VIEWPOINT

Ethical Issues with Implantable Defibrillators

F. JAMES BRENNAN

From the Division of Cardiology, Queen’s University, Kingston General Hospital, Kingston, Ontario, Canada

Implantable cardioverter defibrillators (ICDs) reduce the risk of sudden cardiac death in high risk populations.1 These devices were initially used only in patients who had survived an episode of life-threatening ventricular tachyarrhythmia,2−4 but recent clinical trials have yielded favorable results in populations of patients who have not experienced such arrhythmias but who are at high risk.5−7 In The Second Multicenter Automatic Defibrillator Implantation Trial (MADIT II), for example, myocardial infarction survivors with poor left ventricular function were randomized to ICD or no ICD therapy.7 Patients treated with an ICD had a 3-year mortality rate of approximately 20%, while those receiving no ICD had a mortality rate of about 30% in the same period. The difference in mortality rates was statistically significant. Based on this study, a number of professional societies (including North American Society of Pacing and Electrophysiology [NASPE]) have recently released clinical practice guidelines endorsing ICD implantation for the primary prevention of sudden cardiac death in survivors of myocardial infarction who have a left ventricular ejection fraction < 0.30.8 This raises troubling ethical issues which have not yet received due attention.

Consider a hypothetical clinical trial in which survivors of myocardial infarction with low ejection fraction are randomized to receive drug X or placebo. After 3 years mortality is 30% in the placebo-treated group and 20% in the drug X-treated group. The difference is statistically significant. Mortality rates in the two groups are linear functions of time. The results are shown in Figure 1. For each treatment the area under the curve represents patient years lost due to death. The area between the curves represents the number of life years gained by the drug X-treated patient group over the placebo-treated group. This amounts to 15 years per 100 patients. These 15 years could be distributed evenly to each patient receiving drug X, in which case the benefit per patient would be 0.15 years (or 55 days). Alternatively, the benefit might be unevenly distributed with some patients getting more than 55 days and others getting less. The physician prescribing drug X does not know how much benefit each patient is going to get, but is able to assume that every patient receiving the drug gets some benefit.9 This provides rational and ethical justification for prescribing the drug routinely to all survivors of myocardial infarction with a low ejection fraction.

The situation is inherently different with ICD treatment for such patients. By interrogating the patients and their devices, the physician prescribing this form of therapy will be able to identify, albeit retrospectively, which individual patients received all the benefit. They will previously have received a shock or antitachycardia pacing therapy, which will have been recorded by the device if not recognized by the patient. Based on the results of MADIT II, for every 100 patients treated with an ICD, 10 will be alive after 3 years because of the treatment. Twenty will be dead, but some of these may have had their lives lengthened by ICD use. The 15 life years gained by this population of 100 patients will be distributed among no more than 30 of its members. The other 70 patients, who can be readily identified, will have received no benefit at all despite having been subjected to heavy financial cost, a surgical procedure under general anesthesia, the deliberate induction of ventricular fibrillation at least twice, regular trips to a facility where their devices can be monitored, and the risk of complications like infection, lead problems, and inappropriate shocks. With ICD therapy for the primary prevention of sudden cardiac death in myocardial infarction survivors with low ejection fraction, the physician cannot assume that every patient gets some benefit.

Differences in interpretation between drug trials and defibrillator trials may seem inconsequential to statisticians, epidemiologists, economists, and health care administrators who deal with populations. They are fundamentally important, however, to clinicians who deal with individual patients. It is a breach of medical ethics to prescribe a treatment that is expected to provide no benefit. The Code of Ethics of the Canadian Medical Association, for example, requires physicians to “Recommend only those diagnostic and therapeutic procedures that you consider to be beneficial to your patient or to others.”10 Clinicians should be reluctant to recommend a treatment that offers no benefit to at least seven of every ten recipients.

This leads to another ethical problem. Based on the foregoing considerations it would seem
logical and desirable to conduct research to identify, prospectively, which seven of every ten survivors of myocardial infarction with poor left ventricular function have a low risk of sudden cardiac death and do not need an ICD. It might be hypothesized, for example, that patients with a narrow electrocardiographic QRS complex,7 infrequent ventricular premature complexes,11 and/or no T wave alternans12 have a good prognosis and would get no benefit from ICD therapy. To test this hypothesis a clinical trial could be designed in which such patients were randomized to ICD therapy or no ICD therapy and followed to determine if those receiving an ICD had a survival advantage. An ethical clinical trial requires clinical equipoise, however, meaning that “...on the basis of the available data, a community of competent physicians would be content to have their patients pursue any of the treatment strategies being tested in a randomized trial, since none of them have been clearly established as preferable.”13 If the medical community prematurely embraces the notion that ICD therapy is the standard of care for myocardial infarction survivors with low ejection fraction, there will be an ethical objection to any trial in which some such patients are denied an ICD. In that case future clinical trials could only expand, not refine, the indications for ICD use.

ICD implantation rates are increasing rapidly as clinical trials like MADIT II identify the benefit for ever larger populations of patients, even though the benefit is confined to small numbers of individual patients within them. Rather than implanting ICDs in every member of these populations we should be striving to identify the individuals who will truly benefit, thereby sparing the majority of members the burdens of ICD therapy. This would obviously result in more cost-effective use of expensive and intrusive therapy as well.

The issue of whether or not an individual survivor of myocardial infarction with severe impairment of left ventricular function should receive an ICD forces us clinicians to carefully examine how we reconcile scientific data from clinical trials with ethical medical practice. At the present time, there remains a great deal of room for clinical judgment in the decision making process.

References