The effect of a patient's risk-taking attitude on the cost effectiveness of testing strategies in the evaluation of pulmonary lesions

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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
Testing strategies (combinations of sputum, fine-needle aspiration, bronchoscopy, thoracoscopy and expectant management) in the evaluation of pulmonary lesions.

Type of intervention
Diagnosis.

Economic study type
Cost-effectiveness analysis; cost-utility analysis.

Study population
Two hypothetical 50-year-old male patients with a radiographically detected pulmonary lesion with a large peripheral mass (>3 cm). The hypothetical patients differed only in their attitude to taking risks: Patient 1 was averse to expectantly waiting without definitive knowledge of whether cancer was or was not present, whilst Patient 2 was averse to tests with higher morbidity and mortality.

Setting
Hospital. The economic study was carried out in Iowa, USA.

Dates to which data relate
The effectiveness data were derived from published literature for the years 1980-1996. Resource use and cost data were mainly derived from 1980-1996 sources. The dates associated with the resource use data were not stated. The price year was 1996.

Source of effectiveness data
Effectiveness data were derived from a review of the literature.

Modelling
A decision analysis model was used to estimate lifetime costs and benefits associated with the different diagnostic strategies, according to two patient preference profiles towards the trade-off of expected false positive-false negative rates. The model was based on population-based (incidence and prevalence) data for the USA.

Outcomes assessed in the review
Test accuracy (false and true positive and negative values), indeterminate diagnosis with and without cancer, and test-related mortality and complication rate were assessed in the review.
Study designs and other criteria for inclusion in the review
Studies included in the review were published from 1980 to 1996. No other information was provided on the criteria for inclusion in the review.

Sources searched to identify primary studies
MEDLINE was searched to identify primary studies.

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 sputum test had the following characteristics:

indeterminate diagnosis with cancer = 20%;
true-negative diagnosis = 10%;
indeterminate diagnosis = 95%;
no cancer = 1%;
test-related death = 0 %; and
test-related complication = 15%.

For the fine-needle aspiration test the corresponding values were: 80%, 6%, 95%, 1%, 0.05% and 15%, respectively. The thoracoscopy test had corresponding values of 100%, 0%, 0%, 0%, 0.5% and 15%, respectively. Finally, the values for the expectant management test were 20%, 20%, 80%, 10%, 0% and 0%, respectively (thoracoscopy was used as reference test).

Measure of benefits used in the economic analysis
The measures of benefits used in the economic analysis were life years gained and quality adjusted life years (QALYs) gained. The authors’ values and those from the literature were used to assess the health states. The valuation tool used was a rated 0-1 scale. Since two preference profiles were separately represented in the analysis, the authors only reported the results for benefits that resulted from using the set of values for Patient 1 (more willing to take risks with...
tests of high false-positive rates and more averse to waiting expectantly for a definitive diagnosis).

**Direct costs**
Quantities of resource use were analysed separately from costs and these were discounted annually. The quantity/cost boundary adopted was that of the hospital. Costs included were treatment costs generated for the lifetime of the patient and included initial care costs (for the first six months, not including costs associated with testing, surgery, or surgical complication), continuing care and terminal care (6 months before death). Costs of medical care were obtained from HMO hospitals in Northern California, USA. The sources of costs associated with testing procedures were Stanford University and the University of Iowa, USA. Total costs were calculated using a model. The price date was 1996.

**Currency**
US dollars ($).

**Sensitivity analysis**
One-way sensitivity analyses were used to analyse the effect of the different utility weights on the cost-effectiveness of the thoracoscopy alone (T) strategy.

**Estimated benefits used in the economic analysis**
Whilst the value for expected life-years without testing was 6.702, the mean life expectancy was estimated to be 7.853 for ST, 7.853 for T, 7.853 for SFT, 7.853 for FT, 7.726 for SFE. Patient 1's mean QALYs were estimated to be 6.902 years for ST, 6.902 years for T, 6.901 years for SFT, 6.900 years for FT, 6.810 for SFE, and 5.949 years for no test.

**Cost results**
The mean lifetime cost of medical care including a 3% discount rate was estimated to be $31,594, $48,473, $52,172, $52,314, $53,445, and $53,983 in the ST, T, SFT, FT, SFE and no test strategies, respectively.

**Synthesis of costs and benefits**
The estimated benefits and costs were combined as the cost per QALY gained. This used a 3% discount rate for costs and benefits and referred to 1996 prices. The corresponding figures for the case of patient 1 were estimated to be $60,752 (T), $54,740 (ST), $41,547 (FT), and $40,092 (SFT), relative to the SFE strategy. For patient 2, the corresponding values were $9,185,000, $1,004,647, $219,235, and $205,226, respectively. The sensitivity analysis showed that, as the willingness to tolerate a false positive diagnosis increases, and the willingness to tolerate a false-negative diagnosis decreases, the thoracoscopy alone (T) strategy becomes more cost-effective relative to the SFE strategy (without any quality weighting, the former strategy falls between the $50,000 and $40,000 figures).

**Authors' conclusions**
Risk-taking attitudes influenced the cost effectiveness of testing strategies. Consideration of patient risk-taking attitudes in diagnostic testing appears warranted in setting clinical policies and making individual decisions.

**CRD COMMENTARY - Selection of comparators**
The choice of comparators corresponded to the stated study objective of showing how patient preferences towards the risks associated with diagnostic tests affect the determination of the most efficient choice of diagnostic strategy for pulmonary lesions.

**Validity of estimate of measure of benefit**
Insufficient information is given regarding the methodology employed for an assessment of the validity of the estimate.
of benefit to be made. The source of data for the effectiveness study and the way the estimates were derived are not clear.

Validity of estimate of costs
Resource quantities and prices were analysed separately. Adequate details of methods of quantity/cost estimation were given and it seems that no important cost items were omitted from the analysis.

Other issues
The effects of the uncertainty in the patient's utility data were studied in the sensitivity analysis. The generalisability to other setting/countries depends on the pretest probability of cancer in the study population, which for the present study was assumed to be 75%. Appropriate comparisons were made with other studies.

Implications of the study
Further information is necessary before a definitive statement regarding the validity of the study results can be made.

Source of funding
None stated.

Bibliographic details

PubMedID
9187178

Indexing Status
Subject indexing assigned by NLM

MeSH
Attitude to Health; Cost-Benefit Analysis; Decision Trees; Diagnostic Tests, Routine /economics /statistics & numerical data; Humans; Life Expectancy; Lung Neoplasms /diagnosis /economics /psychology; Male; Middle Aged; Probability; Quality-Adjusted Life Years; Risk-Taking; United States

AccessionNumber
21997000867

Date bibliographic record published
28/02/1999

Date abstract record published
28/02/1999