Cost-effectiveness analysis of prostatic cancer screening
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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
Standard tests in the screening of prostatic cancer (PC).

Type of intervention
Screening.

Economic study type
Cost-effective analysis.

Study population
A hypothetical cohort of 10,000 asymptomatic males for which estimations for PC screening were conducted for three age groups: 55-59, 60-69 and 70-79 years old.

Setting
Hospitals and clinics in Japan.

Dates to which data relate
The detection rate of PC, sensitivity and specificity of PC screening using systematic biopsy, were derived from reports published in Japan in 1995. The average life expectancy of those who have survived the cancer was derived from a Japanese Ministry of Health publication in 1995. The average life expectancy of those who died of PC was derived from a paper in press. 1993 and 1996 cost data were used. The price year was not stated.

Source of effectiveness data
Effectiveness data were derived from a review of previous literature and an estimate by clinicians.

Clinical conclusions
PC screening effectiveness increases with age.

Modelling
A decision tree model was used to calculate the cost-effectiveness ratios for screening versus no screening. The model was based on standard guidelines for socio-economic evaluations of health services set forth by Kudo and Kamae, sponsored by the Japanese Ministry of Health.

Outcomes assessed in the review
The outcomes assessed were the sensitivity and specificity of the screening tests, the five year survival rate and average
life expectancy for the populations studied.

**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**
4 primary studies were included.

**Methods of combining primary studies**
Not stated.

**Investigation of differences between primary studies**
Not stated.

**Results of the review**
The sensitivity of the PSA test was 0.875 and the specificity was 0.967. The average life expectancies for those achieving a cure were: 22.88 years for the 55-59 age group, 16.67 years for the 60-69 age group, and 9.96 years for the 70-79 year age group. For those with PC, who did not achieve a cure, the life expectancy was 3 years for all age groups. The median was taken for each age group and the average for this figure was then taken, based on the 1995 published figures of life expectancy in Japan.

**Methods used to derive estimates of effectiveness**
Estimates of effectiveness were also based on the authors' estimates. No specific explanation was provided.

**Estimates of effectiveness and key assumptions**
The 5-year survival rate for the non-screened population was 0.659 and for the screened population this was 0.83. The relative survival rate was assumed to be the same for all three age groups.

**Measure of benefits used in the economic analysis**
The measure of benefit was life years saved between screening and non-screening groups for PC. The model used was set forth previously as the standard guideline for socio-economic evaluations of health enterprises. This source sets the national standard in comparing the cost-effectiveness of PC screening to that of screenings for other cancer types already being carried out in Japan.
**Direct costs**
Direct costs included examination costs, diagnosis costs and treatment costs. Examination costs were based on a report published in Japan in 1996. Diagnosis costs were based on a Japanese Ministry of Health publication from 1996. Treatment costs were based on a report published in Japan in 1993. The price year was not stated. Discounting was not applied.

**Statistical analysis of costs**
Not undertaken.

**Indirect Costs**
Not included.

**Currency**
Japanese Yen.

**Sensitivity analysis**
A series of one way sensitivity analyses was carried out to test the effects of the five factors used in the cost-effectiveness of the PC screening, namely the rate of PC prevalence, the rate of examinees for the secondary study, treatment costs, sensitivity and specificity of the PC screening.

**Estimated benefits used in the economic analysis**
Differences in life years saved between screening and non-screening groups increases with age (from 556 years for the 55-59 age group to 984 for the 60-69 age group and 1,524 years at 70-79 age group, based on a population of 10,000).

**Cost results**
The total costs estimated per person for the 55-59 age group were 7,629 yen for the screened group and 6,495 yen for the non-screened group. Costs for those in the 60-69 age group were 15,589 yen and 16,237 yen, respectively, and those in the 70-79 age group were 43,057 yen and 49,657 yen, respectively. The results show that for those over 60 years of age PC screening brings about economic benefits nationally.

**Synthesis of costs and benefits**
The cost per life-year saved for PC cancer screening was calculated based on the differences in costs and life-years saved between the screening and non-screening groups for three age groups:

204,000 yen per life year saved for the 55-59 age group;

-65,000 yen per life year saved for the 60-69 age group;

-433,000 yen per life year saved for the 70-79 age group.

These were finally compared with those for the other cancer types for which national screening is already undertaken. The cost-effectiveness ratio of PC screening was similar to that of colorectal cancer screening and 2 to 14 times lower than that of the remaining 4 established cancer screening programmes. The results of the sensitivity analyses showed that the rate of prevalence of PC, as well as the rate of the examinees (compliance) for the secondary study, markedly influenced the cost-effectiveness of PC screening.

**Authors’ conclusions**
The morbidity and mortality of PC has seriously increased in recent years in Japan and the number of PC patients in
the year 2015 is anticipated to show a 5.19-fold increase compared with 1990 figures. Considering the favourable cost-effectiveness results of PC screening, even compared with that of established screening programmes for other cancer types, the introduction of national PC screening would be beneficial.

CRD COMMENTARY - Selection of comparators
The reason for the choice of comparators was clear. No screening is clearly a reasonable alternative and established programmes for the screening of other cancers acted as references for the decision at a policy level.

The estimate of benefit is likely to be valid as the authors undertook comprehensive sensitivity analyses on parameters which were uncertain, and reliable sources were utilised in determining the parameters used in the decision tree.

Sources used to determine costs included official documents and published papers. Sensitivity analyses on costs were shown to have little effect on the cost-effectiveness results and therefore the estimate of costs is likely to have high validity.

The authors would appear to have met their objectives of demonstrating the cost-effectiveness of screening for prostatic cancer for specific groups within a Japanese context. The issue of generalisability to areas other than Japan was not addressed. Comparisons were made with the only other study conducted in Japan on the cost-effectiveness of prostatic screening which produced similar results and which argued that screening every two years, in men aged 55 and above, could potentially eliminate prostatic cancer from this age group in Japan.

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