Cost-effectiveness of cholesterol-lowering therapies according to selected patient characteristics


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
Cholesterol-lowering therapies recommended by the National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. The interventions were step I diet and statin therapy.

Type of intervention
Primary prevention and secondary prevention.

Economic study type
Cost-utility analysis.

Study population
Women and men, 35 to 84 years of age, with low-density lipoprotein (LDL) cholesterol levels of 4.1 mmol/L or higher.

Setting
Community. The economic study was set in the USA.

Dates to which data relate
Effectiveness and resource use data were collected from studies published between 1987 and 1997. Cost data were collected from 1990-1997 sources. The price year was 1997.

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

Modelling
A 30-year decision analytic model was used to determine the cost-effectiveness of the cholesterol-lowering therapies. The analysis used the Coronary Heart Disease Policy Model.

Outcomes assessed in the review
The review assessed the effects of therapies on lipid levels, quality of life, and discontinuation rate.

Study designs and other criteria for inclusion in the review
The effectiveness of statin was derived from the Scandinavian Simvastatin Survival study. Quality of life weights were derived from the Beaver Dam Health Outcomes study and a survey of Medicare patients.
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 individual studies were used. No further details were provided.

Number of primary studies included
At least 16 studies were included.

Methods of combining primary studies
Effectiveness estimates of the impact of low-cholesterol diet on cholesterol levels were pooled from five studies. Estimates for primary prevention with a statin were pooled from three studies. The estimates for secondary prevention with a statin were based on results from a single study (Scandinavian Simvastatin Survival Study).

Investigation of differences between primary studies
Not stated.

Results of the review
The change in total cholesterol level was -6.5% for primary prevention with step I diet, -20.1% for primary prevention with a statin, and -25% for secondary prevention with a statin. The change in HDL cholesterol level was -0.9% for primary prevention with step I diet, 5.2% for primary prevention with a statin, and 8% for secondary prevention with a statin. The change in LDL cholesterol level was -7.7% for primary prevention with step I diet, -26.4% for primary prevention with a statin, and -35% for secondary prevention with a statin. A discontinuation rate of 6% because of adverse events was assumed for both primary and secondary prevention with statins.

Measure of benefits used in the economic analysis
Quality-adjusted life years (QALYs) were used as the measure of benefit. Benefits were discounted at an annual rate of 3%.

Direct costs
Direct costs were discounted at an annual rate of 3%. Quantities and costs were reported separately. Direct costs included intervention costs (costs of medication, physician visits, and laboratory tests), costs of coronary heart disease health care, and costs of non-coronary heart disease health care. The quantity/cost boundary adopted was that of society. The estimation of quantities and costs was based on actual data. Cost estimates of medication were based on average wholesale prices. The costs of non-coronary heart disease health care were collected from the 1987 National Medical Expenditure Survey. The price year was 1997.

Indirect Costs
Indirect costs were discounted at an annual rate of 3%. Quantities and costs were reported separately. Indirect costs reflected the value of patient time associated with each physician visit. The quantity/cost boundary adopted was that of society. The estimation of quantities and costs was based on actual data. The price year was 1997.
Currency
US dollars ($).

Sensitivity analysis
One-way, two-way, and three-way sensitivity analyses were performed on the cost of diet and statin therapy, quality of life weights, effectiveness of step I diet, lag time between initiation of treatment and its effect on coronary heart disease event rates, logistic regression coefficients for the effects of LDL and HDL cholesterol levels on coronary heart disease event rates in the model, and the inclusion of niacin as a treatment option for primary prevention.

Estimated benefits used in the economic analysis
The estimated benefits were not reported.

Cost results
Cost results were not reported.

Synthesis of costs and benefits
Incremental cost-effectiveness ratios for primary prevention with step I diet ranged from $1,900 per QALY gained to $500,000 per QALY gained, depending on risk subgroup characteristics. Primary prevention with a statin compared with diet therapy ranged from $54,000 per QALY to $1,400,000 per QALY. Cost-effectiveness ratios became more favourable with increasing numbers of risk factors and age. Cost-effectiveness ratios for women were higher than for men. Secondary prevention with a statin cost less than $50,000 per QALY for all risk subgroups. The inclusion of niacin as a primary prevention option resulted in much less favourable cost-effectiveness ratios for primary prevention with a statin (over $500,000 per QALY).

Authors' conclusions
Primary prevention with a step I diet seems to be cost-effective for most risk subgroups, but may not be cost-effective for otherwise healthy young women. Primary prevention with a statin may not be cost-effective for younger men and women with few risk factors, given the option of secondary prevention and of primary prevention in older age ranges. Secondary prevention with a statin seems to be cost-effective for all risk subgroups and is cost saving in some high-risk subgroups.

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

Validity of estimate of measure of benefit
The authors did not state that a systematic review of the literature had been undertaken. More details could have been provided about the design of the review and the method of combining primary effectiveness estimates. The estimation of benefits was modelled. The instrument used to derive a measure of health benefit was not reported.

Validity of estimate of costs
Some good features of the analysis included the following: all relevant cost categories were included; quantities and costs were reported separately; sensitivity analyses were conducted on costs and on quantities; actual costs were used; a societal perspective was adopted; both direct and indirect costs were considered; and the price year was reported.

Other issues
Extensive sensitivity analyses were performed to account for the uncertainties in the data. However, it appears that the discount rate (3% for both costs and benefits) was not varied, thus limiting the generalisability of the results. The authors did make appropriate comparisons of their findings with those from other studies. They did not address the issue of generalisability to other settings. The authors did not present their results selectively. The study considered women and men 35 to 84 years of age with low-density lipoprotein cholesterol levels, and this was reflected in the authors’ conclusions. As acknowledged by the authors, the analysis did not include the effects of diabetes or a family history of coronary heart disease. Any increase in costs or cost savings, resulting from more widespread use of newer treatments, were not considered. Discounts from wholesale prices were not included. Additional costs or cost savings such as those associated with substituting lower-fat foods and an annual physical examination were ignored. The possible benefits of a low-fat diet on conditions other than coronary heart disease were not included.

**Implications of the study**
The cost-effectiveness of other widely used statin drugs (simvastatin, atorvastatin, cerivastatin, and fluvastatin) in primary prevention remains to be assessed.

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