 30 days (HR = 1.2, 95% CI = 1.0, 1.5). In the group with dementia (delirium−/dementia+), 30 day mortality (12.8%; HR = 0.7, 95% CI = 0.7, 0.8) and readmissions (5.3%; HR = 1.0, 95% CI = 0.8, 1.1) were not different relative to the reference group.

Conclusions Delirium, independent of pre-existing dementia, confers increased risk of hospital readmission and mortality in HF patients discharged to SNFs. Managing HF after hospitalization is a complex cognitive task and an increased focus on mental status in the acute care setting prior to discharge is needed to improve HF management and transitional care, mitigate adverse outcomes, and reduce healthcare costs.

Keywords Heart failure; Rehabilitation; Delirium; Dementia; Mortality; Skilled nursing facilities

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Introduction

Heart failure (HF) is a progressive, life-limiting condition associated with adverse clinical outcomes, high health care expenditure, and increased mortality.[1,2] It is the leading cause of hospitalization and hospital readmission among Medicare beneficiaries, nearly a quarter of whom are discharged to skilled nursing facilities (SNFs) following acute hospitalization for HF.[3,4] HF patients discharged to SNFs have a markedly higher mortality risk relative to patients discharged home. A study of 15 459 Medicare patients with HF[3] showed that 53.5% of patients discharged to SNFs died within 1 year vs. 29.1% of those discharged home. In the same study, 1 year readmission was common overall but significantly higher in patients discharged to SNFs compared with those discharged home (76.1% vs. 72.2%). These data highlight a critical need to identify factors associated with disproportionately worse outcomes in this vulnerable HF

subgroup, with an eye towards improving HF management and transitional care. SNF patients are at a determining point in their life course where engagement with the medical system, aggressive physical, occupational, and cardiac rehabilitation, and stable medication management can have lasting effects on survival and quality of life and research in this population can have immediate implications for action.

Dementia and delirium are highly prevalent among people with HF and are independently associated with increased readmission and mortality.[5–8] Although well established in the ambulatory HF population, these associations have not been specifically examined in patients discharged to SNFs following hospitalization. In addition, despite their high prevalence in HF, it is not known whether the co-occurrence of these disorders uniquely exacerbates poor outcomes in HF patients discharged to SNFs. It is possible that HF patients discharged to SNFs are more susceptible to coexisting dementia and delirium given their inherently poor functional status. To address whether dementia and/or delirium may represent comorbid factors driving disproportionate outcomes in this vulnerable group, we examined the independent and interactive association of dementia and delirium with mortality and hospital readmission risk in a cohort of Veterans discharged to SNFs following hospitalization for HF. We hypothesized that co-occurring dementia and delirium would be associated with increased hospital readmission and mortality risk beyond that conferred by either disorder in isolation.

Methods

Study design

This is a retrospective cohort study to examine the association of dementia and delirium with mortality and hospital readmission risk among Veterans discharged to SNFs following an acute care hospitalization for HF. This study was approved by the Institutional Review Board at the Providence Veterans Affairs Medical Center (VAMC) as a secondary data analysis, no informed consent was required. Based on restrictions in the Data Use Agreements utilized in this study, the authors are unable to make a dataset available. Methodology questions may be directed to the contact author.

Study cohort

Veteran's Health Administration (VHA) electronic records were used to retrospectively identify Veterans hospitalized with a primary diagnosis of HF and discharged to SNFs between 2010 and 2015. HF was identified using hospitalization diagnosis codes across 129 VAMCs with inpatient facilities. Veterans residing in SNFs prior to admission and those who received palliative care or hospice services before, during, or upon hospital discharge were excluded. Discharge to SNFs was identified via the Minimum Data Set (MDS) 3.0. The MDS is a federally mandated, standardized resident assessment administered to patients within 7 days of admission to certified SNFs. Using Veteran Administration (VA) identifiers, we matched patient VHA electronic records to their corresponding Center for Medicare and Medicaid Services (CMS) MDS records. We identified Veterans admitted to a VAMC for treatment of HF and subsequently discharged to SNFs. We then characterized those Veterans along two dimensions: those with and without a pre-existing dementia diagnosis upon VAMC admission and those with and without delirium upon admission screening for SNFs. We purposefully chose our study period to be 2010–2015 to maximize stability in delirium, dementia, and comorbidity data and aid in future analysis. There were two changes that drove our choice of the study period. First, the MDS transitioned from 2.0 to 3.0 in Oct 2010; wherein delirium diagnosis underwent a major change. Second, the International Classification of Diseases (ICD)-9 system of coding changed to ICD-10 in Oct 2015.

Dementia

Accounting for additive risk conferred by coexisting dementia and delirium represented a key goal of this study. Because chronic cognitive impairment cannot be reliably assessed in the setting of acute delirium, we classified dementia based on pre-hospitalization ICD coding. Dementia was measured via the CMS's Chronic Condition Warehouse ICD-9 coding for dementia. Inpatient and outpatient codes in the year prior to hospital discharge were used. A listing of dementia ICD-9 codes can be found in the appendix.

Delirium

Delirium was determined using the MDS Confusion Assessment Method (CAM), completed on admission to SNFs. The CAM is a widely used diagnostic algorithm that accounts for the following features of delirium: (i) acute change and/or fluctuation in mental status, (ii) inattention, (iii) disorganized thinking, and (iv) altered level of consciousness.[9] The algorithm is based on the criteria published with the MDS version of the CAM.[10]

Additional variables

Demographic information including age, sex, and race were drawn from VHA electronic records. Comorbidity data necessary to complete the Elixhauser Comorbidity Index was drawn from VA coding data in the year prior to admission. VA healthcare costs in the year prior to admission were obtained from VA accounting records. Utilization of VA re-

sources (emergency department visits and hospitalizations) was collected from VA administrative records. Ejection fraction was culled from the echocardiogram results nearest to the time of hospital admission.

Outcome measurement

Mortality data were drawn from the VHA Vital Status File that combines death data from several federal sources and has been previously validated.[11] Date of admission to SNFs from the MDS was used as a reference for determining 30 day and 365 day mortality. In addition, we calculated readmission using VA and CMS records for the 1 year after the date of admission to SNFs.

Statistical methods

Baseline characteristics were compared with analysis of variance for continuous variables and χ^2 for categorical variables. The main exposure was a variable categorizing presence or absence of dementia and delirium into four groups: (i) dementia−/delirium−, (ii) dementia−/delirium+, (iii) dementia+/delirium−, and (iv) dementia+/delirium+. Kaplan–Meier curves were used to graphically display event-free survival for readmission and mortality outcomes. Associations of dementia and delirium with clinical outcomes were modelled using Cox regression. Hazard ratios (HR) and 95% confidence intervals (CI) were calculated, with the dementia−/delirium− group serving as reference. The proportional hazard assumption was satisfied for each outcome. Adjustments were made for demographics, comorbidities, clinical measures, and utilization outcomes. For readmission outcomes, Cox regression models were fitted as competing risk models to avoid bias arising from death. Heterogeneity of effect was assessed by fitting interaction terms between dementia and delirium variables.

Results

Population characteristics

Table 1 shows overall population characteristics and compares HF patients according to dementia/delirium categorization. The study population had an average age of 77 (SD = 10.5) and a majority were male (97%), white (78%), and had multiple comorbidities (average = 5). On average, the population was evaluated in the emergency room nearly three times and accrued $38 000 in medical costs in the year preceding discharge to SNFs. Mean left ventricular ejection fraction by echocardiogram was 43%. Missing data are described in Supporting Information, *Table S1*.

Approximately 36% of patients discharged to SNFs had a pre-existing dementia diagnosis, whereas 6% had delirium on SNF admission assessment. Sixty-two per cent of patients were categorized as dementia−/delirium−, 2% were dementia−/delirium+, 32% were dementia+/delirium−, and 4% were dementia+/delirium+. Patients in the dementia−/delirium− group were younger on average relative to other groups but had similar gender distribution and mean left ventricular ejection fraction.

Outcomes

Unadjusted event rates for readmission and mortality outcomes according to dementia/delirium categorization are shown in *Table 2*. Unadjusted and adjusted HRs for outcomes are shown in *Table 3* (adjusted models are described below). *Table S2* shows HF-related readmission outcomes. *Tables S2a*, *S2b*, *S3*, and *S3a* show outcomes according to dementia and delirium status separately. Kaplan–Meier curves for 30 day and 365 day event-free survivorship are shown in *Figure 1*.

Readmission

Adjusted 30 day readmission was highest in the dementia−/delirium+ group and was observed in 18.6% patients (HR = 1.2, 95% CI = 1.0, 1.5). Relative to the dementia−/delirium− reference group (16.3% readmission), 30 day readmission was not significantly increased in the dementia+/delirium+ (13.8%; HR = 0.9, 95% CI = 0.7, 1.0) or dementia+/delirium− groups (12.8%; HR = 0.7, 95% CI = 0.7, 0.8).

Adjusted 365 day readmission was highest in the dementia−/delirium− reference group and was observed in 60.2% of patients. Relative to the reference group, reduced 365 day readmission was observed in all other groups: 58.6% readmission in the dementia+/delirium− group (HR = 0.9, 95% CI = 0.9, 0.9), 53.4% in the dementia−/delirium+ group (HR = 0.9, 95% CI = 0.8, 1.0), and 46.5% in the dementia+/delirium+ group (HR = 0.7, 95% CI = 0.6, 0.8). We performed a sensitivity analysis specifically for HF-related readmissions; the results of which are summarized in *Table S2*.

Mortality

Adjusted 30 day mortality was highest in the dementia−/delirium+ group and was observed in 12.2% of patients (HR = 2.2, 95% CI = 1.7, 3.0), followed by 7.9% mortality in the dementia+/delirium+ group (HR = 1.2, 95% CI = 1.0, 1.6), and 5.6% mortality in the dementia−/delirium− group (5.6%), which served as reference. Thirty-day mortality was not significantly increased in the dementia+/delirium− group (5.3%; HR = 1.0, 95% CI = 0.8, 1.1).

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Table 1 Comparison of study population baseline characteristics according to dementia/delirium categorization

	Dementia/Delirium categorization					
	Overall population[a] (*N* = 21 655)	Dementia−/ Delirium− (*N* = 13 436)	Dementia−/ Delirium+ (*N* = 474)	Dementia+/ Delirium− (*N* = 6938)	Dementia+/ Delirium+ (*N* = 807)	*P* value
Demographics						
Age, mean (SD)	77.01 (10.52)	75.30 (10.69)	77.52 (10.27)	79.78 (9.56)	81.43 (9.11)	<0.0001
Female (%)	3.05	3.14	3.80	2.81	3.22	0.4414
Race (%)						0.0079
White	78.13	78.58	80.59	76.98	79.18	
Black	16.50	15.82	16.46	17.77	16.85	
Other	2.00	2.14	0.84	1.90	1.12	
Hispanic	3.02	3.08	1.69	3.07	2.35	
Missing	0.35	0.38	0.42	0.27	0.50	
Presence of dementia and delirium						
Dementia, *n* (%)	7745 (35.77)	0	0	6938 (89.58)	807 (10.42)	<0.0001
Delirium, *n* (%)	1281 (5.92)	0	474 (37.00%)	0	807 (63.00)	<0.0001
Elixhauser comorbidity index						
Overall, mean (SD)	4.93 (2.82)	4.93 (2.81)	4.26 (2.73)	5.04 (2.85)	4.36 (2.83)	<0.0001
Comorbidities						
Chronic lung disease	9369 (43.3)	44.81	36.50	41.91	33.21	<0.0001
Diabetes	11 131 (51.4)	53.40	45.36	48.85	43.62	<0.0001
Diabetes with complications	6277 (29.0)	31.32	22.78	26.06	18.96	<0.0001
Hypothyroidism	3198 (14.8)	14.23	16.46	15.78	14.00	0.0169
Chronic kidney disease	2172 (10.0)	10.68	7.59	9.34	6.57	<0.0001
Liver disease	1184 (5.5)	6.33	6.54	4.02	2.97	<0.0001
Tumour history	3472 (16.0)	16.74	12.45	15.18	13.75	0.0009
Obesity	4590 (21.2)	24.90	17.72	15.38	11.52	<0.0001
Weight loss	2139 (9.9)	9.15	7.59	11.31	10.90	<0.0001
Anaemia	8258 (38.1)	38.09	30.59	39.22	33.95	0.0001
Alcohol use disorder	1757 (8.1)	8.37	7.38	7.73	7.68	0.3787
Substance use disorder	926 (4.3)	4.67	4.22	3.60	3.59	0.0035
Mental health	4005 (18.5)	14.46	19.62	25.05	28.38	<0.0001
Depression	5400 (24.9)	22.54	20.46	29.75	26.15	<0.0001
#ER admissions in year preceding hospitalization (SD)						
	2.90 (4.03)	2.89 (3.99)	2.48 (4.27)	3.16 (4.21)	2.49 (3.58)	<0.0001
Ejection fraction (%) in year preceding hospitalization (SD)						
	43.45 (14.94)	43.50 (15.05)	43.53 (14.70)	43.25 (14.70)	44.35 (15.31)	0.4771
Ejection fraction categories (%)						<0.0001
<40%, reduced	25.38	26.09	21.31	24.99	19.33	
40–50%, borderline	14.34	14.57	12.66	14.40	11.15	
>50%, preserved	26.48	27.40	21.94	25.40	23.05	
Missing	33.79	31.94	44.09	35.21	46.47	
Health care utilization in year preceding hospitalization ($)						
	38 841 (52 126)	38 535 (50 609)	34 330 (55 202)	39 907 (54 577)	37 414 (53 415)	0.0570

CHF, congestive heart failure; ER, emergency room; SD, standard deviation.
[a]Values are mean (SD), *n* (%) unless otherwise indicated.

Table 2 Unadjusted event rates for readmission and mortality outcomes according to dementia/delirium categorization

	Dementia/Delirium categorization				
	Dementia−/ Delirium− (*N* = 13 436)	Dementia−/ Delirium+ (*N* = 474)	Dementia+/ Delirium− (*N* = 6938)	Dementia+/ Delirium+ (*N* = 807)	*P* value
Outcome (%)					
30 day readmission	16.23	18.57	12.81	13.75	<0.0001
365 day readmission	60.22	53.38	58.59	46.47	<0.0001
30 day mortality	5.57	12.24	5.33	7.93	<0.0001
365 day mortality	38.02	50.21	42.52	49.07	<0.0001

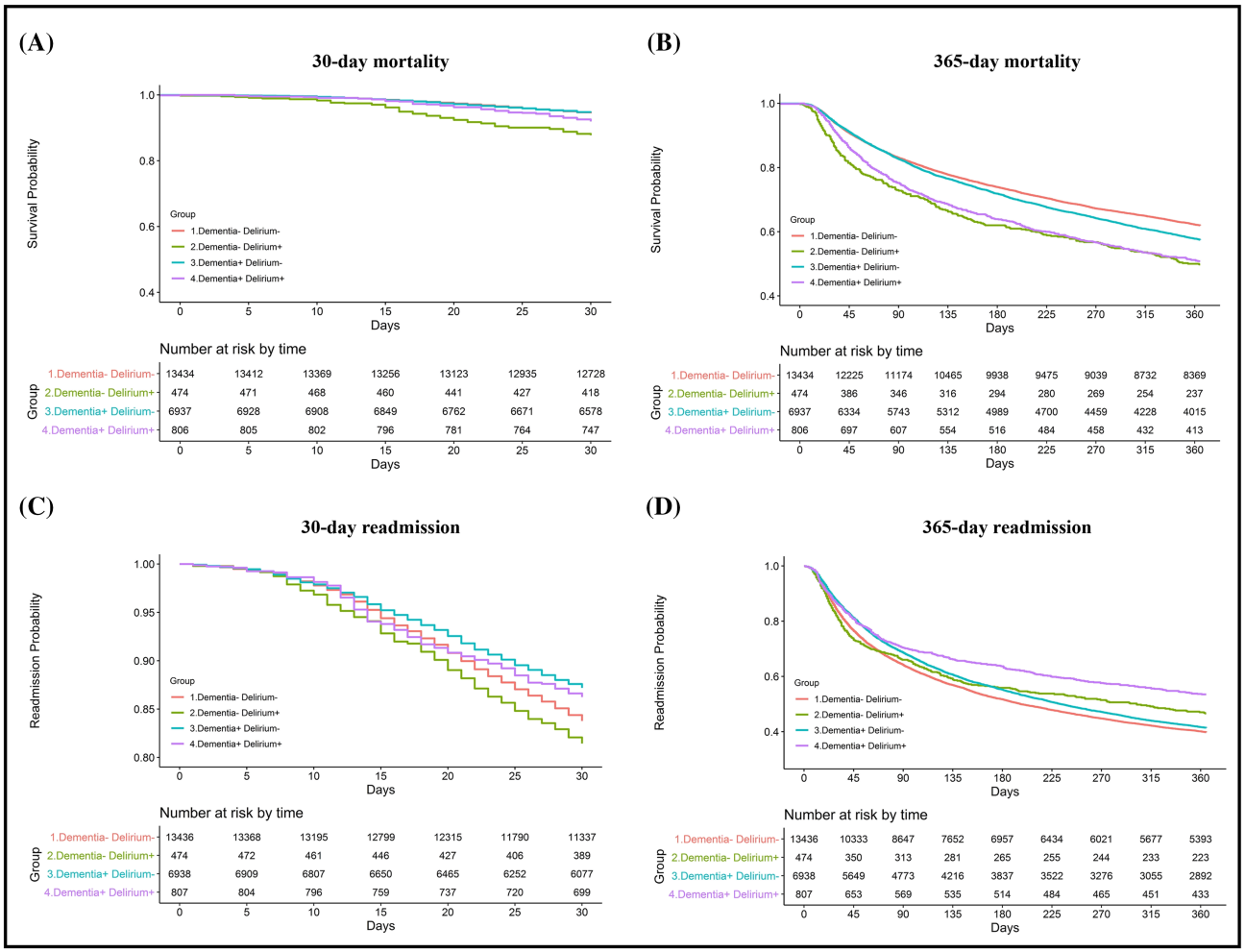
Adjusted 365 day mortality was highest in the dementia−/delirium+ group and was observed in 50.2% of patients (HR = 1.5, 95% CI = 1.3, 1.7), followed by 42.5% mortality in the dementia+/delirium+ group (HR = 1.2, 95% CI = 1.1, 1.4), and 38.0% in the dementia−/delirium− reference group. Adjusted 365 day mortality was not significantly in-

Table 3 Unadjusted and adjusted hazard ratios for readmission and mortality according to dementia/delirium categorization

	Dementia/Delirium categorization			
	Dementia−/ Delirium− (*N* = 13 436)	Dementia−/ Delirium+ (*N* = 474)	Dementia+/ Delirium− (*N* = 6938)	Dementia+/ Delirium+ (*N* = 807)
Unadjusted model HR (95% CI)				
30 day readmission	Ref	1.2 (0.9, 1.4)	0.8 (0.7, 0.8)	0.8 (0.7, 1.0)
365 day readmission	Ref	0.9 (0.8, 0.98)	0.9 (0.9, 0.96)	0.7 (0.6, 0.8)
30 day mortality	Ref	2.3 (1.8, 3.0)	1.0 (0.8, 1.1)	1.4 (1.1, 1.8)
365 day mortality	Ref	1.5 (1.3, 1.7)	1.1 (1.1, 1.2)	1.4 (1.3, 1.6)
Adjusted model HR[a] (95% CI)				
30 day readmission	Ref	1.2 (0.99, 1.5)	0.7 (0.7, 0.8)	0.9 (0.7, 1.03)
365 day readmission	Ref	0.9 (0.8, 1.04)	0.9 (0.9, 0.9)	0.7 (0.6, 0.8)
30 day mortality	Ref	2.2 (1.7, 3.0)	0.8 (0.7, 0.9)	1.2 (0.95, 1.6)
365 day mortality	Ref	1.5 (1.3, 1.7)	1.0 (0.94, 1.03)	1.2 (1.1, 1.4)

CI, confidence interval; HR, hazard ratio; Ref, reference group (dementia−/delirium−).
[a]Adjusted for all covariates listed in *Table 1*.

Figure 1 Kaplan–Meier curves for delirium, dementia, and the outcomes of readmission and mortality at 30 and 365 days. Dementia and/or delirium categorizations are plotted on each curve. (*A*) Kaplan–Meier curves for 30 day readmission stratified by dementia/delirium categorization. (*B*) Kaplan–-Meier curves for 365 day readmission stratified by dementia/delirium categorization. (*C*) Kaplan–Meier curves for 30 day mortality stratified by dementia/delirium categorization. (*D*) Kaplan–Meier curves for 365 day mortality stratified by dementia/delirium categorization.



creased in the dementia+/delirium− group (HR = 1.0, 95% CI = 0.9, 1.0).

Discussion

The current study retrospectively examined the impact of dementia and delirium on hospital readmission and mortality in patients discharged to SNFs following acute hospitalization for HF. These outcomes were assessed in the context of high overall readmission and mortality: 59% of patients were readmitted, and 40% died within a year after discharge to SNFs. Delirium was distinctly associated with increased mortality. Indeed, relative to the reference group (dementia−/delirium−), mortality risk was highest in patients with delirium in isolation and lower, but still increased in patients with delirium superimposed on dementia. Presence of dementia alone was not associated with increased mortality risk relative to patients without either dementia or delirium. Delirium in isolation was associated with the highest risk of readmission within the 30 days after discharge to SNFs. Presence of dementia and/or delirium appeared to confer a protective effect against readmission within the year after discharge.

Patients with dementia may engage with the health system differently than patients with intact cognitive function. Our analytic approach of adjustment for comorbidities may not account for shifts in advanced care planning that occurs with chronic illnesses such as dementia and HF.

These findings add to a nascent body of literature examining characteristics and outcomes of HF patients discharged to SNFs following hospitalization. Prior work showed strikingly higher mortality risk in HF patients discharged to SNFs vs. home.[3] These disproportionate findings were observed even after adjustment for patient factors associated with worse outcomes, including age, history of depression, and stroke, among others. The study did not examine patient-related determinants of outcomes in this population. The current study directly addresses this gap in knowledge by identifying delirium as a critical variable impacting outcome in a highly vulnerable HF population.

It is well established that delirium is associated with profound negative health consequences.[12] Despite such awareness, it is widely under-diagnosed and implementation of screening and preventive measures is sorely lacking within healthcare systems.[13] Our findings suggest that delirium is specifically deserving of increased attention in the setting of acute hospitalization for HF and discharge planning. Patients discharged to SNFs with delirium were most likely to die, and to a lesser extent be readmitted, within the first 30 days following discharge. One explanation for this trend may be that delirium did not resolve in these patients, but persisted well into admission to SNFs as shown in our study population (6% upon SNF admission). In support of this reasoning, accumulating evidence suggests that adverse outcomes associated with delirium may be attributable to a persistence of symptoms and not discrete, time-limited episodes.[14–17] In our study population, with multiple comorbid conditions and delirium, mortality may not be entirely related to HF. We were limited by access to cause of death; on death certificates across the 50 states and so cannot comment on other conditions associated with mortality in the cohort.

Numerous studies have underscored the view that acute hospitalization for HF provides an opportunity to tailor interventions to meet individual patient needs and streamline transfer of care.[18–20] At minimum, bidirectional communication between hospitals and SNF staff about patients' hospital course and dispositional status is essential to ensure SNF staff are prepared to manage the complex clinical needs of HF patients. This is of critical importance given evidence suggesting that SNF staff often lack education, skills, and/or staffing necessary to appropriately monitor HF.[21,22] Transition of care is arguably even more complicated in the setting of delirium, as recognition of delirium in long term care facilities is poor despite its high incidence in these settings.[23,24]

As a preliminary step, evaluation of HF patients during acute hospitalization would benefit from collection of data pertaining to baseline cognitive and functional status. This information helps to characterize pre-existing cognitive impairment, extent of cognitive and/or mental status change from baseline, and temporal course of symptoms, all of which are necessary for discriminating between chronic cognitive impairment and acute delirium.[25–27] Equally important is selecting appropriate evaluation tools that objectively capture subtle differences between these disorders at bedside. For example, prior work highlights the importance of differentiating the attentional deficits seen in dementia from those associated with delirium (i.e., basic vs. sustained attention).[27]

Our finding that dementia was not associated with increased readmission and mortality was at odds with literature linking it with poor outcomes in HF.[4–7] It is possible that our failure to demonstrate this relationship relates, at least in part, to the method by which dementia was classified (i.e., pre-hospitalization ICD coding). This method was primarily chosen to prevent confounding associated with concurrent assessment of dementia and delirium at SNF admission; however, it may be that dementia was under-coded in the study population, thereby diluting measures of association with outcomes. An alternative explanation is that HF patients in our study population with pre-existing dementia were managed more supportively in SNFs than they would have been in the community, which could have effectively reduced adverse events and readmission. In partial support of this reasoning, a 2015 scientific statement on management of HF in SNFs by the American Heart Association and the Heart Failure Society of America suggests that patients with moderate to severe dementia

may be more appropriate for HF management in SNFs without hospital readmission.[22]

The relatively low risk of readmission in the study population (365 day readmission ranged from 46–60% across groups) did not align with prior work indicating 1 year readmission rates of greater than 70% in HF patients discharged to SNFs.[3] One possible explanation for this finding relates to differences in health insurance among Veterans in our study population. Because our data only captured readmission from VA and Medicare data, we were unable to account for data on readmission of Veterans who used private-pay insurance or a Medicare advantage plan, which were unavailable. Lower readmission may also relate to the functionally disruptive nature of dementia and delirium and associated impact on patient-provider communication. Suboptimal recognition of HF symptoms or capacity to report them to providers could at least partially account for lower readmission among patients with cognitive impairment and/or mental status changes.[28,29] Adherence to guideline-directed medical therapy would impact prognosis in HF patients; we could not account for its effect in our study as we were limited by access to the different pharmacy systems across the settings of care to obtain that data.

The current study provides evidence that delirium confers increased mortality risk, independent of pre-existing dementia, in an HF population already at very high risk of premature death. Our findings highlight the predictive value of brain health indices in the treatment of HF and advance the notion that early identification of higher risk patients may carry substantial prognostic value. In the interest of improving HF management and transitional care, mitigating adverse outcomes, and reducing enormous healthcare costs associated with HF, we advocate for increased focus on cognitive and mental status in the acute care setting prior to discharge.

Conflict of interest

All authors have no relationships with industry to disclose.

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Supporting information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Table S1. Comparison of study population baseline characteristics according to dementia/delirium categorization.
Table S2. Unadjusted event rates for readmission specifically for heart failure related readmission outcome according to dementia/delirium categorization.
Table S2a. Unadjusted event rates for readmission and mortality related outcomes according to dementia categorization.
Table S2b. Unadjusted and adjusted hazard ratios for readmission and mortality according to dementia categorization.
Table S3. Unadjusted event rates for readmission and mortality outcomes according to delirium categorization.
Table S3a. Unadjusted and adjusted hazard ratios for readmission and mortality according to delirium categorization.

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Appendix

ICD-9 and ICD-10 codes used to classify pre-hospitalization dementia diagnosis

046.11 Variant Creutzfeldt–Jakob disease
046.19 Other and unspecified Creutzfeldt–Jakob disease
046.3 Progressive multifocal leukoencephalopathy
046.71 Gerstmann–Sträussler–Scheinker syndrome
046.79 Other and unspecified prion disease of central nervous system
046.9 Unspecified slow virus infection of central nervous system
290.0 Senile dementia, uncomplicated
290.10 Presenile dementia, uncomplicated
290.11 Presenile dementia with delirium
290.12 Presenile dementia with delusional features
290.13 Presenile dementia with depressive features
290.20 Senile dementia with delusional features
290.21 Senile dementia with depressive features
290.3 Senile dementia with delirium
290.40 Vascular dementia, uncomplicated
290.41 Vascular dementia, with delirium
290.42 Vascular dementia, with delusions
290.43 Vascular dementia, with depressed mood
291.1 Alcohol-induced persisting amnestic disorder
291.2 Alcohol-induced persisting dementia
292.82 Drug-induced persisting dementia
294.1 Dementia in conditions classified elsewhere
294.10 Dementia in conditions classified elsewhere without behavioural disturbance
294.11 Dementia in conditions classified elsewhere with behavioural disturbance
294.20 Dementia, unspecified, without behavioural disturbance
294.21 Dementia, unspecified, with behavioural disturbance
331.0 Alzheimer's disease
331.11 Pick's disease
331.19 Other frontotemporal dementia
331.82 Dementia with Lewy bodies
294.11/042.0 Dementia in conditions classified elsewhere with behavioural disturbance/HIV with specified infections
294.10/042.0 Dementia in conditions classified elsewhere without behavioural disturbance/HIV with specified infections
294.11/331.5 Dementia in conditions classified elsewhere with behavioural disturbance/idiopathic normal pressure hydrocephalus (INPH)
294.10/331.5 Dementia in conditions classified elsewhere without behavioural disturbance/idiopathic normal pressure hydrocephalus (INPH)
294.11/332.0 Dementia in conditions classified elsewhere with behavioural disturbance/Parkinson's disease
294.10/332.0 Dementia in conditions classified elsewhere without behavioural disturbance/Parkinson's disease
294.11/333.4 Dementia in conditions classified elsewhere with behavioural disturbance/Huntington's chorea
294.10/333.4 Dementia in conditions classified elsewhere without behavioural disturbance/Huntington's chorea
A81.00 Creutzfeldt–Jakob disease, unspecified
A81.01 Variant Creutzfeldt–Jakob disease
A81.09 Other Creutzfeldt–Jakob disease
A81.2 Progressive multifocal leukoencephalopathy
A81.82 Gerstmann–Sträussler–Scheinker syndrome
A81.89 Other atypical virus infections of central nervous system
A81.9 Atypical virus infection of central nervous system, unspecified
F01.50 Vascular dementia without behavioural disturbance
F01.51 Vascular dementia with behavioural disturbance
F02.80 Dementia in other diseases classified elsewhere without behavioural disturbance
F02.81 Dementia in other diseases classified elsewhere with behavioural disturbance
F03.90 Unspecified dementia without behavioural disturbance
F03.91 Unspecified dementia with behavioural disturbance
F10.27 Alcohol dependence with alcohol-induced persisting dementia
F10.97 Alcohol use, unspecified with alcohol-induced persisting dementia
F13.27 Sedative, hypnotic or anxiolytic dependence with sedative, hypnotic or anxiolytic-induced persisting dementia
F13.97 Sedative, hypnotic or anxiolytic use, unspecified with sedative, hypnotic or anxiolytic-induced persisting dementia
F18.17 Inhalant abuse with inhalant-induced dementia
F18.27 Inhalant dependence with inhalant-induced dementia
F18.97 Inhalant use, unspecified with inhalant-induced persisting dementia
F19.17 Other psychoactive substance abuse with psychoactive substance-induced persisting dementia
F19.27 Other psychoactive substance dependence with psychoactive substance-induced persisting dementia
F19.97 Other psychoactive substance use, unspecified with psychoactive substance-induced persisting dementia
G23.1 Progressive supranuclear ophthalmoplegia [Steele–Richardson–Olszewski]
G30.0 Alzheimer's disease with early onset
G30.1 Alzheimer's disease with late onset
G30.8 Other Alzheimer's disease
G30.9 Alzheimer's disease, unspecified
G31.01 Pick's disease
G31.09 Other frontotemporal dementia
G31.83 Dementia with Lewy bodies
G90.3 Multi-system degeneration of the autonomic nervous system

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F02.80/B20 Dementia in other diseases classified elsewhere without behavioural disturbance/human immunodeficiency virus [HIV] disease

F02.81/B20. Dementia in other diseases classified elsewhere with behavioural disturbance/human immunodeficiency virus [HIV] disease

F02.80/G10 Dementia in other diseases classified elsewhere without behavioural disturbance/Huntington's disease

F02.81/G10 Dementia in other diseases classified elsewhere with behavioural disturbance/Huntington's disease

F02.80/G20 Dementia in other diseases classified elsewhere without behavioural disturbance/Parkinson's disease

F02.81/G20 Dementia in other diseases classified elsewhere with behavioural disturbance/Parkinson's disease

F02.80/G91.2 Dementia in other diseases classified elsewhere without behavioural disturbance/idiopathic normal pressure hydrocephalus

F02.81/G91.2 Dementia in other diseases classified elsewhere with behavioural disturbance/idiopathic normal pressure hydrocephalus

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