The prostate: decreasing cost-effectiveness of biopsy with advancing age
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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
Prostate biopsy at different excess prostate specific antigen (PSA) level in different age groups.

Type of intervention
Screening; diagnosis.

Economic study type
Cost-utility analysis.

Study population
A hypothetical cohort of patients undergoing PSA screening and with ages ranging from 50 to more than 70 years.

Setting
Secondary care. The economic study was conducted in Rochester, New York, USA.

Dates to which data relate
Not stated.

Source of effectiveness data
Effectiveness data were based on opinion.

Modelling
A SMLTREE decision model was used to estimate the costs and benefits associated with performing immediate prostate biopsy at different excess PSA levels. The model covered benefits over the lifetime of patients, whilst costs related to the 2 years following screening. The model did not allow for the effect of parameters other than excess PSA level on the probability of prostate cancer being present (for example, family history, abnormal digital rectal examination or TRUS findings). The model assumed patients who were candidates for surgery would be staged (by either computed tomography or magnetic resonance imaging and radionuclide bone scanning) whilst those who were not would not be staged and would undergo external beam radiation regardless of stage. Finally the model also included the effect of a repeat screening at 1 year in patients with clinically significant prostate cancer missed on the first screening.

Methods used to derive estimates of effectiveness
The authors assumed the estimates of effectiveness associated with biopsy/excess PSA levels.
Estimates of effectiveness and key assumptions
It was assumed that 100% of all positive biopsies in 50-year old men were clinically significant cancers. Such a value was decreased linearly with age up to 70 years, which had a value of 20%. Also, the study assumed a 100% sensitivity of an abnormal rise in serum PSA level in detecting patients with clinically significant prostate cancer. Sensitivity and specificity values of 72% and 90%, respectively, were used for both CT and MRI in staging prostate cancer.

Measure of benefits used in the economic analysis
Quality adjusted life-years (QALYs) gained. These benefits were estimated using a model which employed disease-specific mortality rates from the literature. The utility weights (which adjusted estimates of life expectancy for complications resulting from therapeutic interventions, i.e. impotence and urinary incontinence) were derived from the literature.

Direct costs
Whilst no discounting was reported in the paper, quantities of resource use were not analysed separately from the costs. These included costs associated with diagnostic testing and treatment for a period of 2 years. For the valuation of costs, charges at the authors' institution rather than true costs were used. The price year was not stated. The cost of complications was not included in the analysis. Note that total costs were estimated using a model.

Currency
US dollars ($).

Sensitivity analysis
Not performed.

Estimated benefits used in the economic analysis
The incremental QALYs gained with immediate prostate biopsy (relative to 'no prostate biopsy') at excess PSA 2 ng/mL were 0.59 at 50 years of age, 0.21 at 60 years of age, and -0.09 at 70 years of age.

Cost results
Not stated.

Synthesis of costs and benefits
The incremental cost per QALY gained was reported for immediate biopsy relative to the 'no biopsy option for each age group (no report of any discount rate nor the price date used). Results for the 70 years of age group were reported using a 0.40 probability of a clinically significant prostate cancer present given a positive biopsy (rather than the 0.20 used in all other groups). The corresponding figure for the latter group ranged from $275,881 (at an excess PSA level of 0 ng/mL) to $68,362 (at an excess PSA level of 20 ng/mL). The corresponding figures for the 60 years of age group were $13,558 and $8,974. Immediate biopsy at age 50 was a dominant strategy relative to the 'no biopsy' option at all excess PSA levels >= 0.

Authors' conclusions
Whereas screening men over the age of 50 to detect early prostate cancer is reasonable, physicians must be aware that more harm than good can be done by biopsying the prostate of a patient with no other risk factor than an elevated serum PSA level. This is particularly true in men aged 70 years or older where immediate prostate biopsy is not cost-effective and can be detrimental at all excess PSA levels ranging from 0 ng/mL to 20 ng/mL.
CRD COMMENTARY - Selection of comparators
The reason for the choice of comparator was not clear.

Validity of estimate of measure of benefit
The internal validity of the effectiveness study results are questionable due to the way in which the corresponding estimates of effectiveness were derived (based on opinion).

Validity of estimate of costs
Whilst the quantities of resource use were not reported separately from the costs included in the analysis, these covered a period of 2-years, a limitation noted by the authors noted. The costs associated with complications resulting from therapy (both for advanced and early-stage diseases at detection) were omitted from the analysis. Note also that charges rather than true costs were used to value resource use, and that the price date associated with these estimated was not provided.

Other issues
The issue of generalisability was only partly addressed in the sensitivity analysis. Total costs were not stated.

Implications of the study
Further studies are needed in order to validate the results regarding the cost-effectiveness of immediate biopsy of the prostate for suspected cancer.

Source of funding
None stated.

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