Review: Implantable cardioverter defibrillators reduce sudden cardiac death, all-cause mortality, and cardiac mortality

Ezekowitz JA, Armstrong PW, McAlister FA. **Implantable cardioverter defibrillators in primary and secondary prevention: a systematic review of randomized, controlled trials.** Ann Intern Med. 2003;138:445-52.

QUESTION

In persons at risk for sudden cardiac death, do implantable cardioverter defibrillators (ICDs) reduce deaths?

DATA SOURCES

Studies were identified by searching MEDLINE, the Cochrane Central Register of Controlled Trials, EMBASE/Excerpta Medica, Web of Science, National Library of Medicine Gateway, Cardiosource, the Clinical Trials Registry, Clinicaltrials.gov, CRISP, the National Research Register, the Glaxo-Wellcome Clinical Trials Register, LILACS, OCLC ProceedingsFirst, and the National Health Service Economic Evaluation Database in September 2002. Conference proceedings and bibliographies of relevant papers were hand-searched, and experts, device manufacturers, and authors were contacted.

STUDY SELECTION

2 reviewers independently selected randomized controlled trials that included patients who were either at risk for sudden cardiac death or ventricular arrhythmia and had heart failure or coronary artery disease or were survivors of sudden cardiac death or unstable ventricular rhythm. Studies were excluded if patients had inherited arrhythmic disorders, the outcomes did not include sudden cardiac death or all-cause mortality, or crossover rates between groups were > 50%.

DATA EXTRACTION

Data were extracted on patient characteristics, control therapy, crossover rates, history of resuscitated arrest, coronary artery disease, mean ejection fraction, and outcomes (all-cause mortality, sudden cardiac death, total cardiac mortality, and total noncardiac mortality).

MAIN RESULTS

8 studies (4909 patients; mean follow-up 18 to 66 mo) were included. ICDs reduced sudden cardiac death, all-cause mortality (Table), and total cardiac mortality (5 studies, weighted relative risk reduction [RRR] 19%, 95% CI 4 to 31). Noncardiac mortality did not differ between groups (3 studies, weighted RRR 9%, CI −38 to 40).

CONCLUSION

In patients at risk for sudden cardiac death, implantable cardioverter defibrillators reduce sudden cardiac death, all-cause mortality, and cardiac mortality.

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Implantable cardioversion defibrillators (ICDs) vs control for increased risk for sudden cardiac death*

Outcomes	Number of trials	Weighted event rates		RRR (95% CI)	NNT (CI)
		ICDs	Control		
Sudden cardiac death	8	8.5%	22%	57% (47 to 64)	20 (16 to 27)
All-cause mortality	8	14%	28%	26% (18 to 33)	17 (12 to 26)

*Abbreviations defined in Glossary; weighted event rates, RRR, NNT, and CI calculated from data in article using a fixed-effects model.

COMMENTARY

The meta-analysis by Ezekowitz and colleagues has no surprises with the data set limited to the 8 well-known trials published in high-impact journals. As the authors note, a meta-analysis published 3 years ago of the secondary prevention data came to the same conclusion as their own with respect to the hazard ratio for benefit of secondary-prevention ICD use (1). It is important to note that these trials individually have essentially concordant results.

It is, however, not intuitive to combine this data set with the more compelling problem of primary prevention. The latter, by definition, excludes those with the highest (but most rare) risk factor of all: survival from cardiac arrest. Heterogeneity exists among the primary-prevention studies because of the 900-patient CABG Patch trial (2), which emphasized revascularization as a potent antiarrhythmia intervention. The 2 other significant primary-prevention trials—the MUSTT trial of 700 patients (3), which did not randomize patients to ICD therapy, and the MADIT II trial (4)—are both concordant and support the benefit of ICD therapy. Ezekowitz and colleagues conclude that prophylactic ICD therapy is warranted with a need for risk stratification to higher and lower risk groups.

They also note that their conclusions may be changed by data yet to arrive. For example, the American College of Cardiology 2003 preliminary presentation of the 1600-patient COMPANION trial supports the benefit of prophylactic ICD therapy with QRS width as a selection filter, as was suggested by MADIT II. The COMPANION trial also raises the question concerning the optimal ICD platform patients should receive (single, dual, or 3-chambered). Future trials will assess this question. In all, this analysis may have more influence on those involved in policy issues than on clinicians.

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