Screening for abdominal aortic aneurysms in men: a Canadian perspective using Monte Carlo-based estimates

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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
This study examined the cost-effectiveness of routine screening for abdominal aortic aneurysm in men aged 65 years and older. The authors concluded that the screening programme was a cost-effective alternative to the current strategy of no screening from the perspective of the Canadian health care provider. The study was based on valid methodology and was well presented and the authors’ conclusions appear to be robust.

Type of economic evaluation
Cost-utility analysis

Study objective
This study examined the cost-effectiveness of routine screening for abdominal aortic aneurysm (AAA) in men aged 65 years and older.

Interventions
The strategy of AAA screening using ultrasonography was compared with no screening (opportunistic detection of AAA). Patients with an aneurysm of 5.5cm or more in diameter were offered open surgical repair.

Location/setting
Canada/out-patient.

Methods
Analytical approach:
This economic analysis was based on a Markov model, with a lifetime horizon. The authors stated that the perspective was that of the health care payer.

Effectiveness data:
The clinical data came from a systematic review of the literature and, whenever possible, studies of the highest quality, such as randomised controlled trials (RCTs) and prospective naturalistic studies, were selected. The weighted average probabilities were calculated, when more than one study provided data for a parameter. The key clinical input was the rupture rate for different sizes of AAA and was taken from RCTs.

Monetary benefit and utility valuations:
The utility valuations for specific health states were derived from the Health Utility Index, for men aged 65 and older, from the 1994 to 1995 Canadian National Population Health Survey. The utility decrements associated with complications were taken from published studies, the details of which were not given.

Measure of benefit:
Quality-adjusted life-years (QALYs) were used as the summary benefit measure. Other model outputs, such as life-years (LYs), AAA ruptures avoided, and AAA-related mortality, were also presented. The benefits were discounted at 5% per annum.

Cost data:
The health services were abdominal ultrasonography, abdominal computed tomography scan, in-patient care, treatment
of stroke and myocardial infarction, and dialysis. The costs and quantities were derived from various Canadian published sources, including the accounting system at the authors' institution. All costs were in Canadian dollars (CAD) for the year 2005 and future costs were discounted at an annual rate of 5%.

Analysis of uncertainty:
A probabilistic sensitivity analysis was undertaken by assigning probability distributions to all the model inputs and using a second-order Monte Carlo simulation. Cost-effectiveness acceptability curves were then generated. One-way and threshold analyses were also carried out on those model inputs with the greatest level of uncertainty.

Results
The screening strategy led to a gain of 0.019 QALYs and to an additional cost of CAD 118, resulting in an incremental cost per QALY gained with screening over no screening of CAD 6,194 (95% confidence interval: CAD 1,892 to CAD 10,837).

The probabilistic sensitivity analysis suggested that, at a willingness to pay of CAD 20,000 per QALY, the probability of screening being cost-effective was greater than 95%.

The deterministic analysis indicated that these findings were robust, and that the most influential model inputs were the prevalence of AAA, the risk of rupture for a large AAA, and the age at initial screening. However in all circumstances the incremental cost per QALY for screening versus no screening remained lower than CAD 20,000.

Authors' conclusions
The authors concluded that, from the perspective of the Canadian health care provider, the AAA screening programme was a cost-effective alternative to the current strategy of no screening.

CRD commentary
Interventions:
The rationale for the selection of the comparators was clear in that the proposed screening strategy was compared with the current practice of no screening. These strategies are likely to be relevant in other settings. It would also have been interesting to compare a strategy of selective screening with routine screening.

Effectiveness/benefits:
The identification of the clinical inputs was based on a systematic literature review, which is the most appropriate method for selecting the relevant data to populate the model. The authors also attempted to use high-quality evidence by selecting studies with specific designs. Extensive details on the selection and design of the sources were provided, making the clinical analysis transparent. The authors acknowledged that the main limitations were the lack of good-quality data on the natural history of undetected large AAAs and the need to extrapolate long-term outcomes from studies with limited follow-ups. The derivation of the utility valuations was based on a Canadian source. QALYs are an appropriate benefit measure, as they capture the impact of the interventions on both quality of life and survival and they allow cross-disease comparisons.

Costs:
The analysis of costs was consistent with the perspective, both in terms of the cost categories and their sources. A breakdown of cost items was not given and most costs were presented as macro-categories, which is typical when considering the viewpoint of the reimbursing authorities. Other aspects of the economic study, such as the price year and use of discounting, were reported.

Analysis and results:
The costs and benefits were appropriately synthesised and the findings were clearly presented. The uncertainty was appropriately investigated by means of valid methods, which considered both the impact of individual inputs and global effects. The authors discussed specific issues such as screening a subgroup of selected patients such as women or high-risk men.

Concluding remarks:
The study was based on valid methodology and was well presented and the authors' conclusions appear to be robust.

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