Cost-effectiveness of statin therapy for primary prevention in a low-cost statin era
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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.

CRD summary
The objective was to assess the cost-effectiveness of expanded statin prescribing strategies, using low cost generic drugs, for different populations. The authors concluded that low cost statins were cost-effective for people with only modestly elevated cholesterol or any coronary heart disease risk factor. The methods were not reported in full, particularly for the costs, but in general they were good. Given the scope of the study, the authors' conclusions appear to be valid.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to assess the cost-effectiveness of expanded statin prescribing strategies, using low cost generic drugs, for different populations.

Interventions
The intervention was a low intensity statin given to reduce low density lipoprotein (LDL) cholesterol levels. Treatment for patients with different LDL cholesterol levels (>160, >130, and >100mg/dL and treat all) and different coronary heart disease (CHD) risk levels (moderately high, moderate, lower, and lowest) was assessed.

A combination of cholesterol level and risk group was assessed, as a maximum impact intervention, in which statin therapy was given to all patients at moderate or moderately high risk, patients at a lower risk with a LDL cholesterol level above 100mg/dL, and patients at the lowest risk with a LDL cholesterol level over 130mg/dL. These interventions were compared with no statin treatment.

Location/setting
USA/primary care.

Methods
Analytical approach:
The authors used an established Markov state-transition model of CHD incidence, prevalence, mortality, and costs in the U.S population over 35 years old (Weinstein, et al. 1987, and Gaspoz, et al. 2002, see 'Other Publications of Related Interest' below for bibliographic details). The time horizon was the lifetime of the patient. The authors reported that the perspective was that of the health care system.

Effectiveness data:
The clinical and effectiveness data were from a wide range of sources including published clinical trials, meta-analyses, life-tables, and hospital records. The main effectiveness measure was the percentage reduction in LDL cholesterol following statin therapy. These estimates were from three published studies.

Monetary benefit and utility valuations:
The utility estimates were from expert opinion and published studies.

Measure of benefit:
The measure of benefit was quality-adjusted life-years (QALYs) gained. Future outcomes were discounted at an annual
rate of 3%.

Cost data:
The costs of statin therapy were estimated to be four US dollars ($) per month, based on universal access and the prices charged by many US grocers. The health care costs were from national and Californian data. All costs were adjusted, using cost-to-charge ratios, and inflated to 2008 prices, using the medical care component of the consumer price index. They were reported in $, and discounted at an annual rate of 3%.

Analysis of uncertainty:
A probabilistic sensitivity analysis was undertaken by fitting each model parameter with a distribution and using Monte Carlo simulation to determine the uncertainty around the outcomes and costs.

**Results**
With statin treatment for all patients with any cholesterol level, the incremental cost-utility ratios ranged from $23,000 per QALY gained for those at moderately high risk (two or more risk factors and 10% to 20% risk) to $490,000 per QALY gained for those at lowest risk (no risk factors).

With treatment for patients with a LDL cholesterol level over 100mg/dL, the ratios ranged from dominant, where treatment was more effective and less costly, for those at moderately high risk to $150,000 per QALY gained for those at lowest risk.

With treatment for those with a LDL cholesterol level over 160mg/dL, statin therapy was dominant for all CHD risk groups. The maximum impact intervention had an incremental cost-utility ratio of $2,800 per QALY gained, compared with the usual levels of treatment.

The sensitivity analysis showed that these results were most sensitive to large reductions in statin effectiveness and to changes in the quality of life estimates.

**Authors’ conclusions**
The authors concluded that low cost statins were cost-effective for people with only modestly elevated cholesterol or with any coronary heart disease risk factor.

**CRD commentary**
**Interventions:**
The interventions were reported clearly and in detail.

**Effectiveness/benefits:**
The clinical and effectiveness data were from a wide range of sources, which were sufficiently reported in an online appendix. No systematic review was reported to identify these sources, making it impossible to determine if all the relevant evidence was included. The model was peer reviewed and published, and it included adverse events as well as effectiveness. The measure of benefit (QALYs) appears to have included all the relevant outcomes.

**Costs:**
The perspective was reported to be that of the health care system, but few details of the costs were reported, with no description of the categories included. Some items and resource use data were given in a table, but it is not possible to determine if all the relevant costs were analysed. The price year, time horizon, and discount rate were reported.

**Analysis and results:**
The cost and outcome evidence was synthesised using a Markov model. No diagram was provided, but the model was published and validated elsewhere. The model uncertainty was exhaustively tested in univariate and probabilistic sensitivity analyses. As limitations to their study, the authors reported that low price statins might not be universally available through all retailers, and their results could not be extrapolated to younger patients, because many studies only included patients over 40 years old.
Concluding remarks:
The methods were not reported in full, particularly for the costs, but in general they were good. Given the scope of the study, the authors’ conclusions appear to be valid.

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