

The implantable cardioverter defibrillator was not as cost-effective as amiodarone for prolonging survival

O'Brien BJ, Connolly SJ, Goeree R, et al., for the CIDS Investigators. Cost-effectiveness of the implantable cardioverter-defibrillator. Results from the Canadian Implantable Defibrillator Study (CIDS). *Circulation*. 2001 Mar 13;103:1416-21.

QUESTION

In patients with resuscitated ventricular fibrillation (VF) or ventricular tachycardia (VT), is the implantable cardioverter defibrillator (ICD) more cost-effective than amiodarone for prolonging survival?

DESIGN

Randomized {allocation concealed*, unblinded*}†, controlled trial with 6.3-year follow-up (an economic substudy of the Canadian Implantable Defibrillator Study [CIDS]).

SETTING

{Centers in North America and Australia.}†

PATIENTS

Of the 659 patients with resuscitated VF or VT or unmonitored syncope {mean age 64 y, 85% men}† in the original CIDS, 430 were included in the economic substudy. All these patients were included in the analysis.

INTERVENTION

212 patients were allocated to the ICD and 218 to amiodarone.

MAIN COST AND OUTCOME MEASURES

Incremental cost-effectiveness, defined as the cost per year of life gained; survival; and health care resource use. Costs were in 1999 Canadian dollars (Can \$1 approximated US \$0.65) with a 3% annual discount rate.

MAIN RESULTS

Over 6.3 years, mean survival was 4.58 years in the ICD group and 4.35 years in the amiodarone group (difference 0.23 y, 95% CI -0.09 to 0.55 y). Mean duration of the initial hospital stay was longer for the ICD group (4.7 d in intensive care and 12.0 d on the ward) than for the amiodarone group (2.0 d in intensive care and 8.3 d on the ward). More hospital readmissions were seen in the ICD group (708 in 212 patients, or 3.3/patient) than in the amiodarone group (584 in 218 patients, or 2.7/patient). Mean costs per patient were Can \$87 715 in the ICD group and \$38 600 in the amiodarone group (difference \$49 115, 95% CI \$25 502 to \$69 508). The incremental cost-effective-

ness of ICD therapy was \$213 543 per life-year gained.

CONCLUSION

In patients with resuscitated ventricular fibrillation or ventricular tachycardia, use of the implantable cardioverter defibrillator was less economically attractive for prolonging survival than was use of amiodarone.

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For correspondence: Dr. B.J. O'Brien, Centre for Evaluation of Medicines, St. Joseph's Hospital, 50 Charlton Avenue East, H-329, Hamilton, Ontario L8N 4A6, Canada. FAX 905-521-6136. ■

*See Glossary.

†Connolly SJ, Gent M, Roberts RS, et al. *Circulation*. 2000;101:1297-302.

COMMENTARY

CIDS is the fourth reported randomized controlled trial that compared ICDs with antiarrhythmic drugs in recent years. The other 3 studies were the AVID (Antiarrhythmics versus Implantable Defibrillators) trial (1), the MADIT (Multicenter Automatic Defibrillator Implantation Trial) (2), and the CASH (Cardiac Arrest Study Hamburg) trial (3). CIDS allocated 600 patients to either ICD or amiodarone therapy. The current economic analysis limited itself to the first 430 patients. CIDS showed a small, statistically nonsignificant mortality advantage for patients in the ICD group, but the cost-benefit analysis showed a very high cost per year-of-life saved by ICDs. The authors concluded that ICD implantation was not cost-effective in these patients.

Several points should be made about this study relative to its predecessors. First, the patient populations in these trials have been different. For example, the CIDS patients had resuscitated VF, VT, or unmonitored syncope, whereas the CASH patients had all been resuscitated from cardiac arrest secondary to sustained malignant ventricular arrhythmias. Furthermore, MADIT studied postmyocardial infarction patients with a left ventricular ejection fraction < 35% and a positive cardiac electrophysiologic study result. Each subgroup of patients with arrhythmias has a different long-term prognosis; therefore, the results of each trial relate to the relative risk for sudden death of the particular patients studied in that trial. One should be cautious in drawing universal conclusions from the results of any 1 trial. Indeed, a cost analysis of the MADIT concluded that ICD implantation was cost-effective, showing approximately US \$28 000 per life-year gained compared with approximately US \$150 000 per life-year gained in the

CIDS trial. Second, 17% of the patients who received amiodarone crossed over and received an ICD during the > 6-year follow-up period. This crossover could have confounded the study to some degree. Finally, the quality-of-life data showed that patients assigned to the ICD group had better functioning on 5 of the 7 quality-of-life domains monitored during the trial.

Therefore, I believe one should accept the conclusion that in this population of patients, and considering only mortality, ICD implantation was not cost-effective. However, in other populations and considering other end points besides death, ICD implantation would seem to be more cost-effective.

*Joseph S. Alpert, MD
University of Arizona
Tucson, Arizona, USA*

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