Cost-effectiveness of prostate specific antigen screening in the United States: extrapolating from the European study of screening for prostate cancer

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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 screening for prostate cancer using prostate-specific antigen, compared with no screening, using the preliminary results of the European Randomized Study of Screening for Prostate Cancer (ERSPC). Based on the ERSPC data, the authors concluded that screening was very expensive and this was driven by the costs of prostate cancer treatment. The cost-effectiveness framework was conventional, but some aspects of the analysis were not extensively presented. The authors’ conclusions appear to be valid.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study examined the cost-effectiveness of prostate-specific antigen screening, compared with no screening, using the preliminary results from the European Randomized Study of Screening for Prostate Cancer (ERSPC).

Interventions
The intervention was screening for prostate cancer by a blood test of prostate-specific antigen levels and a digital rectal examination.

Location/setting
USA/secondary care.

Methods
Analytical approach:
The analysis was based on a population screening model, with a lifetime horizon. The authors stated that a societal perspective was adopted.

Effectiveness data:
The clinical data and patients’ characteristics were mainly from the ERSPC, which was a large, randomised controlled trial that estimated the impact of prostate-specific antigen screening on mortality from prostate cancer. This trial provided the number needed to treat to prevent one death. The life expectancy for men with or without prostate cancer was from standard US life tables. Some assumptions were made. The accuracy of screening was the key input for the analysis and was from the ERSPC.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
Life-years were the summary benefit measure and were discounted at an annual rate of 3%.

Cost data:
The economic analysis included the costs of screening and treatment for prostate cancer. The screening costs were from a study reporting Surveillance, Epidemiology, and End Results (SEER-Medicare) data and Medicare payment rates. The treatment costs were from a nationwide database of employer-provided data. All costs were in US dollars ($) and a 3%
annual discount rate was applied.

Analysis of uncertainty:
A deterministic sensitivity analysis was undertaken to examine the influence of life expectancy and the number-needed-to-treat (NNT) on the costs, using extreme assumptions. Different patient ages were considered.

Results
For men aged 60 years, life expectancy was 19.89 years and the lifetime costs of care for prostate cancer were $104,359, based on the European trial results. When applied to the US population, the incremental cost per life-year gained with screening was $262,758, assuming mortality from prostate cancer and overall mortality were reduced according to the ERSPC trial results. The discounted cost of screening to prevent one death from prostate cancer was $104,092.

For the cost-effectiveness of screening to be within the threshold of $100,000 per life-year saved, the NNT was 18.

The relative contribution of screening, biopsy, and diagnosis to the overall lifetime costs was minimal, while treatment accounted for 92% to 96% of the lifetime costs.

Authors' conclusions
Based on data from the ERSPC, the authors concluded that prostate cancer screening was very expensive and this cost was driven by the costs of prostate cancer treatment. Screening became cost-effective at a NNT of 21 men or fewer, depending on their age at diagnosis.

CRD commentary
Interventions:
No screening was implicitly used as the comparator for the screening strategy. This appears to have been a valid comparison. Different patient ages at diagnosis were considered.

Effectiveness/benefits:
The clinical data were mainly from a large, multicentre, randomised controlled trial with a relatively long follow-up of a median of nine years. This should ensure high internal validity and accurate data for the impact of screening on mortality and the screening accuracy. More details on this study would have been useful to fully assess its quality. The authors did not discuss screening compliance, which is important in the real world and might have been different in a clinical trial. Other sources of data were US life tables, which were appropriate. Life expectancy was the main outcome measure and this will allow comparisons with other diseases. The authors stated that quality-adjusted life-years would have been more appropriate, but there were possible limitations in the estimation of the quality-of-life weights.

Costs:
The authors stated that a societal perspective was adopted, but only the direct medical costs appear to have been considered. They acknowledged that the inclusion of productivity losses and other non-medical costs would have been appropriate. A list of cost items was not given and the unit costs were not presented separately from the resource quantities. The data sources were mentioned, but were not described; they appear to have been standard US sources. The price year was not explicitly stated. These issues limit the transparency of the economic analysis.

Analysis and results:
Only the incremental findings were reported, but they were given in detail. The uncertainty was partly investigated in an analysis that focused on selected parameters and their impact on the costs. The model was not fully described. The authors compared their results with those of other published studies and underlined their limitations. The analysis appears to have been USA-specific and not easily transferable to other settings.

Concluding remarks:
The cost-effectiveness framework was conventional, but some aspects of the analysis were not extensively presented. The authors’ conclusions appear to be valid.
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