Can implantable cardioverter-defibrillator therapy reduce healthcare costs?

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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
Implantable cardioverter defibrillator (ICD) in resuscitated patients after cardiac arrest. The ICD generator Ventak P (CPI) defibrillator with +/- 3 years longevity was compared with a hypothetical future scenario using a Ventak Mini-2 with an assumed 5 years longevity.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
A hypothetical cohort of successfully resuscitated patients after cardiac arrest due to documented ventricular fibrillation or rapid ventricular tachycardia occurring more than 4 weeks after acute myocardial infarction.

Setting
Hospital. The study was carried out in Utrecht, the Netherlands.

Dates to which data relate
The effectiveness data were assumed to be based on data collected from the period 1989-1993. The resource use data were assumed to correspond to the period 1996-2000. The price year was 1993.

Source of effectiveness data
The estimates for the device longevity and post-implant hospital stay were derived from a review of previously published studies. The estimates for the effectiveness of ICD implantation, in terms of survival, were derived from experts' opinion.

Outcomes assessed in the review
The outcomes assessed were device longevity and post-implant hospital stay.

Study designs and other criteria for inclusion in the review
Not stated.

Sources searched to identify primary studies
No specific study designs were stipulated by the authors as inclusion criteria.
Criteria used to ensure the validity of primary studies
Not stated.

Methods used to judge relevance and validity, and for extracting data
Not stated.

Number of primary studies included
2 primary studies were selected.

Methods of combining primary studies
Narrative method.

Results of the review
The device longevity of Ventak P was 3 years and the post-implant hospital stay was 13 days (mean).

Methods used to derive estimates of effectiveness
Authors’ assumptions were used to estimate the effectiveness of ICD implantation in terms of survival for (29) patients undergoing defibrillator implantation using a new ICD generator device and leads along with changes in the surgical approach (for the period 1996-2000), relative to the ICD implantation procedure available during the period 1989-1993.

Estimates of effectiveness and key assumptions
The total number of days alive for 29 operated patients using the 1996-2000 and 1989-1993 procedures, was the same (25,544 days) during a mean follow-up of 27 months.

Measure of benefits used in the economic analysis
Since the effectiveness study assumed no difference in clinical benefit between the ICD procedure during the 1989-1993 and 1996-2000 periods, the economic analysis was based on the differences in costs only.

Direct costs
The costs measured were those associated with operating costs at the hospital. The analysis was based on resource use data from a study carried out in 1989-1993, and assumptions regarding the technical changes introduced to the procedure since then. Such assumptions involved the following elements:

1) A Ventak Mini-2 device implant needs no replacement for the period 1996-2000 (due to a life expectancy of the device of 5 years rather than the 3 years of the device used in the 1989-1993 study);

2) Post-implant hospitalization, including the days of hospitalization and discharge, will be 5 days (rather than 13, as before);

3) The number of days between day of decision to implant and the day of the implantation is 3 days (rather than 12 days in the period 1989-1993).

The analysis assumed constant prices from 1993 during the hypothetical study period (1996-2000). The quantity/cost boundary adopted was the hospital. Discounting was not applied.
Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis was performed.

Estimated benefits used in the economic analysis
Not applicable.

Cost results
The ICD implantation during the 1996-2000 period would be expected to reduce costs per patient by $11,530 ($44,537 versus $56,067).

Synthesis of costs and benefits
Not applicable.

Authors' conclusions
Modern ICD technology will be associated with an increasing reduction in health care costs, at least in selected patients. This reduction is associated with a more favourable cost-effectiveness ratio.

CRD COMMENTARY - Selection of comparators
The reason for the choice of comparator was clear. The ICD implantation procedure using the Ventak P ICD generator device was used as the comparator in the study. You, as a user of this database, should consider whether these are widely used health technologies in your own setting.

Validity of estimate of measure of benefit
The internal validity of the study results appears to be questionable due to the fact that they were based solely on assumptions, which need to be confirmed with actual data (as the authors recognized).

Validity of estimate of costs
Although reductions in key parameters of resource use were identified and reported, the validity of the cost results needs to be confirmed with actual data as in the case of the effectiveness study.

Other issues
The conclusions are unlikely to be justified given the uncertainties in the data. The issue of generalisability was not addressed.

Implications of the study
A study had begun, at the time this hypothetical study was completed, to support the results regarding the improvement in efficiency of ICD implantation in patients successfully resuscitated after cardiac arrest due to malignant ventricular tachyarrhythmias with chronic myocardial infarction.

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