Economic impact of automated primary screening for cervical cancer

Smith B L, Lee M, Leader S, Wertlake P

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
Automated primary screening for cervical cancer.

Type of intervention
Screening.

Economic study type
Cost-effectiveness analysis.

Study population
Hypothetical cohort of 100,000 women aged 18 with the potential for cervical cancer and other disease based on reported US population statistics.

Setting
Hospital. The study was carried out in the USA.

Dates to which data relate
Effectiveness data were collected from studies previously published between 1983 and 1999. Resource use and cost data were collected from studies previously published between 1987 and 1990. The price year was 1997.

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

Modelling
A seven-state lifetime Markov model was developed to estimate the cost-effectiveness of the two screening strategies.

Outcomes assessed in the review
The review assessed the following outcomes: probability of being screened in a year, prevalence of disease, sensitivity and specificity of screening tests, transition probabilities, age- and sex-adjusted mortality values, and age-adjusted cancer mortality values.

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
Summary statistics from each study.

Number of primary studies included
Approximately 7 studies were included.

Methods of combining primary studies
Narrative method.

Investigation of differences between primary studies
Not stated.

Results of the review
The probability of being screened in a year was 0.33 (range: 1 - 0.25). The prevalence of disease was 0.072 (range: 0.01 - 0.18). The sensitivity and specificity for manual screening was 0.816 (range: 0.4 - 0.97) and 0.94 (range: 0.9 - 0.99), respectively. The sensitivity and specificity for automated screening was 0.91 (range: 0.8 - 0.98) and 0.95 (range: 0.9 - 0.99), respectively.

Measure of benefits used in the economic analysis
The measure of benefits used was the number of life years saved.

Direct costs
Costs were discounted at an annual rate of 3%. Quantities and costs were reported separately. Direct costs reflected lifetime costs and included Pap costs, costs of office visits, colposcopy costs, treatment costs and cancer costs. The quantity/cost boundary adopted was that of the health service. The estimation of quantities and costs was based on actual data. All cost estimates using Medicare's resource based relative value scale were calculated using 1998 relative value units standardised to 1997 dollars. The price year was 1997.

Statistical analysis of costs
Not reported.

Indirect Costs
Not included.

Currency
US dollars ($)
Sensitivity analysis
A one-way and multi-way sensitivity analysis was carried out on all effectiveness and cost estimates.

Estimated benefits used in the economic analysis
The marginal rate of life-years saved by automated screening as compared to conventional screening varied between 10.1 days at a four-year screening interval and 32.1 days at a one-year screening interval.

Cost results
The marginal savings of automated screening as compared to conventional screening varied between $3 at a four-year screening interval and $628 at a one-year screening interval.

Synthesis of costs and benefits
The marginal cost per life-year saved of automated screening as compared to conventional screening varied between -$108 at a four-year screening interval and -$7,144 at a one-year screening interval. These results were sensitive to changes in the cost of the Pap test, sensitivity, specificity and disease prevalence.

Authors' conclusions
Automated screening for cervical cancer has the potential significantly to improve health care outcomes and reduce costs.

CRD COMMENTARY - Selection of comparators
The rationale for the choice of the comparator was clear. You, as a user of this database, should verify whether these health technologies are relevant to your setting.

Validity of estimate of measure of benefit
One relevant measure of benefits was used. The authors did not consider patient quality of life. The model did not take into account the effect of false negatives not subsequently screened. The impact of a decreased workload for laboratories associated with automated screening was not assessed.

Validity of estimate of costs
Only direct costs were included. The model did not evaluate the costs for unscreened women nor did it reflect additional costs incurred by laboratories implementing additional quality control measures or other new technologies designed to increase the accuracy of the traditional Pap smear. Actual costs of screening are therefore probably higher than the costs used in the model.

Other issues
An extensive sensitivity analysis was conducted to allow for uncertainty in the effectiveness and cost estimates. The generalisability of these results to other settings or countries was not discussed.

Implications of the study
Future research is needed to compare the cost-effectiveness of different new technologies designed to increase the accuracy of the traditional Pap smear.

Source of funding
Supported by a Neopath, Inc, research grant.
Bibliographic details

Original Paper URL
http://www.jreprodmed.com/

Indexing Status
Subject indexing assigned by NLM

MeSH
Adolescent; Autoanalysis /economics; Female; Health Care Costs; Humans; Models, Statistical; Research Support, Non-U.S. Gov't; Sensitivity and Specificity; Survival Rate; Uterine Cervical Neoplasms /mortality /diagnosis; Vaginal Smears

AccessionNumber
21999001252

Date bibliographic record published
30/04/2000

Date abstract record published
30/04/2000