Cost-effectiveness analysis of rosuvastatin versus atorvastatin, simvastatin, and pravastatin from a Canadian health system perspective

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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 examine the cost-effectiveness of rosuvastatin in comparison with atorvastatin, simvastatin, and pravastatin for managing lipid parameters in patients with hypercholesterolaemia. The authors concluded that rosuvastatin was a cost-effective treatment among the statins available in Canada. The study was methodologically well conducted and reflected real-world patterns of care. The authors’ conclusions appear to be valid, but this may depend on the validity of some assumptions.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The objective was to examine the cost-effectiveness of rosuvastatin in comparison with atorvastatin, simvastatin, and pravastatin for managing several lipid parameters in patients with hypercholesterolaemia.

Interventions
The doses were branded rosuvastatin 10mg, 20mg, and 40mg, branded atorvastatin 10mg, 20mg, 40mg, and 80mg, generic simvastatin 10mg, 20mg, 40mg, and 80mg, and generic pravastatin 10mg, 20mg, and 40mg. These doses were taken orally once daily for six weeks and were also aggregated on the basis of Canadian statin-utilisation patterns.

Location/setting
Canada/primary care.

Methods
Analytical approach:
A simple decision analytic model was developed and populated with data from a single study. The time horizon of the analysis was one year. The authors stated that the perspective of the Canadian health care system was adopted.

Effectiveness data:
The clinical data came from a multi-centre, open-label, prospective, randomised controlled trial (RCT), namely the Statin Therapies for Elevated Lipid Levels compared Across doses to Rosuvastatin (STELLAR) trial, which enrolled 2,268 adults. The clinical endpoints were estimated over a six-week follow-up period using an intention-to-treat analysis. One-year data were based on the assumption that the six-week trial data would remain constant over time. Another key assumption was that adherence would have no important impact on the relative effectiveness for the different statins. The key clinical endpoint was treatment efficacy, which was estimated using various measures.

Monetary benefit and utility valuations:
Not included.

Measure of benefit:
The benefit measures (treatment efficacy) were the percent reduction in lipid parameters such as low-density lipoprotein cholesterol (LDL-C), total cholesterol, total cholesterol divided by high-density lipoprotein cholesterol (HDL-C), triglycerides, apolipoprotein B, and the ratio between apolipoprotein B and apolipoprotein A-I; the percent increase in HDL-C; and the proportion of patients achieving the Canadian LDL-C goal. These measures were derived
directly from the STELLAR trial.

Cost data:
The economic analysis included only the consumption of drugs and these data were derived from actual dosages for each drug in British Columbia. The economic impact of drug-related adverse events was not considered as they were assumed to be similar for each drug. The drug costs were based on average wholesale prices in British Columbia. The price year was 2007 and the costs were in Canadian dollars (CAD).

Analysis of uncertainty:
Monte Carlo simulation was used to randomly vary all the effectiveness inputs at once, and to generate cost-effectiveness acceptability curves (CEACs). The drug prices were considered to be fixed.

Results
The clinical analysis showed that rosuvastatin was associated with better clinical endpoints than the other statins.

When doses were not aggregated, rosuvastatin 10mg was dominant over, which means it was more effective and less expensive than, atorvastatin 10mg and 20mg, simvastatin 20mg and 40mg, and pravastatin 40mg, using all measures except reduction in triglycerides. In comparison with pravastatin 20mg, the incremental cost per percent change in all measures (except achieving LDL-C goal) ranged from CAD 3.89 to CAD 26.07, while for an additional patient achieving the LDL-C goal it was CAD 419.75.

When doses were aggregated, rosuvastatin was dominant over atorvastatin using all effectiveness measures (except triglycerides). Rosuvastatin was more effective, but also more costly with respect to pravastatin and simvastatin. With rosuvastatin, the incremental cost per additional percent reduction in LDL-C was CAD 2.10 compared with generic simvastatin and CAD 4.02 compared with pravastatin, and per additional patient achieving the LDL-C goal it was CAD 144.51 compared with simvastatin and CAD 373.91 compared with pravastatin.

The CEACs showed that rosuvastatin had the highest probability of being cost-effective compared with other statins over a broad range of monetary values per percent decrease in LDL-C.

Authors' conclusions
The authors concluded that rosuvastatin was a cost-effective treatment among the statins available in Canada for patients with hypercholesterolaemia.

CRD commentary
Interventions:
The rationale for the selection of the comparators was clear in that the most widely prescribed statins were considered. Different doses were compared and were also aggregated.

Effectiveness/benefits:
The clinical data came from a well conducted RCT and its design should have ensured the validity of the clinical inputs. The large sample size, the use of intention-to-treat, and the multi-centre setting made the clinical analysis more robust, but the relatively short time horizon required the authors' assumptions for the one-year estimates of clinical efficacy. These estimates were subjected to probabilistic sensitivity analysis. The benefit measures were all disease specific and, although they may be of some clinical relevance, they may not be comparable with the benefits of other health care interventions.

Costs:
The analysis of costs was restricted to the cost of the drugs. The exclusion of drug-related side effects was justified by the similar safety profile of the drugs. Monitoring costs were also excluded as they were likely to be low. The source of data was reported and reflected local treatment patterns and prices. No statistical tests were carried out on the economic inputs. The price year was reported, which will facilitate reflation exercises in other time periods.

Analysis and results:
The costs and benefits were appropriately reported along with the results of the sensitivity analyses, which was a valid approach to assess the variability in the clinical estimates. The analytic approach was appropriate for identifying the optimal treatment strategy. The simple model was consistent with the objective of the study. The authors acknowledged some limitations of their analysis and these mainly related to the assumption of long-term effectiveness of the statins, and the assumption that patients could not switch between statins.

**Concluding remarks:**
The study was methodologically well conducted and reflected real-world patterns of care. The authors’ conclusions appear to be valid, but this may depend on the validity of some assumptions.

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**Other publications of related interest**


Miller PS, Smith DG, Jones P. Cost effectiveness of rosuvastatin in treating patients to low-density lipoprotein cholesterol goals compared with atorvastatin, pravastatin, and simvastatin (a US analysis of the STELLAR trial). American Journal of Cardiology 2005; 95: 1314-1319.

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