Impact of Delirium on Mortality in Patients Hospitalized for Heart Failure: A National Inpatient Sample Study

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BACKGROUND

- Heart failure (HF) is one of the leading causes of hospitalizations in the United States and accounts for $11 billion in costs annually.

- Delirium is one of the most common causes of acute end-organ dysfunction in the hospital setting.

- Patients with HF are particularly prone to delirium given their declining cognitive dysfunction, advanced age and likelihood of polypharmacy.

- It remains unclear how delirium impacts the clinical outcomes of people hospitalized for HF and the economical burden of the healthcare system.

- We explored the prevalence and predictors of delirium and its impact on mortality, length of stay and hospital costs in patients hospitalized with HF using a large national database.

METHODS

- The National Inpatient Sample was queried from 2001-2014 to identify hospitalizations with a primary discharge diagnosis of HF (ICD-9-CM: 428.xx) stratified by presence or absence of delirium (ICD-9-CM: 239.0, 290.41, 293.0, 293.1, 348.31).

- The delirium trend was evaluated using orthogonal polynomial contrasts

- Differences between delirium and non-delirium for in-hospital mortality, length of stay (LOS), and hospital costs were evaluated using propensity-score matched cohorts; match robustness was evaluated via propensity distributions and standardized mean differences

RESULTS

Table 1. Clinical characteristics for hospitalizations with a primary discharge diagnosis of CHF stratified by delirium

	Delirium			
	No (n = 12,715,309)	Yes (n = 89,489)	p	Standardized Difference
Dementias	1.0	7.0	<.001	0.31
Alzheimer's disease	1.7	5.6	<.001	0.21
MDD, recurrent	1.2	2.8	<.001	0.12
Acute Kidney Injury	13.3	33.6	<.001	0.49
Mechanical Ventilation	2.4	8.7	<.001	0.28
Cardiogenic shock	0.8	3.5	<.001	0.19
Heart Catheterization	4.6	4.8	0.657	0.01
PCI	0.9	0.9	0.253	0.00
CABG	0.3	0.8	<.001	0.06
Intra-aortic balloon pump	0.2	0.8	<.001	0.07
Elixhauser Comorbidity Index	2 [-2 to 8]	8 [1-15]	<.001	0.59

MDD = major depressive disorder.
PCI = percutaneous coronary intervention.
CABG = coronary artery bypass grafting

	Delirium			
	No (n = 76,612)	Yes (n = 76,411)	Ratio (95% CI)	p
In-hospital Death, %	7.4	11.5	1.64 (1.51-1.77)	<.001
LOS, days	4.8	7.1	1.47 (1.45-1.51)	<.001
Hospital Cost, 2014$	9,346	13,485	1.44 (1.41-1.48)	<.001

Table 2. Propensity-score matched in-hospital outcomes

RESULTS

- From 2001-2014 there were ~12,804,794 hospitalizations in the United States with a primary discharge diagnosis of HF, of which an estimated 89,485 (0.7%) included a secondary diagnosis of delirium.

- Hospitalizations for HF with a secondary diagnosis of delirium were more likely to include patients who were older, Caucasian, and had higher comorbidity burdens and coexistent diagnoses of dementia, Alzheimer's disease, major depressive disorder, and complications such as cardiogenic shock, and acute kidney injury.

- HF hospitalizations with concomitant diagnosis of delirium had a 64% higher odds of in-hospital morality (95% CI: 51% to 77%, $p < .001$), 47% longer length of stay (95% CI: 45% to 51%, $p < .001$), and 44% higher hospital cost (95% CI: 41% to 48%, $p < .001$).

CONCLUSIONS

- Delirium in patients admitted with HF is independently associated with increased in-hospital mortality, length of hospital stays, and hospitalization cost.

- Future research should focus on measures to improve early recognition, prevention and active management of delirium in HF patients and assess if these measures can improve outcomes of hospitalized HF patients.

LIMITATIONS

- The NIS provides discharge level data and does not account for repeated admissions or include some important patient level data.

- The results are dependent on accurate coding practices and delirium is highly underdiagnosed.