Received: 28 October 2019 | Accepted: 31 October 2019

DOI: 10.1002/joa3.12263

EDITORIAL

Journal of Arrhythmia Open Access WILEY

Editorial to implantable cardioverter defibrillator and cardiac resynchronization therapy use in New Zealand (ANZACS-QI 33)

Sudden cardiac death (SCD) is an important public health problem that accounts for 15%-20% of the total annual mortality in industrialized nations.[1] Implantable cardioverter-defibrillator (ICD) is a useful tool for improving the prognosis of heart failure and/or ventricular arrhythmias. Cardiac resynchronization therapy (CRT) provides a significant reduction in the morbidity and mortality in selected patients with left ventricular systolic dysfunction and specific parameters of electrocardiographic evidence of dyssynchrony. Analyzing the national database regarding ICD/CRT was useful for understanding the national features of cardiac disease. In Japan, the Japan Cardiac Device Treatment Registry (JCDTR) was established in 2006 by the Japanese Heart Rhythm Society (JHRS) for a survey of the actual conditions in patients undergoing cardiac device implantations.

In New Zealand, almost half of the ICDs were implanted for primary prevention, but in Japan only 42%. The primary prevention ratios reported in several international registries over the past decade are as follows: 46% in Denmark, 55% in Germany, 57% in the United Kingdom, 59% in Sweden, 62% in Spain, 63% in France, 82% in Italy, 73% in Canada, and 75% in the United States. Compared with the Western countries, the incidence of an ICD implantation for primary prevention has been relatively low in Asian countries. New Zealand is a multiethnic country and, though New Zealand belongs to the Asia region, about three-fourths of the patients are European. Interestingly, however, an ischemic etiology accounted for only 43% of the primary prevention and 56% of the secondary prevention indications. ICD implantations for primary prevention due to SCD have been largely affected by the nationality and religious reasons. In Japan, the major underlying diseases of patients in the JCDTR were ischemic cardiomyopathy (ICM, 35%), dilated cardiomyopathy (DCM, 25%), hypertrophic cardiomyopathy (HCM, 8%), and Brugada syndrome (8%).[2] The incidence of ICM was relatively lower than that of the Western countries, whereas the incidence of non-ischemic cardiomyopathy (NICM) was higher. The incidence of primary prevention among the individual diseases has varied. ICM was the most prevalent underlying condition in the patient cohort; however, the incidence of primary prevention was 33%, which was relatively lower than that of the other structural heart diseases. The incidence of primary prevention was relatively higher in patients with DCM (57%) and Brugada syndrome (47%). In the Sudden Cardiac Death in Heart Failure Trial (SCD-HeFT) that randomly assigned 2521 symptomatic individuals with either ischemic (n = 1310) or non-ischemic (n = 1211) heart failure and an left ventricular ejection fraction (LVEF) ≤35% to a placebo, amiodarone, or ICD, compared with the placebo, the ICD group was associated with a 23% relative risk reduction and an absolute decrease of 7.2% in the all-cause mortality after 5 years of follow-up. However, that benefit was not statistically significant in the stratified analysis of NICM participants (hazard ratio [HR] 0.73, 95% confidence interval [95% CI] 0.50-1.07; P = .06).[3] Although individual ICD trials have failed to demonstrate a mortality benefit with prophylactic ICD implantations, multiple meta-analyses of primary prevention in ICD use for the NICM population as well as ICM have demonstrated a clinical efficacy. The Heart Rhythm Society (HRS) guidelines have continued to recommend prophylactic ICD implantations in patients with NICM, an LVEF ≤35%, and NYHA Class II-III heart failure despite optimal medical therapy. However, the recent Danish Study to Assess the Efficacy of ICDs in Patients with Non-ischemic Heart Failure on Mortality (Danish) study also demonstrated that there was no clinical benefit of primary prevention in patients with NICM.[4] Other recent trials also demonstrated similar results, and therefore, the number of ICD implantations in patients with NICM might be gradually decreasing in response to these various negative results in the near feature; however, the evaluation of the SCD risk stratification in patients with NICM will become a more clinically important issue for primary prevention. In a pre-specified analysis from the DANISH trial, the survival benefit from an ICD implantation was seen only in patients ≤70 years of age. Among the patients ≥70 years of age, the rate of non-sudden death was nearly twice as high as that in the younger population, and no mortality benefit was seen with an ICD implantation. As a result of this age interaction, the widespread use of cardioprotective therapies including CRT, and overlap of the mortality benefit to a prophylactic ICD implantation, clinicians are critically evaluating the evolution of heart failure management, ICD implantations, and the SCD risk stratification in NICM. As a result, a refined approach of risk stratification that selects patients at the

highest risk for SCD may lead to a significant improvement in the ICD efficacy. Advances in cardiac imaging, biologic markers, and non-invasive electrophysiologic testing have the potential to provide insights into ventricular arrhythmia risk stratification. Future studies that incorporate traditional measures of risk stratification with novel methods may have the potential to enhance the benefits of prophylactic ICD implantations.

The advent of CRT has resulted not only in an improved morbidity from heart failure but also a reduction in mortality events. In the Comparison of Medical Therapy, Pacing and Defibrillation in Heart Failure (COMPANION) trial, both CRT with a pacemaker function only (CRT-P) and CRT with a defibrillator (CRT-D) demonstrated a similar reduction in the mortality risk. Furthermore, the Cardiac Resynchronization-Heart Failure (CARE-HF) study also demonstrated that CRT pacing alone reduced the mortality in NICM patients as compared to that with medical therapy only. The addition of primary prevention, defibrillator therapy over CRT pacing only is beneficial in well-selected patients with ICM. In the AHA/ACC/ESC guidelines, the indication for CRT-P and CRT-D implantations partially overlapped, and therefore, the choice of a CRT-P or CRT-D implantation in patients with severe heart failure largely depends on the physician's discretion. To clarify the characteristics of this decision making is clinically important. According to the JDCTR in Japan, a younger age, being male, reduced LVEF, and history of non-sustained ventricular tachycardia (NSVT) are independently associated with the choice of a CRT-D for primary prevention of SCD.[5] Interestingly, in New Zealand, as well as in Japan, similar features were observed in the patient selection of CRT-P and CRT-D implantations.

ACKNOWLEDGEMENT

I thank Mr John Martin for his linguistic assistance with this article.

CONFLICT OF INTERESTS

Author declares no conflict of interests for this article.

Hitoshi Minamiguchi MD

Department of Cardiovascular Medicine, Osaka Graduate School of Medicine, Suita, Japan

Email: hminami@cardiology.med.osaka-u.ac.jp

ORCID

Hitoshi Minamiguchi https://orcid.org/0000-0002-3319-6316

REFERENCES

1. Mozaffarian D, Benjamin EJ, Go AS, Arnett DK, Blaha MJ, Cushman M, et al. Heat disease and stroke statistics-2016 update: a report from the American heart association. Circulation. 2016;133:e38–60.
2. Shimizu A, Nitta T, Kurita T, Imai K, Kobayashi Y, Soejima K, et al. Actual conditions of implantable defibrillator therapy over 5 years in Japan. J Arrhythmia. 2012;28:263–72.
3. Bardy GH, Lee KL, Mark DB, Poole JE, Packer DL, Boineau R, et al. Amiodarone or an implantable cardioverter-defibrillator for congestive heart failure. N Engl J Med. 2005;352:225–37.
4. Køber L, Thune JJ, Nielsen JC, Haarbo J, Videbæk L, Korup E, et al. Defibrillator implantation in patients with nonischemic systolic heart failure. N Engl J Med. 2016;375:1221–30.
5. Yokoshiki H, Shimizu A, Mitsuhashi T, Furushima H, Sekiguchi Y, Manaka T, et al. Trends and determinant factors in the use of cardiac resynchronization therapy devices in Japan: analysis of the Japan cardiac device treatment rejistry database. J Arrhythmia. 2016;32:486–90.