The cost-effectiveness of liver biopsy in rheumatoid arthritis patients treated with methotrexate

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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
Liver biopsy (in rheumatoid arthritis patients treated with methotrexate).

Type of intervention
Diagnosis.

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

Study population
The prototype patient in the base model was a white female who was 50 years old at the time methotrexate treatment began.

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

Dates to which data relate
Effectiveness data were derived from studies published between 1986 and 1992. The dates of the resource usage data were not specified. 1991 dollar values were used.

Source of effectiveness data
Effectiveness data were derived from a review of previously completed studies and opinion based estimates.

Modelling
A decision tree was used to compare final costs and benefits of a biopsy versus no biopsy strategy in patients receiving methotrexate for rheumatoid arthritis.

Outcomes assessed in the review
The outcomes assessed were the probability of cirrhosis after 5 and 10 years of methotrexate, probability of death from liver biopsy, and probability of complication after liver biopsy.

Study designs and other criteria for inclusion in the review
Three long-term prospective studies and one study of unspecified type. No inclusion or exclusion criteria were 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
Three unknown types of prospective studies (1 of which was a large multicentre study) and one other study of unspecified type.

Methods of combining primary studies
Studies were not combined as they measured different outcomes.

Investigation of differences between primary studies
Not applicable.

Results of the review
The probability of cirrhosis after 5 and 10 years of methotrexate treatment was 1/1,000 and 14/1,000 respectively. The probability of death and serious complication after liver biopsy was 0.09/1,000 and 1.47/1,000 respectively.

Methods used to derive estimates of effectiveness
The authors made assumptions on increased risk of cirrhosis and increased cirrhosis mortality if no liver biopsy was applied.

Estimates of effectiveness and key assumptions
The increased risk of cirrhosis if no liver biopsy was undertaken was 10% and the increased cirrhosis mortality if there was no liver biopsy was 25%.

Measure of benefits used in the economic analysis
Life expectancy (additional life years saved) and quality adjusted life years (QALYs) were used as the final outcome measures in the economic analysis. The decision-tree model was used to assess life years saved and QALYs gained under the two strategies. Quality of Life adjustments were obtained from the literature using a generic valuation matrix.

Direct costs
Costs and quantities were not reported separately. Direct medical costs of each strategy, including liver biopsy costs, biopsy complication costs, and treatment costs were considered. Liver biopsy costs were based on the typical utilization of resources for an outpatient liver biopsy, including physician, laboratory, hospital and pathology costs. Costs of biopsy complication were based on DRG reimbursement for a hospital admission for that complication. All costs were discounted at a rate of 5% per year.

Currency
Sensitivity analysis
One-way simple sensitivity analyses of the baseline probability, cost and quality of life estimates were carried out to test final cost-effectiveness.

Estimated benefits used in the economic analysis
A no-biopsy strategy at 5 years of methotrexate treatment resulted in a life expectancy of 11.1914 years. A strategy of biopsy after 5 years of methotrexate treatment resulted in a marginal increase in life expectancy of 0.0005 years, to 11.1919 years. The no-biopsy strategy at 5 years resulted in a quality-adjusted life expectancy of 8.5046 years, and the biopsy strategy 8.5035 years. At 10 years, a no-biopsy strategy resulted in a life-expectancy of 9.1089 years and a biopsy strategy resulted in an increase of 0.1610 years, to 9.1250 years. At 10 years, the no-biopsy strategy resulted in a quality-adjusted life expectancy of 6.9862 years and the biopsy strategy resulted in a decrease of 0.0012 years, to 6.9850.

Cost results
At 5 years, the cost of the no biopsy strategy was $44 per patient, compared with $920 for a biopsy strategy. At 10 years, the cost of the no-biopsy strategy was $618 per patient, compared with $1,461 for a biopsy strategy.

Synthesis of costs and benefits
At 5 years, the marginal cost-effectiveness ratio was $1,891.830 per year of life saved for a biopsy strategy. Sensitivity analysis showed that only extreme changes in the probability of cirrhosis (to 29/1000) and the cost of biopsy (to <$4) would result in a cost-effectiveness ratio of < $20,000 per year of life saved. At 10 years, the marginal cost-effectiveness ratio for a biopsy strategy was $52,374 per year of life saved. Sensitivity analysis revealed that changes in several variables had an important effect on the results. Either the probability of cirrhosis would need to be at least 34/1000 or the cost of liver biopsy would need to be decreased from $871 to less than $350 in order for the cost-effectiveness ratio to be < $20,000 per year of life saved.

Authors' conclusions
Routine liver biopsy at 5 years of methotrexate treatment was not a cost-effective monitoring strategy for methotrexate induced cirrhosis. When quality of life adjustments were made, even biopsy after 10 years of treatment did not appear to be cost-effective.

CRD Commentary
This was a well-conducted modelling exercise which included a wide-ranging sensitivity analysis. Indirect costs were not included in the economic analysis. Further detail of the search strategy by which the probabilities for the decision tree model were obtained would have been useful.

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Bibliographic details