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Primary Prevention Implantable Cardioverter-Defibrillators and Survival in Older Women

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ABSTRACT

OBJECTIVES The purpose of this study was to assess the benefit of primary prevention implantable cardioverter defibrillators (ICDs) in women.

BACKGROUND Clinical trials of primary prevention ICDs enrolled a limited number of women.

METHODS Using a propensity score method, we matched 490 women ≥65 years of age who received an ICD during a hospitalization for heart failure in the National Cardiovascular Data Registry ICD Registry from January 1, 2006, through December 31, 2007, to 490 ICD-eligible women without an ICD hospitalized for heart failure in the Get With The Guidelines for Heart Failure database from January 1, 2006, through December 31, 2009. The primary endpoint was all-cause mortality obtained from the Medicare Claims Database. An identical analysis was conducted in men.

RESULTS Median follow-up for patients with an ICD was 4.6 years versus 3.2 years for patients with no ICD. Compared with women with no ICD, those with an ICD were younger and less frequently white. In the matched cohorts, the survival of women with an ICD was significantly longer than that of women without an ICD (adjusted hazard ratio: 0.79, 95% confidence interval: 0.66 to 0.95; $p = 0.013$). Similarly, men with an ICD had longer survival than men without an ICD (adjusted hazard ratio: 0.73, 95% confidence interval: 0.65 to 0.83; $p < 0.0001$). There was no interaction between sex and the presence of an ICD with respect to survival ($p = 0.44$).

CONCLUSIONS Among older women with left ventricular dysfunction, a primary prevention ICD was associated with a significant survival benefit that was nearly identical to that seen in men. These findings support the use of primary prevention ICDs in eligible patients regardless of sex. (J Am Coll Cardiol HF 2015;3:159–67) © 2015 by the American College of Cardiology Foundation.

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ABBREVIATIONS AND ACRONYMS

AHA = American Heart Association

CI = confidence interval

CMS = Centers for Medicare and Medicaid Services

CRT = cardiac resynchronization therapy

GWTG = Get With The Guidelines

HF = heart failure

HR = hazard ratio

HRS = Heart Rhythm Society

ICD = implantable cardioverter-defibrillator

LVEF = left ventricular ejection fraction

NCDR = National Cardiovascular Data Registry

Randomized clinical trials demonstrating a benefit of primary prevention implantable cardioverter-defibrillators (ICDs) comprised only 10% to 30% women (1–4). This lack of trial information, in part, led some to question whether primary prevention ICDs are beneficial in women; however, ICD recommendations in practice guidelines make no distinction between women and men (5,6). Studies have subsequently demonstrated substantially lower use of primary prevention ICDs in women seen in clinical practice (7,8). This disparity is likely multifactorial and may be in part caused by the lack of definitive data on the survival benefit of ICDs in women. Indeed, various retrospective and post-hoc analyses of existing trial data have produced conflicting results (9–14).

A Canadian registry-based study of a combined primary and secondary prevention ICD population demonstrated a wide sex differential in referrals for ICD but similar survival rates among men and women with an ICD (15). In addition, a recent single-center study matched men and women with ICDs by propensity score and found that mortality benefit was similar (16). Other comparisons of the mortality benefit associated with ICDs between men and women have reached similar conclusions (17,18). However, to date, there has been no large multicenter analysis comparing survival in eligible women with and without a primary prevention ICD. Although ideally one would conduct an adequately powered randomized clinical trial to address this specific question, such a trial is highly unlikely because of the associated cost and ethical challenges.

Therefore, this analysis of women in the National Cardiovascular Data Registry (NCDR) and American Heart Association (AHA) Get With The Guidelines-Heart Failure (GWTG-HF) database was conducted to examine the survival difference between women with a primary prevention ICD and eligible women with no ICD. Indeed, one of the primary goals of the NCDR is to determine whether the randomized controlled trial findings can be applied to subpopulations of interest, including women (19).

METHODS

DATA SOURCES. Data for this investigation were acquired from 3 sources: the NCDR ICD Registry, the GWTG-HF database, and the Centers for Medicare & Medicaid Services (CMS). The NCDR ICD Registry and the GWTG-HF database have been described previously (7,20,21). The ICD Registry was launched in 2005 by the American College of Cardiology and the Heart Rhythm Society to meet a CMS mandate that requires submission of data on all Medicare beneficiaries receiving a primary prevention ICD, but a large majority of participating hospitals submit data on all ICD implants. Data are submitted to the ICD Registry via a secure website and then undergo rigorous electronic quality checks. Formal auditing demonstrates that data within the NCDR accurately represent data from medical charts (22). In the most recently available audit data, the raw accuracy of data abstraction for the ICD Registry was 91.2%.

The GWTG program began in 2000 as a voluntary data collection and hospital-based quality improvement initiative. The HF module originated in March 2005 (23). Data quality is monitored via automated checks and site visits to ensure completeness and accuracy; only fully participating hospital sites are used in the analyses. Formal auditing of sample records showed a very high data quality against medical record sources (24). Quintiles Inc. (Durham, North Carolina) serves as the data collection (through their Patient Management Tool [PMT]) and coordination center for the AHA/American Stroke Association GWTG programs. The Duke Clinical Research Institute (Durham, NC) serves as the data analysis center and has an agreement to analyze the aggregate deidentified data for research purposes. Data include demographic and clinical characteristics, comorbidities, previous therapies and interventions, contraindications to evidence-based therapies, and in-hospital outcomes. Data on ICD therapy include whether an ICD was present on admission, was implanted during the index hospitalization, or was planned after hospital discharge; contraindications to ICD therapy; and any reason documented by a physician for not implanting an ICD during the index hospitalization. Patients enrolled in the GWTG-HF

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