Cost utility analysis of radiographic screening for an orbital foreign body before MR imaging

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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
Radiographic screening for an orbital foreign body before MR imaging.

Type of intervention
Screening.

Economic study type
Cost-utility analysis.

Study population
The study involved 45-year-old patients who were screened for an ocular injury.

Setting
The setting was hospital. The economic study was carried out in the USA.

Dates to which data relate
Effectiveness and resource use data were collected from studies published between 1988 and 1997. Cost data were taken from studies published between 1996 and 1998. The price year was not reported.

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

Modelling
A single-state change model was used to determine the cost-effectiveness of screening for an orbital foreign body before MR imaging.

Outcomes assessed in the review
The review assessed disability, life expectancy, and probability of injury.

Study designs and other criteria for inclusion in the review
Not stated.

Sources searched to identify primary studies
MEDLINE was searched using a range of key words. Relevant references from articles found were also retrieved.

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 individual studies were used.

Number of primary studies included
At least 16 primary studies were included in the review.

Methods of combining primary studies
The narrative method was used.

Investigation of differences between primary studies
Not stated.

Results of the review
The results of the review were as follows:

The probability that a foreign body remained after eye examination was 0.1.

The probability that a metallic foreign body was ferromagnetic was 0.5.

The prevalence of metallic foreign body in screening population was 0.65%.

The sensitivity of radiologic screening for foreign body was 90%.

The probability of injury if patient with foreign body was examined by MR imaging was 0.25.

The degree of disability associated with ocular injury was 0.24.

The average life expectancy of screened population was 30 years.

Measure of benefits used in the economic analysis
Quality-adjusted life years (QALYs) were used as the measure of benefit. Utility values were based on the Disability Rating Guide of the American Medical Association.

Direct costs
Direct costs were discounted at rates ranging from 0% to 10%. Quantities and costs were reported separately. Direct costs included costs of initial medical care for each injury and the costs of rehabilitation. The quantity/cost boundary adopted was that of society. The estimation of quantities and costs was based on actual data. Costs of screening were taken from the medical literature, Medicare fee schedules, and other fee schedules for various examinations. The price year was not reported.

Statistical analysis of costs
No statistical analysis was reported.
Indirect Costs
Indirect costs were not included.

Currency
US dollars ($).

Sensitivity analysis
One-way sensitivity analyses were conducted on all model parameters.

Estimated benefits used in the economic analysis
The number of QALYs saved was not reported separately.

Cost results
The cost of radiographic screening was $173.

Synthesis of costs and benefits
The cost per QALY of radiographic screening was $328,580. This amounted to $2,464,350 to avoid one blind eye event. Sensitivity analysis identified screening cost, discount rate, and effectiveness of foreign body removal as critical variables. The probability of injury and prevalence of foreign body may also impact the results.

Authors’ conclusions
Clinical screening before radiography increases the cost-effectiveness of foreign body screening by an order of magnitude. Asking the patient "Did a doctor get it all out?" serves this purpose. Occupational history by itself is not sufficient to mandate radiographic orbital screening. Current practice guidelines for foreign body screening should be altered.

CRD COMMENTARY - Selection of comparators
A justification was given for the comparators used, namely currently employed strategy. You, as a user of the database, should decide if these health technologies are relevant to your setting.

Validity of estimate of measure of effectiveness
The authors undertook a systematic review of the literature to derive effectiveness estimates for the model. This, in conjunction with the sensitivity analyses undertaken, suggests that the effectiveness results have high validity.

Validity of estimate of measure of benefit
The estimation of benefits was appropriately modelled. Utility values were based on the Disability Rating Guide of the American Medical Association, which would appear to be a relevant instrument to determine benefits.

Validity of estimate of costs
Good features of the cost analysis were that all relevant direct cost categories were included; quantities and costs were reported separately; and charges were not used to proxy prices. However, the price year was not reported which would make reflation exercises in other settings problematic.
Other issues
The authors did make appropriate comparisons of their findings with those from other studies but did not address the issue of generalisability to other settings. The authors did not present their results selectively. The study considered 45-year-old patients who were screened for an ocular injury and this was reflected in the authors' conclusions. In terms of enhancing the analysis, the authors did not consider the cost of lost time to the patient, transportation, child care, or wages. The authors also assumed that there would be complete loss of vision in the affected eye and that this would be immediate and permanent. Moreover, they assumed that all medical care to ameliorate blindness would be futile.

Implications of the study
Radiographic screening before MR imaging on the basis of occupational exposure alone is not cost-effective. It is also probably not clinically necessary. The critical variables that may affect this conclusion are the cost of screening, probability of injury, and frequency of foreign body invasion of the orbit.

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None stated.

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Other publications of related interest

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