Cost-effectiveness of guidelines for insertion of inferior vena cava filters in high-risk trauma patients

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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.

CRD summary
The study objective was to assess the cost-effectiveness of prophylactic versus therapeutic retrievable interior vena cava filters placement in high-risk trauma patients. The authors concluded that their results suggested that prophylactic filters were not cost-effective. The quality of the study methodology was adequate. Methods and results were reported appropriately. The authors’ conclusions mirror recommendations from most recent guidelines and appear appropriate.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective of the study was to assess the cost-effectiveness of prophylactic versus therapeutic retrievable interior vena cava filter (IVCF) placement in high-risk trauma patients with acute contraindications to anticoagulation.

Interventions
Prophylactic IVCF in high-risk trauma patients as recommended in the Eastern Association for the Surgery of Trauma (EAST) 2002 guidelines (Rogers et al. 2002, see Other Publications of Related Interest) was compared to traditional therapeutic retrievable IVCF as recommended in American College of Chest Physicians (ACCP) 2008 guidelines (Geerts et al. 2008, see Other Publications of Related Interest).

Location/setting
USA/In-patient secondary care.

Methods
Analytical approach:
A Markov decision analytic model was used to simulate the costs and outcomes of the two interventions. The time horizon was the lifetime of a hypothetical cohort of 46-year-olds. The perspective was societal.

Effectiveness data:
Clinical and effectiveness data were derived from published vascular surgery and trauma literature. The authors reported that for data unavailable from the literature, published evidence using similar populations was used to make assumptions. The main measure of effectiveness used in the study was the probability of death or venous thromboembolism. These estimates were derived from previously published studies.

Monetary benefit and utility valuations:
The authors reported that utilities were derived from the published literature and New England Medical Centre Utility Search Database.

Measure of benefit:
Quality-adjusted life-years (QALYs) gained. Discounted using an annual rate of 3%.

Cost data:
Direct costs included costs for hospitalisations (including complications), prophylactic and therapeutic anticoagulation, computed tomography of the thorax, filter placement and complications, filter removal and treatment of venous
insufficiency. Costs were derived from the Medicare and Medicaid Services fee schedules, Healthcare Cost and Utilisation Project (HCUP) database and the Red Book for wholesale drug prices. Indirect costs included those due to lost wages due to hospitalisation and treatment. Time off work was valued by the authors at the hourly private non-farm worker wage. Cost of death was valued at $5,000. All costs were reported in 2007 US dollars ($) and were discounted using an annual rate of 3%.

Analysis of uncertainty:
The authors reported that they performed a series of one-way sensitivity analyses to assess how robust the base case results were and determine the most influential variables.

Results
Average QALYs gained were 15.612 for patients who received therapeutic IVCF placement compared with 15.473 for patients who received prophylactic IVCF, a gain of 0.139 QALYs.

Average cost per patient was $37,300 for patients who received therapeutic IVCF placement compared with $37,700 for patients who received prophylactic IVCF, a cost saving of $400.

Costs and benefits were not combined as therapeutic IVCF placement was dominant over (less costly and more effective than) prophylactic IVCF.

Results of the sensitivity analysis showed that the biggest change in cost-effectiveness were due to changes in probabilities of venous thromboembolism after successful IVCF retrieval. The authors reported that prophylactic filter placement would become cost-effective (assuming a willingness to pay threshold of $50,000 per QALY gained) with either an annual probability of venous thromboembolism of 9.6% or more or a very high annual probability of anticoagulation complications of 24.3% or more.

Authors’ conclusions
The authors concluded that their results suggested that prophylactic IVC filters were not cost-effective for high-risk trauma patients.

CRD commentary
Interventions:
The interventions were described adequately. The comparator selected appeared appropriate and was based on guidelines produced for the authors' setting.

Effectiveness/benefits:
Clinical and effectiveness data were derived from previously published studies. The authors adequately reported the base case value used for each model parameter, its range and the sources from which these values were derived. The authors did not report how the included studies were identified and selected and did not state whether there was a systematic review of the literature. As a result, it was not possible to determine whether all relevant clinical and effectiveness data were included in the model.

Costs:
All major relevant cost categories, including indirect costs, for the explicitly reported societal perspective were included in the analysis. The authors adequately reported the sources from which they derived the costs. Most direct costs were based on Medicare reimbursement rates. As such, they were reported as macro-categories and were not broken down into individual items. Price year, time horizon, discount rate and currency details were all reported adequately.

Analysis and results:
The analytical approach was appropriate. Full details of the model structure were reported and included a graphical depiction. The results were reported appropriately. The impact of uncertainty on the model's results was tested using an exhaustive series of one-way sensitivity analyses. Probabilistic sensitivity analyses would have been a better methodology to capture overall model parameter uncertainty. The authors reported that for many model parameters there was no perfect source of information and they had to rely on studies such as those using historic controls in which some outcomes were not measured.
Concluding remarks:
The quality of the study methodology was adequate. Methods and results were reported appropriately. The authors’ conclusions mirror recommendations from most recent guidelines and appear appropriate.

Bibliographic details

PubMedID
20843631

DOI
10.1016/j.jvs.2010.06.152

Original Paper URL

Other publications of related interest


Indexing Status
Subject indexing assigned by NLM

MeSH
Cost-Benefit Analysis; Costs and Cost Analysis; Device Removal /economics; Humans; Injury Severity Score; Markov Chains; Middle Aged; Practice Guidelines as Topic; Pulmonary Embolism /economics /etiology /prevention & control; Quality-Adjusted Life Years; Risk Factors; Vena Cava Filters /economics; Wounds and Injuries /complications

AccessionNumber
22011000068

Date bibliographic record published
13/04/2011

Date abstract record published
09/08/2012