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Disparity in utilization of implantable cardioverter-defibrillators in treatment of heart failure based on sex and race

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Evaluation of: Hernandez AF, Fonarow GC, Lang L *et al.*: Sex and racial differences in the use of implantable cardioverter-defibrillators among patients hospitalized with heart failure. *JAMA* 298(13), 1525–1532 (2007) [1]. Disparity of utilization of proven therapies for treatment of cardiac disease according to gender and ethnicity has been well documented in various aspects of cardiac care. Implanted cardiac defibrillators (ICDs) are devices that have been proven to prevent sudden cardiac death. This retrospective study examined ICD use in heart-failure patients who had an indication for ICD implantation, from the "Get with the Guidelines" program. The patients were stratified by gender and ethnicity (Black vs White). The overall rate of utilization (or intention for utilization) of ICDs was 35%, while among women and Black people the rate was significantly lower, at 27 and 23%, respectively, with the lowest rate being for Black women (28%). These findings suggest a bias against implantation of such devices in women and Black people, which is not explained by clinical variables.

Sudden cardiac death (SCD) is a feared complication of heart failure. Half of this mortality is attributed to lethal ventricular arrhythmias that can be effectively avoided by implantation of a cardiac defibrillator (ICD). Numerous clinical trials have proven the survival benefit of ICDs and current guidelines promote implantation of an ICD both in primary and secondary prevention of SCD, primarily based on the ejection fraction (EF) [2–4]. Regardless of the etiology of reduced left ventricular function, an EF of less than 30% is considered an indication for implantation of an ICD. However, implantation of an ICD is costly [5] and does not always improve quality of life, as some patients may suffer painful, inappropriate shocks.

Disparity in cardiac care based on sex and race is well recognized. Women and Black people are less likely to be referred for cardiac catheterization [6], for coronary artery bypass surgery or for use of thrombolytics in myocardial infarction [7]. Prior studies have indicated that implantation of ICDs may also be biased. A review of the Medicare and Medicaid beneficiaries noted that in 2002, for patients diagnosed with ischemic cardiomyopathy, 10% of men versus 3.5% of women and 8.1% of White people versus 5.4% of Black people had an ICD implanted [8]. In a similar analysis of Medicare data, of a 5% sample from all hospitalized Medicare patients over the course of 5 years, Curtis *et al.* identified cohorts of patients who had a cardiac arrest or ventricular tachycardia and had an ICD implanted for

secondary prevention. Men were 2.4-times more likely than women to have an ICD implanted. In the group with ischemic cardiomyopathy, without a prior cardiac arrest, men were 3.2-times more likely than women to have an ICD implanted for primary prevention [9]. A shortfall of both studies is the lack of clear indication for device implantation based on the coding diagnosis of ischemic cardiomyopathy alone; thus, it is not clear if an actual treatment lapse occurred.

Hernandez *et al.* studied data from the 'Get to the Guidelines' program. This is an ongoing, voluntary, observational registry of patients in 217 hospitals used primarily for quality assurance. Between January 2005 and January 2007, these hospitals admitted 59,965 patients with heart failure. A total of 13,034 of these patients were documented as having an EF of less than 30%, which would fulfill the criteria of current guidelines to justify implantation of an ICD. The authors examined the frequency of actual implantation or documented intention for implantation of an ICD in these patients, as well as in specific patient groups, based on ethnicity and gender [1].

The findings show that the frequency for White males was 43%, for Black males 33%, for White women was 29% and for Black women was 28%. This translated into a significant difference in the odds ratio for device implantation: for Black men 0.73, White women 0.62 and Black women 0.56 ($p \leq 0.001$). These differences persisted after controlling for insurance, age, prognosis, comorbidities and locality. The authors conclude that despite

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recommendations and insurance coverage, ICD therapy is underused in all patient groups, and markedly more so in women and Black people [1].

In their discussion, the authors note that in the original trials validating the use of ICDs, women and Black people were under-represented and underpowered to make conclusions regarding the utility of ICDs in these subgroups, possibly causing physicians to refrain from recommendations for these populations. Even so, based on the limited data, the guidelines make no distinction on the basis of gender or ethnicity regarding ICD indications. Another possible explanation for the observed differences may be in the quality of care that these patients are receiving, with minorities being treated at facilities with less, well-trained personnel; however, the authors adjusted for hospital characteristics and found their conclusion to remain valid. Other possible confounders include compliance with physician recommendations in these patient groups. Ethnic groups have been reported to distrust specialist recommendations [10]. This may be compounded by under-representation of women and minorities in the specialty work force that is making these recommendations [11]. In actuality, little is known regarding the characteristics of patients who refuse ICD implantation.

Reviewer's perspective

This study found that the rate of ICD implantation in provisionally indicated patients with heart failure is low and disproportionately lower in women and Black people. However, the conclusion that there is a general lack of conformation with guidelines may be somewhat misleading. It is not clear why a large proportion of apparently indicated patients did not receive ICDs. In actual practice, an ICD would not necessarily be implanted during the course of a hospitalization for heart failure. An attempt should first be made to optimize medical therapy, and then reassess the EF as well as functional capacity on an ambulatory basis. If the EF and functional capacity remain low, a defibrillator with cardiac resynchronization capabilities should be considered [12], and this decision is generally not made during a hospitalization for acute heart failure. The authors attempted to include in their study only patients who met all ICD implant criteria (documentation of appropriate medical therapy as well as adequate waiting periods after initial diagnosis and any revascularization) as well as excluding those with a documented contraindication to an ICD. However, this method relied on adequate

documentation of these data points, which was almost surely incomplete. For example, lack of documentation of a contraindication to ICD use does not mean there was no contraindication that precluded ICD consideration. Beyond this, it is not clear whether physicians did not refer appropriate candidates for ICD therapy, or if patients declined an ICD when offered.

Regardless of these factors, the authors' finding of a relative bias towards underuse of ICDs in minorities and women remains valid and joins other studies both in ICD implantation and in other proven interventions that are underutilized in these patient groups. Clearly, further research is needed into the reason or reasons behind this inequity. If physicians are systematically not offering this therapy to certain patient groups, this must be addressed with better physician education or other methods, perhaps even including application of certain therapies across gender and ethnic groups in performance measures. On the other hand, if research shows that women, Black people and other groups are more likely to decline ICD therapy when offered, the reasons for this will need to be explored. Clinical trials should be encouraged to enroll minorities and women, to enable evidence-based decisions in their care. Physician education is important to overcome possible nonclinical influences in the decision-making process. These are essential steps in order to ensure equality in healthcare.

Future perspective

More research is urgently needed into reasons behind unequal application of advanced therapies, such as implantable cardioverter-defibrillators, to women and minorities. Many possible reasons have been put forth, with widely different implications and solutions. Funding for such research may be difficult to obtain but must be prioritized; only then will it be possible to more equitably distribute potentially life-saving treatments.

Financial & competing interests disclosure

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Executive summary

- The research by Hernandez *et al.* shows that not only are a minority of apparent candidates for implantable cardioverter-defibrillators (ICDs) actually receiving these life-saving devices, but that Black people and women are even less likely to receive ICD therapy.
- Their study was not designed to reveal the reasons for these findings; speculation ranges from physician bias in not offering potentially life-saving therapies to all candidates, and more particularly Black people and women, to a greater tendency for patients in these subsets to decline therapies that are offered.
- This study joins a growing body of research showing a surprisingly unequal application of advanced cardiovascular therapies.
- Understanding the reasons for these inequities will be necessary in order to correct them, and is urgently needed.

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