Cost-effectiveness of prostate cancer chemoprevention: a quality of life-years analysis

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 compared the cost-utility of chemoprevention using daily finasteride in the prevention of prostate cancer compared with no chemoprevention. The authors concluded that chemoprevention for men, when started at age 50, was not cost-effective in terms of life-years saved. However it approached cost-effectiveness when quality-adjusted life-years were considered. Overall, the conclusions made by the authors are hard to evaluate as the study methods and results were not transparently and comprehensively reported.

Type of economic evaluation
Cost-utility analysis

Study objective
The purpose was to assess the cost-effectiveness of chemoprevention, through the use of finasteride for preventing prostate cancer in men.

Interventions
Daily treatment with finasteride was compared with no chemoprevention. The hypothetical cohort were assumed to be male, aged 50 years, with no signs of prostate cancer, which was defined by a prostate-specific antigen level of 3mg per mL or less and a normal digital rectal examination.

Location/setting
USA/primary prevention.

Methods
Analytical approach:
A Markov model was developed for a 25-year time frame and was populated with synthesised published and unpublished data estimates. The authors reported that the study used a US societal perspective.

Effectiveness data:
The effectiveness data were derived from the combination of published literature and national estimates. However, a single randomised controlled trial (the Prostate Cancer Prevention Trial) formed the key source of data (Thompson, et al. 2003, see ‘Other Publications of Related Interest’ below for bibliographic details). The clinical outcomes were incidence of prostate cancer, disease recurrence, chemoprevention-related side-effects (erectile dysfunction, loss of libido, and incontinence), treatment-related side-effects (impotence and incontinence) and deaths.

Monetary benefit and utility valuations:
The utilities were adapted from the published results of three studies (Stewart, et al. 2005, Krahn, et al. 2003, and Mittmann, et al. 1999, see ‘Other Publications of Related Interest’ below for bibliographic details) in which preferences were elicited from men with and without prostate cancer.

Measure of benefit:
The two measures of benefit used were life-years saved and quality-adjusted life-years (QALYs) and these were discounted at an annual rate of 3%.

Cost data:
The direct medical costs were those of resources for medications, biochemical recurrence, metastasis, terminal care,
radical prostatectomy, physician visits, medical tests, and surgical complications. The prices were derived from various sources such as clinical charges, published studies and drug schedules. These prices were updated to 2007 US dollars ($) using the Gross Domestic Product Deflator Inflation Calculator. All costs were discounted annually at 3%.

Analysis of uncertainty:
One-way and two-way sensitivity analyses tested changes in the key parameters, in addition to assessing chemoprevention for high-risk men and altering the prevalence of prostate cancer. A probability sensitivity analysis was also conducted, for which the distributions were defined and 5,000 Monte Carlo samples were used.

Results
Using variables which showed reduced overall prostate cancer incidence and increased high-grade prostate cancer with finasteride, the mean cost per person with chemoprevention was $14,470 compared with $5,445 for no chemoprevention and the mean number of QALYs with chemoprevention was 17.587 compared with 17.513 for no chemoprevention. This was equivalent to a gain of 74 QALYs per 1000 men or 29 days per person for men using finasteride.

The incremental cost-effectiveness ratio was $122,747 per QALY gained for chemoprevention compared with no chemoprevention.

The results, using model input variables which showed a reduced overall prostate cancer incidence and no increase in high-grade prostate cancer with finasteride, and a model which excluded variables related to benign prostatic hyperplasia, were also presented.

The sensitivity analysis showed that the incremental cost-effectiveness ratios were less than $100,000 per QALY gained as long as finasteride was given to high-risk populations (those with a prevalence of prostate cancer of 30% or more and containing men aged 50 years or older) and the cost of finasteride was less than $1,000 per year.

Authors' conclusions
The authors concluded that chemoprevention using finasteride was not cost-effective for all men aged 50 years, but would be if it was provided to men at high risk (those aged 50 years or older, with a prevalence of prostate cancer of 30% or more) provided the cost of finasteride remained less than $1000 per year.

CRD commentary
Interventions:
The profile of the intended patient population was based on the clinical trial, which was used for the effectiveness results. There was no discussion in the paper of how a finasteride chemoprevention programme would actually be implemented into the wider community.

Effectiveness/benefits:
The effectiveness data were derived from various published studies which appear to have been of high quality. However, the methods used to identify and select these particular studies were not stated so it is not possible to ascertain if the best available evidence was used. Also, the clinical data were not reported. The sources of the utility data were given, but it is unclear how the utilities from these studies were adapted. Further the methods used to elicit the utilities in the primary studies were not reported. The reader was referred to the three primary sources to assess the quality of the utilities used.

Costs:
Although the authors stated that the study was conducted from a societal perspective, the costs seem to have represented the direct medical costs to the health provider. It was acknowledged in the discussion that productivity costs were not considered. Therefore, the perspective is more likely to have been that of the health care provider. There was minimal reporting of the costing types, sources, and findings. All costs were adjusted for inflation and the price year was reported.

Analysis and results:
There was no illustration of the model structure and no description of the health states and possible transitions between them. The QALYs gained and net costs were synthesised into cost-effectiveness ratios. Limited results were presented for life-years saved without a justification for using these. It is unclear if the reporting of the results was selective. The authors presented a case for using a high threshold of $100,000 per QALY, but in most scenarios the results exceeded this threshold. For the UK setting, this threshold is higher than is usually considered acceptable. The authors identified and discussed a number of limitations to their study and compared their findings with other similar studies, which also indicated that finasteride was not cost-effective.

Concluding remarks:
Overall, the conclusions made by the authors are difficult to evaluate as the study methods and results were not transparently and comprehensively reported.

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