Clinical and economic effects of replacing enalapril with benazepril in hypertensive patients
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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
Introduction of a programme aimed at encouraging treatment of hypertension using less costly angiotensin-converting-enzyme (ACE) inhibitors, namely, benazepril instead of enalapril for selected patients.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Outpatients being treated for hypertension (using enalapril) who did not have congestive heart failure.

Setting
The study was set in primary care clinics. The economic analysis was conducted in Atlanta, Georgia, USA.

Dates to which data relate
Data for the effectiveness and resource use analyses were collected between June 1993 and June 1995. Price dates were not stated.

Source of effectiveness data
Effectiveness data were derived from a single study.

Link between effectiveness and cost data
Costing was undertaken retrospectively on a patient sample including the subsample used in the effectiveness study.

Study sample
The study sample was a random selection of 104 medical records from the records of 1500 patients who had been switched to benazepril from enalapril during the two years of the prescribing programme. Thirty-two (30.7%) of those records were excluded as they did not meet the criteria of having two blood pressure measurements following the switch to benazepril. Power calculations were not used to determine the sample size.

Study design
A before and after study was conducted. It is not clear whether the study was conducted in a single centre or at multiple sites. The method of randomisation used to select medical records for review was not stated. There was no loss to
follow up, which lasted up to two years.

**Analysis of effectiveness**
The analysis of the clinical study was based on intention to treat. The primary health outcomes used were the percentage of patients achieving systolic and diastolic blood pressure control and adverse events. Blood pressure control was defined as mean measurements $\leq 140$ mm Hg for systolic and $\leq 90$ mm Hg for diastolic blood pressure.

**Effectiveness results**
Before the switch to benazepril 43% of the study group had systolic blood pressure control when on enalapril therapy and 75% has diastolic blood pressure control. After switching therapy, 44% had systolic blood pressure controlled and 82% had diastolic blood pressure controlled. A total of 13 patients had blood pressure controlled by enalapril but not by benazepril and 17 patients had blood pressure controlled by benazepril but not by enalapril. Only one adverse event was reported after switching to benazepril.

**Clinical conclusions**
The introduction of the non mandatory programme encouraging prescribers to switch to benazepril from enalapril had no detrimental effect on patient care.

**Measure of benefits used in the economic analysis**
Since the effectiveness analysis following the introduction of the non-mandatory prescribing programme did not show any difference in clinical benefit between enalapril and benazepril, the economic analysis was based on the difference in costs only.

**Direct costs**
Costs were not reported as discounted. The difference in the acquisition costs of enalapril and benazepril was estimated by multiplying the monthly change by the number of months since switching for each of the 1,500 patients in the programme. The costs of the programme were also estimated. These included the costs of additional antihypertensive therapy following switching therapy, discarded enalapril tablets following the switch, changes in the number of clinic visits, laboratory costs and pharmacists' time. The cost of the initial clinic check to determine blood pressure was included in costs. The costs of a clinic visit were estimated by determining the amount of time spent by each member of staff during a visit. These estimates were determined by a questionnaire. Future clinic visits were not included in the costs of the programme since the time between visits did not differ "significantly” (p$\leq 0.05$) from that when using enalapril. Costs of changes in antihypertensive therapy were not included if the patient had experienced uncontrolled blood pressure whilst on enalapril, had received a higher amount of antihypertensive therapy whilst on enalapril, or had received a lower dosage of benazepril than was equivalent to the dose of enalapril previously received. For those patients with comparable antihypertensive regimens before and after the switch, the drug costs for changes in non-ACE-inhibitor regimens were excluded because they were considered to be common to both periods. The price year was not stated.

**Currency**
US dollars ($).

**Sensitivity analysis**
No sensitivity analysis was conducted.

**Estimated benefits used in the economic analysis**
Not applicable.
Cost results
The two-year programme led to a decrease in costs of $259,054.

Synthesis of costs and benefits
Not applicable.

Authors' conclusions
The authors concluded that the introduction of the non-mandatory programme to encourage prescribing physicians to switch to benazepril from enalapril led to a decrease in the overall costs of therapy without having a detrimental effect on patient care.

CRD COMMENTARY - Selection of comparators
Although the analysis examined the impact of the non-mandatory prescription programme, the authors noted that, whilst no comparison of clinical efficacy has been conducted between benazepril and enalapril, both therapies were available on the hospital formulary and prescribing physicians were left to make the final determination as to whether a patient could suitably be switched from enalapril to benazepril.

Validity of estimate of measure of benefit
The estimate of measure of benefit is questionable due to the study design, which was retrospective and which used historical controls.

Validity of estimate of costs
The price year used in reporting costs has not been stated and costs do not appear to have been discounted over the two year length of the study.

Other issues
The issue of generalisability was not adequately addressed by the authors.

Implications of the study
Further research is required to compare the clinical efficacy of enalapril and benazepril and, then, a prospective study would be required to validate the study results presented by this paper.

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