Cost-effectiveness analysis of valsartan versus losartan and the effect of switching
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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 evaluate the cost-effectiveness of valsartan, compared with losartan, and the impact of switching patients from valsartan to generic losartan, to lower blood pressure and prevent cardiovascular disease. The authors concluded that valsartan appeared to be cost-effective, compared with switching to generic losartan. Overall the quality of the study was adequate, but some of the assumptions made, due to a lack of data, make the results and the authors' conclusions, highly uncertain.

**Type of economic evaluation**
Cost-effectiveness analysis, cost-utility analysis

**Study objective**
The objective was to evaluate the cost-effectiveness of valsartan, compared with losartan, and the impact of switching patients who were established on valsartan to generic losartan, to lower blood pressure and prevent cardiovascular disease.

**Interventions**
The interventions were valsartan 160mg per day; losartan 100mg per day; and switching patients from valsartan to generic losartan, once the latter became available.

**Location/setting**
USA/out-patient care.

**Methods**

**Analytical approach:**
A Markov model was used to simulate the patients’ progression through clinically relevant health states, and assess the costs and outcomes associated with those states, for the three interventions. The time horizon was 20 years. The authors stated that the perspective was that of a US third-party payer.

**Clinical data:**
The clinical and effectiveness data were from published studies. The main estimate of treatment effectiveness was the reduction in systolic blood pressure, which was from a published meta-analysis (Nixon, et al. 2009, see Other Publications of Related Interest). The impact of blood pressure on cardiovascular disease was evaluated using a series of risk prediction equations, estimated using data from the Framingham Heart Study (Wilson, et al. 2008, see Other Publications of Related Interest). In the model, adherence was defined as 80% of medication taken, and 76% of patients were assumed to be adherent. The effectiveness of treatments was assumed to be equal. Switching treatments was assumed to affect adherence, which fell by 8% when a switch occurred. Non-adherence was assumed not to affect the average reduction in systolic blood pressure. Other parameters, such as mortality and cardiovascular events, were from relevant published sources.

**Monetary benefit and utility valuations:**
Age-specific utilities were from a published study.

**Measure of benefit:**
The summary measures of benefit were life-years and quality-adjusted life-years (QALYs) gained. As benefits could be generated over 20 years, future benefits were discounted at an annual rate of 3%.
Cost data:
The direct costs were those of drug treatment; treatment of cardiovascular events, including myocardial infarction, other chronic heart disease, stroke, and transient ischaemic attack; and follow-up care. The costs associated with the treatment of cardiovascular events were from an analysis of in-patient hospital records. Follow-up costs were from published studies. Drug costs were average wholesale price estimates from the Micromedex Red Book. Future costs were discounted at an annual rate of 3%. All costs were reported in US $.

Analysis of uncertainty:
One-way sensitivity and scenario analyses were performed. In the sensitivity analyses, each model parameter was varied by ±10% and the results were presented in a tornado diagram.

Results
With valsartan, the life-years gained were 10.65, and the QALYs gained were 8.02. With losartan, the life-years gained were 10.62; and the QALYs gained were 8.00. With switching from valsartan to losartan, the life-years gained were 10.62, and the QALYs gained were 8.00.

Valsartan was associated with additional costs of $714 per patient, compared with losartan, and $667 per patient, compared with switching.

Compared with losartan, valsartan was associated with an additional cost per QALY gained of $32,313, and an additional cost per life-year gained of $27,268. Compared with switching, valsartan was associated with an additional cost per QALY gained of $30,170 and an additional cost per life-year gained of $25,460.

The sensitivity analysis showed that the model was most sensitive to changes in the time horizon, the cost of branded losartan, and the clinical efficacy.

Authors’ conclusions
The authors concluded that valsartan appeared to be cost-effective, compared with switching to generic losartan.

CRD commentary
Interventions:
The interventions were described, but it was clear that a number of other treatment options were available, and their use and relevance to clinical practice (and any economic analysis) is likely to vary by setting.

Effectiveness/benefits:
The sources for the major clinical and effectiveness model inputs were reported. It was not clear how these were identified and selected, but they appear to have been relevant and of good quality. The treatment efficacy was not reported in detail. The model assumed that patients on either treatment had reduced systolic blood pressure and that reduction led to a reduced risk of cardiovascular events and death. Treatment efficacy was related to adherence to treatment, but due to a lack of data, it was assumed that non-adherence would affect the costs (less treatment costs), but not the outcomes (the average reduction in systolic blood pressure was not affected by non-compliance with treatment). Some sensitivity analysis around this assumption was undertaken, but the authors acknowledged that further evidence on the relationship between adherence and change in systolic blood pressure was required.

Costs:
The authors explicitly reported the perspective and it appears that all the major relevant costs were included. The sources for these costs were adequately reported, but the price year was not, which will hamper future inflationary exercises. Other details, such as the time horizon and discount rate, were given.

Analysis and results:
A Markov model was used to synthesise the cost and outcome information. The details of the model were reported, with a diagram. Exhaustive one-way sensitivity analyses were undertaken to assess the impact of uncertainty on the model’s results. This type of analysis goes some way towards evaluating uncertainty, but a probabilistic sensitivity analysis would have been a better way to assess the overall model uncertainty. As the main limitation to their study, the authors reported that their model did not evaluate subsequent cardiovascular events, and only considered changes in
Concluding remarks:
Overall, the quality of the study was adequate, but some of the assumptions made, due to a lack of data, make the results and the conclusions drawn by the authors, highly uncertain.

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