

PERSPECTIVE

# Impact of Current Versus Previous Cardiac Resynchronization Therapy Guidelines on the Proportion of Patients With Heart Failure Eligible for Therapy



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## ABSTRACT

**OBJECTIVES** This study sought to ascertain the impact of heart failure (HF) guideline change on the number of patients eligible to undergo cardiac resynchronization therapy (CRT).

**BACKGROUND** The 2013 HF guideline of the American College of Cardiology Foundation and American Heart Association (ACCF/AHA) narrowed the recommendations for CRT. The impact of this guideline change on the number of eligible patients for CRT has not been described.

**METHODS** Using data from Get With The Guidelines–Heart Failure between 2012 and 2015, this study evaluated the proportion of hospitalized patients with HF who were eligible for CRT on the basis of historical and current guideline recommendations. The authors identified 25,102 hospitalizations for HF that included patients with a left ventricular ejection fraction (LVEF)  $\leq 35\%$  from 283 hospitals. Patients with a medical, system-related, or patient-related reason for not undergoing CRT were excluded.

**RESULTS** Overall, 49.1% (n = 12,336) of patients with HF, an LVEF  $\leq 35\%$ , and no documented contraindication were eligible for CRT on the basis of historical guidelines, and 33.1% (n = 8,299) of patients were eligible for CRT on the basis of current guidelines, a 16.1% absolute reduction in eligibility (p < 0.0001). Patients eligible for CRT on the basis of current guidelines were more likely to have CRT with an implantable cardioverter-defibrillator or CRT with pacing only placed or prescribed at discharge (57.8% vs. 54.9%; p < 0.0001) compared with patients eligible for CRT on the basis of historical guidelines.

**CONCLUSIONS** In this population of patients with HF, an LVEF  $\leq 35\%$ , and no documented contraindication for CRT, the current ACCF/AHA HF guidelines reduce the proportion of patients eligible for CRT by approximately 15%. (J Am Coll Cardiol HF 2017;5:388–92) © 2017 by the American College of Cardiology Foundation.

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The 2009 American College of Cardiology Foundation and American Heart Association (ACCF/AHA) heart failure (HF) guidelines recommended cardiac resynchronization therapy (CRT) in patients with a left ventricular ejection fraction (LVEF)  $\leq 35\%$ , New York Heart Association (NYHA) functional class III or IV symptoms, and a QRS duration of  $\geq 120$  ms (1). However, evidence since that time has demonstrated CRT to be effective in patients in NYHA functional class II (2), and it has revealed that the benefit of CRT is most evident in those patients with a QRS duration  $\geq 150$  ms (3), as well as patients with a left bundle branch block (LBBB) pattern (4). On the basis of these data, the current (2013) ACCF/AHA HF guidelines expanded the eligibility criteria for CRT to include patients in NYHA functional class II but limited the criteria to recommend CRT only in patients with an LVEF  $\leq 35\%$ , sinus rhythm, and LBBB or non-LBBB and a QRS duration  $\geq 150$  ms (5). Using the AHA's Get With The Guidelines-Heart Failure (GWTG-HF) registry, we describe the difference in the proportion of patients eligible for CRT on the basis of current and historical guidelines.

## METHODS

We used patients from the GWTG-HF registry from October 1, 2012 to September 30, 2015 who had at least 75% complete data on medical history ( $n = 192,254$ ). Patients' baseline and discharge characteristics, diagnostic test and laboratory values, medical history, medications, outcomes at discharge, and device-related measures are submitted by trained health care workers into the Internet-based GWTG-HF Patient Management Tool (Quintiles Real-World and Late Phase Research, QuintilesIMS, Durham, North Carolina). Information on cardiac rhythm was not collected, and patients without sinus rhythm could not be excluded. For the present study, we excluded patients with the following: quantitative LVEF, QRS duration or QRS morphology information missing ( $n = 24,620$ ); LVEF  $> 35\%$  ( $n = 106,570$ ); new onset HF ( $n = 12,642$ ); death in hospital ( $n = 1,519$ ); transfer to another acute care facility or hospice ( $n = 3,295$ ); left against medical advice or discharge information missing ( $n = 715$ ); and discharge to a skilled nursing facility or rehabilitation center ( $n = 6,327$ ). We further

excluded 11,464 patients with a documented contraindication to CRT. "Not being NYHA functional class III or IV" was also listed as a contraindication for CRT within the GWTG-HF, but these patients were not excluded from this study.

We defined patients to be guideline eligible for CRT according to historical guidelines if they met the following criteria: QRS duration  $\geq 120$  ms and NYHA functional class III or IV (i.e., patients documented as "not being NYHA functional class III or IV" were not eligible for CRT on the basis of historical guidelines). We defined patients to be guideline eligible for CRT on the basis of current guidelines if they met the following criteria: LBBB with a QRS duration  $\geq 120$  ms or non-LBBB (right bundle branch block or interventricular conduction delay) with a QRS duration  $\geq 150$  ms and NYHA functional class III or IV (i.e., patients who were documented as "not being NYHA functional class III or IV" with non-LBBB were not eligible for CRT on the basis of current guidelines). For patients with LBBB, NYHA functional class was not included in our eligibility assessment. However, only 2% of our final study cohort was documented as not being in NYHA functional class III or IV, and we believe that most patients hospitalized for HF are at least in NYHA functional class II.

Baseline characteristics are presented as medians with 25th and 75th percentiles for continuous variables and percentages for categorical variables. Patients' baseline characteristics were compared between patients eligible for CRT on the basis of historical versus current guideline recommendations by using standardized differences. Device-related measures before and during hospitalization and device- and medication-related measures at discharge are presented as percentages and are compared by patients eligible for CRT on the basis of historical versus current guidelines with the use of 2 sample Student *t* tests. CRT eligibility on the basis of historical versus current guideline recommendations was also examined for QRS morphology and QRS duration subgroups. All *p* values are 2-sided, with  $p < 0.05$  considered statistically significant. All analyses were completed using SAS version 9.4 software

## ABBREVIATIONS AND ACRONYMS

**ACCF/AHA** = American College of Cardiology Foundation and American Heart Association

**CRT** = cardiac resynchronization therapy

**CRT-D** = cardiac resynchronization therapy with an implantable cardioverter-defibrillator

**CRT-P** = cardiac resynchronization therapy with pacing only

**GWTG-HF** = Get With The Guidelines-Heart Failure

**HF** = heart failure

**ICD** = implantable cardioverter-defibrillator

**LBBB** = left bundle branch block

**LVEF** = left ventricular ejection fraction

**NYHA** = New York Heart Association

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