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Outcomes of Medicare Beneficiaries With Heart Failure and Atrial Fibrillation

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Objectives This study sought to examine the long-term outcomes of patients hospitalized with heart failure and atrial fibrillation.

Background Atrial fibrillation is common among patients hospitalized with heart failure. Associations of pre-existing and new-onset atrial fibrillation with long-term outcomes are unclear.

Methods We analyzed 27,829 heart failure admissions between 2006 and 2008 at 281 hospitals in the American Heart Association's Get With The Guidelines–Heart Failure program linked with Medicare claims. Patients were classified as having pre-existing, new-onset, or no atrial fibrillation. Cox proportional hazards models were used to identify factors that were independently associated with all-cause mortality, all-cause readmission, and readmission for heart failure, stroke, and other cardiovascular disease at 1 and 3 years.

Results After multivariable adjustment, pre-existing atrial fibrillation was associated with greater 3-year risks of all-cause mortality (hazard ratio [HR]: 1.14 [99% confidence interval (CI): 1.08 to 1.20]), all-cause readmission (HR: 1.09 [99% CI: 1.05 to 1.14]), heart failure readmission (HR: 1.15 [99% CI: 1.08 to 1.21]), and stroke readmission (HR: 1.20 [99% CI: 1.01 to 1.41]), compared with no atrial fibrillation. There was also a greater hazard of mortality at 1 year among patients with new-onset atrial fibrillation (HR: 1.12 [99% CI: 1.01 to 1.24]). Compared with no atrial fibrillation, new-onset atrial fibrillation was not associated with a greater risk of the readmission outcomes. Stroke readmission rates at 1 year were just as high for patients with preserved ejection fraction as for patients with reduced ejection fraction.

Conclusions Both pre-existing and new-onset atrial fibrillation were associated with greater long-term mortality among older patients with heart failure. Pre-existing atrial fibrillation was associated with greater risk of readmission. (J Am Coll Cardiol HF 2014;2:41–8) © 2014 by the American College of Cardiology Foundation

Although atrial fibrillation (AF) is common among patients hospitalized with heart failure (HF), it is unclear whether pre-existing and new-onset AF confer similar risks. In-hospital mortality and length of stay are greater among patients with HF and AF (1); however, long-term prognosis is less clear. In some studies, concurrent HF and AF were associated with higher rates of all-cause mortality and other cardiovascular events (2–4). Other studies have shown no

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Abbreviations and Acronyms

AF = atrial fibrillation

EF = ejection fraction

HF = heart failure

higher risk of adverse outcomes (5–7). Conflicting outcomes in patients with HF and AF may reflect prognostic differences between pre-existing and new-onset AF or differences between HF with preserved ejection fraction (EF) and AF.

To clarify the long-term prognosis of patients with HF and pre-existing or new-onset AF, and AF-associated risk in patients with HF with reduced or preserved EF, we examined long-term outcomes of patients hospitalized with HF and AF in a clinical registry linked with Medicare claims.

Methods

Data sources. Data were from the American Heart Association's Get With The Guidelines–Heart Failure registry and Medicare claims. As described previously (8,9), the voluntary hospital-based registry includes patients with HF as the primary cause of admission or patients who developed significant HF symptoms during the hospitalization. Outcome Sciences, Inc., is the data collection coordination center for the American Heart Association/American Stroke Association Get With The Guidelines programs.

The Medicare data consisted of research-identifiable inpatient files and corresponding denominator files for 2006 through 2008. The inpatient files contain institutional claims for facility costs covered under Medicare Part A and include beneficiary, physician, and hospital identifiers; admission and discharge dates; and diagnosis and procedure codes. The denominator files include dates of birth, sex, race/ethnicity, dates of death, and information about program eligibility and enrollment. We linked registry data to claims data by using the method described by Hammill et al. (10).

Study population. We identified Medicare beneficiaries who were ≥65 years of age, were discharged from a registry hospitalization between January 1, 2006, and December 31, 2008, and were enrollees in fee-for-service Medicare at discharge. We restricted the initial dataset to patients who had a history of HF and who required documentation in the registry (at least 1 admission vital sign, presence or absence of medical history of AF, and presence or absence of a diagnosis of AF at presentation or upon hospitalization), were discharged alive, did not leave against medical advice, and were not transferred to another short-term hospital or to hospice. For patients with multiple hospitalizations in the registry, we selected the first instance as the index hospitalization. The population was stratified according to AF status as documented in the registry: no AF (no medical history of AF or diagnosis of AF at presentation or during hospitalization), new-onset AF (diagnosis at presentation or during hospitalization and no pre-existing AF), or pre-existing AF (International Classification of Diseases-Ninth Revision-Clinical Modification, diagnosis code 427.31 in any position on an inpatient claim or ≥2 outpatient or carrier claims in the year before the study period). This approach has 94% sensitivity, 99% specificity, and 97% positive predictive value for identifying new-onset AF in administrative data (11).

Outcomes. The outcomes of interest were all-cause mortality and readmission for any cause, HF, stroke, and other cardiovascular reasons at 1 and 3 years. We identified deaths on the basis of death dates in the Medicare mortality files. Readmission was defined on the basis of any new nonelective inpatient claim, not including the index hospitalization claim, transfers to or from another hospital, and admissions for rehabilitation. Table 1 presents the codes used to identify outcomes in the claims. HF readmissions were readmissions with a primary diagnosis of HF. Stroke readmissions were those with a primary diagnosis of subarachnoid hemorrhage, intracerebral hemorrhage, ischemic stroke, or transient ischemic attack. Other cardiovascular readmissions were those with a diagnosis-related group of cardiovascular causes that did not also meet the criteria for a stroke or HF readmission and were not for a primary diagnosis of AF. In previous analyses, the positive predictive values for these outcomes were 97% for HF, 96% for stroke, and almost 100% for death and all-cause readmission (12,13).

The index hospitalization discharge dates were identified from the registry. We analyzed outcomes by using survival methods (time-to-event) and calculated days to death and first readmission. For patients who did not experience a particular outcome, we defined a censoring date as 1 or 3 years after discharge (depending on the outcome), the end of Medicare claims data availability, or the date the patient enrolled in a Medicare managed care plan, whichever occurred first. Death was treated as a competing risk for the readmission outcomes.

Covariates. Baseline covariates included demographic characteristics, vital signs, medical history, comorbid conditions, and medical tests at admission from the registry. Demographic characteristics included age, sex, and race. Vital signs at admission included systolic blood pressure, respiratory rate, and heart rate. Tests at admission included blood urea nitrogen, serum creatinine, left ventricular EF, and serum sodium. Renal function was assessed by using the Modification of Diet in Renal Disease formula for estimated glomerular filtration rate (14). From the registry, we identified medical history of anemia, implantable cardioverter-defibrillator use, chronic obstructive pulmonary disease, depression, diabetes mellitus, hyperlipidemia, hypertension, ischemic etiology of HF, pacemaker use, peripheral vascular disease, cerebrovascular accident or transient ischemic attack, renal insufficiency, and being a smoker in the past year. From the Medicare claims data, we identified comorbid conditions on the basis of Hierarchical Condition Category codes on the index hospitalization claim (Table 1). Comorbid conditions included protein-calorie malnutrition, dementia, major psychiatric disorders, and chronic liver disease. These variables have independent prognostic value for modeling all-cause hospital readmission and mortality after hospitalization for HF (15,16).