

Title: 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 hospitalization in the United States accounting for \approx 800,000 hospital discharges and \$11 billion in annual costs. Delirium occurs in 30-80% of elderly hospitalized patients. Given the advancing age of the HF population, we hypothesized that rates of delirium in HF hospitalizations are increasing and that delirium is associated with adverse outcomes in HF hospitalizations.

Methods: We queried the 2001-2014 Nationwide Inpatient Sample to identify hospitalizations that included 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, whereas 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: Of the 12.8 million hospitalizations with HF, 89,489 (0.7%) had a diagnosis of delirium. The rate of delirium increased slightly from 0.3% in 2001 to 0.4% in 2007 and increased significantly to 1.6% by 2014 (quadratic p trend $<$.001). Major predictors of delirium included advanced age, Caucasian race, underlying dementia or psychiatric diagnoses, higher Elixhauser Comorbidity Index, renal failure, cardiogenic shock, and coronary artery bypass surgery. In the propensity-score matched analysis of 76,411 hospitalization with delirium compared to 76,612 without delirium, in-hospital mortality (odds ratio: 1.67, 95% CI: 1.51-1.77), LOS (rate ratio [RR]: 1.47, 95% CI: 1.45-1.51), and hospital costs (RR: 1.44, 95% CI: 1.41-1.48) were all statistically higher in the presence of delirium (all $p <$ 0.001).

Conclusion: In patients hospitalized with HF, delirium is an independent predictor of increased in-hospital mortality, longer LOS, and excess hospital costs despite adjustment for baseline characteristics. Whether interventions targeting prevention, early recognition, and treatment of delirium will mitigate this excess risk requires evaluation in future studies.