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Clinical Research

Geographic Disparities in Heart Failure Hospitalization Rates Among Medicare Beneficiaries

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Objectives This study was designed to document local-level geographic disparities in heart failure (HF) hospitalization rates among Medicare beneficiaries.

Background Although the burden of HF is well documented at the national level, little is known about the geographic disparities in HF.

Methods The study population consisted of fee-for-service Medicare beneficiaries ≥65 years of age who resided in the U.S., Puerto Rico, or the U.S. Virgin Islands during the years 2000 to 2006. Using hospital claims data for Medicare beneficiaries, we calculated spatially smoothed and age-adjusted average annual county-level HF hospitalization rates per 1,000 Medicare beneficiaries for the total population and by racial/ethnic group (blacks, Hispanics, and whites) for the years 2000 to 2006. A HF hospitalization was defined as a short-stay hospital claim with a principal (first-listed) discharge diagnosis of HF using the International Classification of Diseases-9th Revision-Clinical Modification code 428.

Results The average annual age-adjusted HF hospitalization rate per 1,000 Medicare beneficiaries was 21.5 per 1,000, and ranged from 7 to 61 per 1,000 among counties in the U.S. For the total study population, a clear East-West gradient was evident, with the highest rates located primarily along the lower Mississippi River Valley and the Ohio River Valley, including the Appalachian region. Similar patterns were observed for blacks and whites, although the pattern for Hispanics differed.

Conclusions The evidence of substantial geographic disparities in HF hospitalizations among Medicare beneficiaries is important information for health professionals to incorporate as they design prevention and treatment policies and programs tailored to the needs of their communities. (J Am Coll Cardiol 2010;55:294–9) © 2010 by the American College of Cardiology Foundation

The burden of heart failure (HF) has been well documented at the national level (1–4). The number of prevalent HF cases is approximately 5,700,000 and continues to increase, in part because of improved survival and better care of patients with acute myocardial infarction (AMI) and increased prevalence of hypertension and diabetes mellitus, as well as the aging of the U.S. population (1,3,5,6). It is estimated that the lifetime risk of developing HF is 20% among persons age 40 years or older (7). More than 1.1 million people were hospitalized with HF as the principal diagnosis in 2006 and >290,000 people died from HF-related diseases in 2004 (3). The economic cost of HF, including direct medical costs and indirect costs due to loss of productivity, is >$37 billion (3). The prevalence rate of HF increases with age and is higher among non-Hispanic blacks than among non-Hispanic whites and Mexican Americans, based on estimates from the National Health and Nutrition Examination Survey (3).

However, very little is known about geographic disparities in HF at the local level. One recent study examined regional differences in HF hospitalization rates among the 4 main regions of the U.S. (Northeast, Midwest, South, and West) (8), and another recent study published HF readmission rates among Medicare beneficiaries using hospital referral regions as the unit of analysis (9). However, we believe there have been no published studies of county-level HF hospitalization rates. In this brief report, we document the geographic disparities in the burden of HF among fee-for-service Medicare beneficiaries, by race-ethnicity, at the county level for the aggregated years 2000 to 2006.

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Methods

The study population consisted of fee-for-service Medicare beneficiaries ages ≥65 years who resided in the U.S., Puerto Rico, or the U.S. Virgin Islands during the years 2000 to 2006. Beneficiaries were excluded if they were members of a health maintenance organization, died before July 1, or were younger than 65 years of age on July 1 of each of the study years.

We obtained hospital claims data included in the Medicare Provider Analysis and Review, Part A, for our study population from the Centers for Medicare and Medicaid Services. We defined a HF hospitalization as a short-stay hospital claim with a principal (first-listed) discharge diagnosis of HF using the International Classification of Diseases-9th Revision-Clinical Modification (10) code 428.

We calculated spatially smoothed and age-adjusted average annual county-level HF hospitalization rates per 1,000 Medicare beneficiaries for the total population and by racial/ethnic group (blacks, Hispanics, and whites) for the years 2000 to 2006. To produce more stable rates in counties with small populations, spatial smoothing was performed using a spatial moving average and the contiguity matrix from the Area Resource File. Hospitalization rates were directly age-standardized to the 2000 U.S. standard population, age ≥65 years. For the total population and each racial/ethnic group, county-level HF hospitalization rates were categorized into quintiles, and maps were produced using Environmental Systems Research Institute (ESRI) software (Redlands, California) to document the geographic distribution of HF hospitalization rates for the total population, blacks, Hispanics, and whites.

We identified the race/ethnicity of each beneficiary on the basis of the race code on the claim record for a patient's hospital stay. Because race and Hispanic ethnicity were not

Abbreviations and Acronyms

AMI = acute myocardial infarction

HF = heart failure

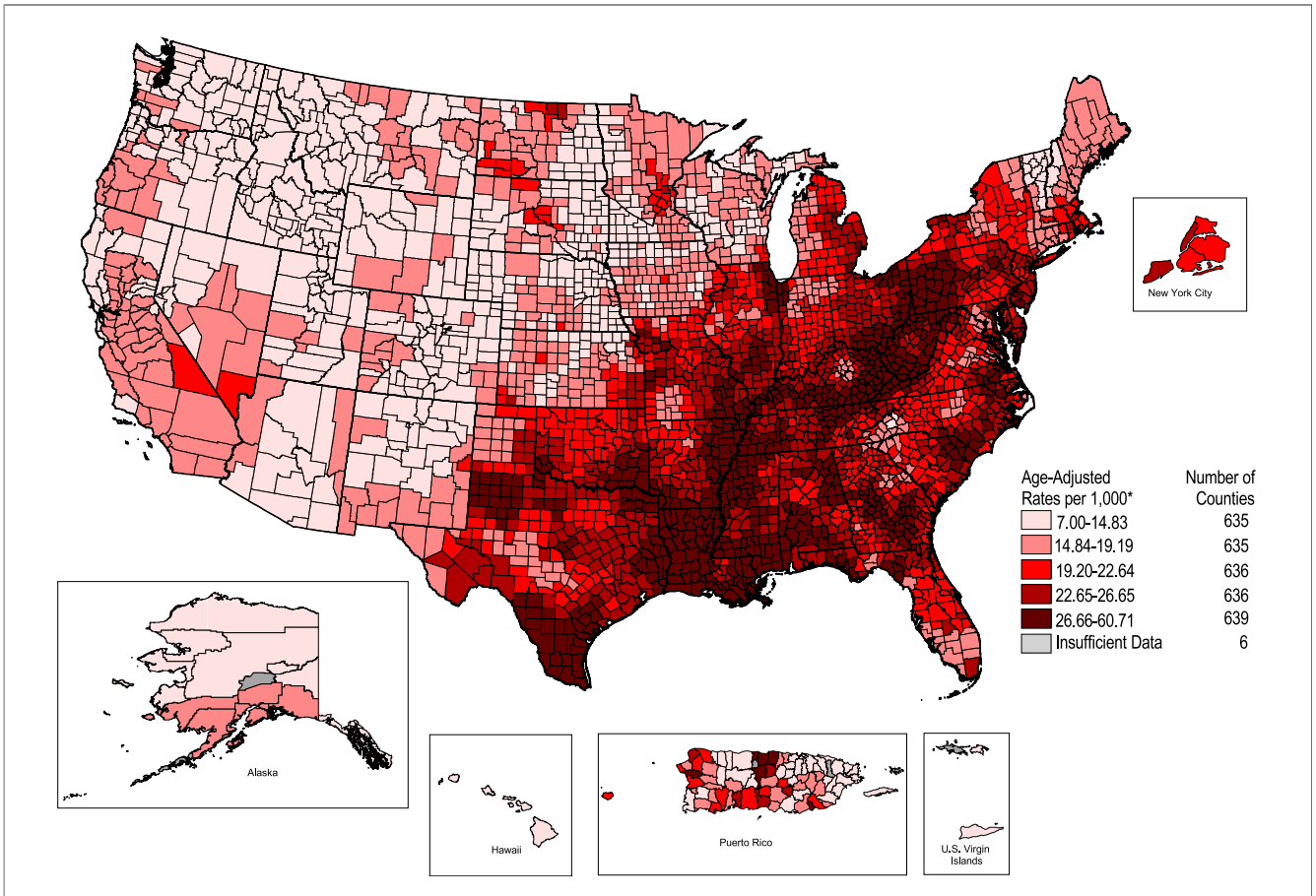

Figure 1 HF Hospitalization Rates Among Medicare Beneficiaries, Age ≥65 Years, 2000–2006: Total Population

The map depicts age-adjusted and spatially smoothed county-specific heart failure (HF) hospitalization rates per 1,000 among fee-for-service Medicare beneficiaries, age 65 years and older, for the aggregated years 2000 to 2006. HF hospitalization was defined as principal discharge diagnosis of HF using the International Classification of Diseases-9th Revision-Clinical Modification code 428. Counties labeled as "insufficient data" (n = 6) did not have large enough populations of Medicare beneficiaries to produce stable rates of HF hospitalization. A clear East-West gradient was evident, with the highest rates located primarily along the lower Mississippi River Valley and the Ohio River Valley, including the Appalachian region. *HF hospitalization rates are spatially smoothed to enhance the stability of rates in countries with small populations. Source: Medicare Provider Analysis and Review (MEDPAR).