

Do Ontario Patients with Heart Failure Have Equal Access to Life-Saving Technology?

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The Issue

Sudden cardiac death (SCD) is a major cause of mortality, and many such events are due to lethal heart rhythm disturbances or ventricular arrhythmias. Patients with a prior heart attack and left ventricular dysfunction are at particularly high risk of SCD. Although the majority of drug therapies have been ineffective in preventing sudden cardiac death, the implantable cardioverter defibrillator (ICD) – a device similar in size to a pacemaker that allows for heart monitoring and immediate cardiac shock if necessary – has been found to significantly reduce the chance of mortality and arrhythmic death in those at increased risk of cardiac events. Randomized trials of the ICD found that it substantially improved outcome in cardiac arrest survivors.

The ICD was also found to offer significant survival benefits when used for primary prevention (i.e., in heart failure patients with no history of a cardiac arrest). The recommendations for ICDs were, therefore broadened to include those who have never had a cardiac arrest, but had reduced cardiac pump function and prior heart attack or heart failure.

However, there may be disparities in access to this technology because of its novelty and high cost (approximately \$30,000 per device). To better explore possible inequities in the use of implantable defibrillators in a universal healthcare environment, scientists at the Institute for Clinical Evaluative Sciences (ICES) examined the use of such procedures for the primary prevention of sudden cardiac death in Ontario from 1993 to 2004.

The Study

Using the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) from 1993 to 2004, ICES scientists identified patients who were discharged after hospitalization for congestive heart failure and who had established coronary disease, defined as a prior heart attack or hospitalization for unstable angina. To emulate a primary prevention patient population, those with prior cardiac arrest or a life-threatening episode of ventricular tachyarrhythmia were excluded from the analysis. The trends in ICD implantation rates including the influence of age, gender, place of residence and socioeconomic status were examined over time.

How Did ICD Implantation Rates Change over Time?

A total of 48,426 patients were studied during this period and of these, 440 patients (0.9%) received an ICD. The annual rate of ICD implantation increased from 0.12% in 1993 to 3.9% in 2004, representing a 32-fold increase in defibrillator implants during this time.

What Factors Determined Likelihood to Receive an ICD?

When the utilization of ICDs was examined by sex, there was significant disparity in the rates of use and increase over time (Figure 1). Throughout the entire study period, men were more than four times more likely to receive an ICD than women. Unequal access to implantable defibrillators was also seen in older patients. Patients who were 75 years of age or younger were three times more likely to receive an ICD than those who were older. Similarly, patients 65 years of age or younger were two times more likely to receive an ICD than those over 65 years of age. Over time, rates of ICD implants increased substantially in those younger than 75 years of age, but remained the same in older patients.

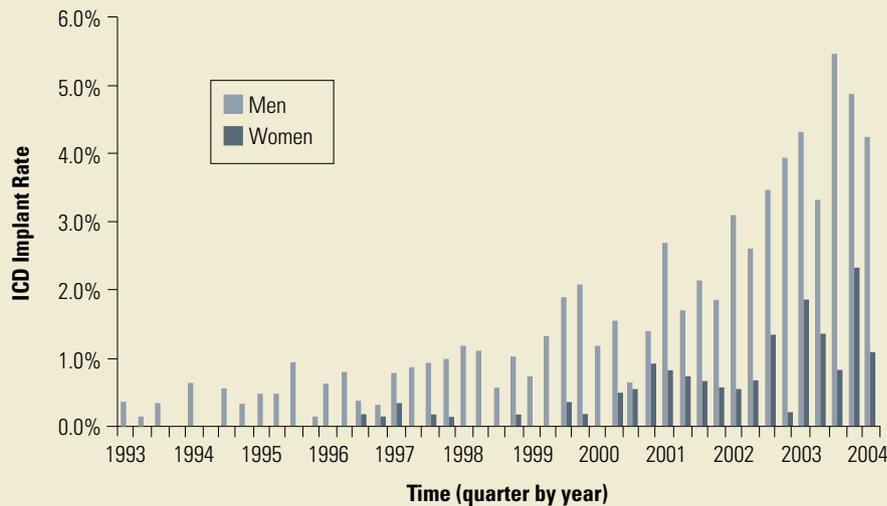
How Did Geographic Factors Impact on ICD Utilization?

Place of residence had a significant impact on whether Ontario patients would receive an implantable defibrillator. Those who lived in urban areas were 42% more likely to receive an ICD, as compared to those living in rural regions. When Ontario regions were divided into quintiles of socioeconomic status, those in the highest two quintiles of socioeconomic status (e.g., wealthier neighbourhoods) were 32% more likely to undergo ICD implants than those living in poorer regions.

What Do These Findings Mean?

Using more than a decade of population-based health data, scientists found significant inequities in ICD implantation rates for primary prevention, which is contrary to Canada's principle of universal access to care. Groups with significantly lower implantation rates included women, the elderly and those

Figure 1. Rates of implantable cardioverter defibrillator implantation for primary prevention in men and women per quarter, 1993–2004, in Ontario



living in areas that were rural or of lower socioeconomic status. Despite efforts to increase awareness of heart disease in women, the use of this potentially life-saving technology in women is persistently lower than in men. These findings suggest that there may be a bias in access to ICDs based on sex, or, alternately, biological differences in the indications for implantable defibrillators. Disadvantaged and vulnerable patients, including those of lower socioeconomic status and the elderly, are also afforded less access to ICDs even though these patients have traditionally been found to have worse cardiovascular outcomes.

Future Research

Future studies are needed to identify barriers to defibrillators for primary prevention and should explore whether biological factors, patient preferences, or gender bias contribute to access disparities. The impact of these disparities on mortality and morbidity from SCD should also be determined. The ongoing Ontario Implantable Cardioverter Defibrillator Database, a prospective province-wide registry of patients undergoing ICD implantation, may add new insights.

Conclusion

There is still uncertainty about the best approaches to use ICDs in the population, and this study demonstrates significant inequities of its use in patients with heart failure. Since these devices are very expensive, governments will face the challenging task of implementing targeted approaches to screening, ensuring that devices are implanted in those at greatest need, regard-

less of gender, age, income and geography, while also containing the potentially explosive costs of widespread ICD use. **HQ**

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