
Economic evaluation of screening for prostate cancer: a randomized population based programme during a 10-year period in Sweden

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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

Three-yearly prostate cancer screening for men aged 50-69 years. The screening involved digital rectal examination (DRE) by specialists and general practitioners (GPs) in the first screening round, DRE by GPs in the second round, and prostate specific antigen (PSA) test followed by DRE by the GP in the third and fourth rounds. Because of the time-adapted choice of methodology, the evaluation was of a 'moving target' character, i.e. the programme was based on accepted clinical practice at each time-point and changed over time when the study was underway. During all the rounds fine-needle aspiration biopsy was performed when there was a suspicion of prostate cancer.

Type of intervention

Screening, diagnosis, and treatment.

Economic study type

Cost-effectiveness analysis.

Study population

Swedish men aged 50-69 years.

Setting

Primary care and hospital. The economic study was performed in Sweden.

Dates to which data relate

Effectiveness and resource use data were collected during the period 1987-1996. 1996 prices were used.

Source of effectiveness data

The evidence for final outcomes was based on a single study and a review of the literature.:

Link between effectiveness and cost data

Costing was retrospectively based on the same patient sample as that used in the effectiveness analysis.:

Study sample

Power calculations were not reported to have been used to determine the sample size. 1,492 men in central Norrköping were randomly selected from 9,171 men available in the age group 50-69 years and were invited to participate in a screening study. The remaining 7,679 men constituted the control group. The intervention group was invited to participate in repeat screenings, at 3-year intervals, from 1987 to 1996. Four screening rounds were completed. The control group was followed in the cancer registry during the same time period. The rate of participation in the first

screening round was 77.8%.

Study design

This was a limited randomized trial, carried out in a community in Sweden. The duration of the follow-up covered the entire study period from 1987 to 1996. The participation rate in the second round dropped to 70%, and then increased to 73.1% in the third round peaking at 73.8% in the fourth round.:

Analysis of effectiveness

The principle (intention to treat or treatment completers only) used in the analysis of effectiveness was not explicitly specified. The clinical outcome measures were the number of detected cases of cancer per 1000 men and the types of primary treatment adopted including curative, palliative, and expectant management.:

Effectiveness results

In the intervention group, 13 cancers were detected (1 advanced and 12 localized) in round 1, 5 cancers were detected in round 2 (1 advanced and 4 localized), 7 in round 3 (1 advanced and 6 localized) and 6 in round 4 (1 advanced and 5 localized). From the limited trial, therefore, the number of detected cases of cancer per 1000 men according to stage were: 10.7 for advanced stage in the intervention group versus 8.9 in the control group (NS), and 23.5 (intervention) and 10.2 (control) for localized cancer, ($p < 0.05$). In terms of primary therapy in the intervention group, the rates were 12.7 for curative treatment, 9.4 for palliative treatment and 11.4 for expectant management. In the control group, the respective rates were 4.2, 8.5 and 6.4 per 1000. The difference in the number of cases with curative treatment and expectant management was close to being significant (0.066 and 0.051, respectively).:

Clinical conclusions

The number of detected cancer cases per 1000 men shows that the screening programme results in more than twice as many detected localized cases of cancer as the 'no screening' alternative. There are three times as many cancer cases managed with potentially curative therapy per 1000 individuals with screening than with 'no screening'.

Modelling

A decision-analysis model (employing the TREEAGE software program) was used to construct a hypothetical, national screening programme on the basis of a limited, randomised study.

Outcomes assessed in the review

It was reported that a few probabilities in the four different decision trees were taken from the literature. The probabilities taken from the literature were not explicitly specified.:

Study designs and other criteria for inclusion in the review

Not stated.

Sources searched to identify primary studies

Not stated.

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

Not stated.

Methods of combining primary studies

Not stated.

Investigation of differences between primary studies

Not stated.

Results of the review

The specific probabilities taken from the literature were not reported.

Measure of benefits used in the economic analysis

The benefit measures used in the economic analysis were the number of detected cancers and patients receiving a potentially curative treatment. The number of cancer cases in the control group was obtained using the national cancer registry.

Direct costs

Costs were not discounted. Quantities and costs for different services were based on a medical record study which was published elsewhere in 1998. A decision-tree model was used to describe the screening, diagnosis and therapy processes as costs for the screening examinations and costs for each newly diagnosed case of cancer in the form of type of cancer and therapy. Costs were calculated for the course of the disease, and all treatment measures were included. The cost for examination of suspected cases of cancer was calculated to be an average of two methods (fine-needle biopsy and transurethral resection) with microscopic examination of tissue from the prostate after transurethral resection for presumed benign enlargement of the prostate. The latter has occurred with interval cancer and in the control group. 1996 price data were used.

Indirect Costs

Not included.

Currency

Swedish kroner (SEK). The conversion rate was US\$1 = 8.2 SEK.

Sensitivity analysis

No sensitivity analysis was conducted.

Estimated benefits used in the economic analysis

In the hypothetical national screening programme the annual number of detected cancer cases with screening would exceed the 'no screening' alternative by approximately 1,071 localized cancers, 719 of which have potentially curative treatment. If a general screening programme was carried out, 63 additional advanced cancers would be detected.

Cost results

The total cost of the screening programme for four rounds of screening in Norrköping was SEK947,100. The annual cost of a 12-year national screening programme compared to 'no screening' would be SEK179 million. The cost per 1000 men at risk would be SEK190,000 per year compared to the 'no screening' alternative.

Synthesis of costs and benefits

The total direct cost for the screening programme in Norrköping was SEK18,600 per detected cancer and SEK49,800 per patient receiving a potentially curative treatment. Under the hypothetical national screening programme, the incremental cost per detected cancer was SEK158,000, per detected localized cancer was SEK167,000 and per potentially curative treatment was SEK249,000.

Authors' conclusions

The authors concluded that general screening for prostate cancer could be performed with a reasonable cost per detected localized cancer. Information on the long-term effect on life quality and cancer mortality was unknown.

CRD COMMENTARY - Selection of comparators

The reason for the choice of the comparator (no screening) is clear.

Validity of estimate of measure of benefit

The estimates of the measures of benefits used in the economic analysis are likely to be internally valid although, as the authors indicated, information on the long-term effect on life quality and cancer mortality remains unknown.

Validity of estimate of costs

Quantities were not reported separately from the costs. Insufficient details of the methods of cost estimation were provided in this paper. However they were published elsewhere in the Scandinavian Journal of Urology and Nephrology in 1998.

Other issues

The authors' conclusions were justified given the uncertainties in the data. The issue of generalisability to other settings or countries was not addressed, although appropriate comparisons were made with other studies.

Implications of the study

Screening programmes for the early detection of prostate cancer entail higher costs and are also controversial because of uncertainty concerning the advantage of screening and the effectiveness of therapy. At present, the criteria for being able to carry out a national screening programme have not been fulfilled. However, research should be conducted on diagnostic methods, prevention, the natural history of the disease, and treatments, as well as on screening programmes. To this end, small-scale trials and modelling are recommended.

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Bibliographic details

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Other publications of related interest

Holmberg H, Carlsson P, Kalman D, Varenhorst E. Impact on health service costs of medical technologies used in management of prostatic cancer. *Scandinavian Journal of Urology and Nephrology* 1998;32:195-199.

Indexing Status

Subject indexing assigned by NLM

MeSH

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