Cost effectiveness analysis of a hypertension management program in patients with type 2 diabetes

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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
This study examined the cost-effectiveness of a hypertension management programme in patients who had existing hypertension and were newly diagnosed with diabetes. The authors concluded that the hypothetical programme might be effective and affordable compared with standard care alone from the perspective of a third-party payer. The methods appear to have been valid, which should ensure that the conclusions are robust, despite the limited reporting of the data sources.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to identify the cost that would result in a neutral return on investment, by examining the cost-effectiveness of a hypothetical hypertension management programme in patients, who were aged 25 to 65 years, had existing hypertension, and were newly diagnosed with diabetes.

Interventions
The hypertension management programme was added to standard care and compared with standard care alone, which included out-patient visits, laboratory tests, and blood pressure medication.

Location/setting
USA/primary care.

Methods
Analytical approach:
The analysis was based on a Markov decision analytic model. Three time horizons were considered: five years, three years, and one year. The authors stated that the perspective of a third-party payer was adopted.

Effectiveness data:
The clinical data were from a selection of relevant studies. Most of the evidence came from the UK Prospective Diabetes Study (UKPDS), which provided data on the incidence rates of diabetes-related complications in the two groups. The UKPDS was also used for the effectiveness of the two strategies in reducing hypertension. In general, little information on the data sources was given.

Monetary benefit and utility valuations:
The utility values were derived from published studies, the methods of which were not reported.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary benefit measure and they were discounted at an annual rate of 3%.

Cost data:
The economic analysis included the costs of diabetes and hypertension care as well as the costs of fatal and non-fatal complications (heart failure, stroke, myocardial infarction, and renal failure). The cost of the programme was not
included as the aim was to determine the maximum programme cost at which the two options would cost the same. Most of the costs were from Medicare reimbursement rates. They were in US dollars ($) and the price year was 2007. A 3% annual discount rate was applied.

Analysis of uncertainty:
A deterministic one-way sensitivity analysis was undertaken using estimates from the published literature for disease states, costs, and utilities. The most influential inputs were further investigated in two-way sensitivity and threshold analyses.

 Results
In the simulated cohort of 1,000 patients, over five years, the expected QALYs were 4,571 and the costs were $6,055.73 with the management programme and the QALYs were 4,426 and costs were $8,325.60 in the control group. Over three years, the expected QALYs were 2,848 and costs were $4,513.54 with the programme and the QALYs were 2,796 and costs were $5,827.66 in the control group. Over one year, the expected QALYs were 984 and costs were $3,090 with the programme and the QALYs were 979 and costs were $3,337.56 in the control group.

The programme was more effective and less expensive (dominant) than standard care alone, excluding the programme costs, with the greatest savings associated with longer time horizons. The programme remained cost-neutral if the payer invested up to $159 over five years, $109 over three years, and $41 over one year, per person per month in the programme.

The sensitivity analysis showed that the base-case results were quite robust to the plausible variations. At a cost-effectiveness threshold of $50,000 per QALY, the hypertension management programme was no longer cost-effective, when the rate of other causes of death was greater than 41.7 per 1,000 person-years in the intervention group or smaller than 11 per 1,000 person-years in the control group.

Authors’ conclusions
The authors concluded that a hypothetical hypertension management programme might be effective and affordable compared with standard care alone from the perspective of a third-party payer.

CRD commentary
Interventions:
The rationale for the selection of the comparators was clear in that the proposed programme was compared against conventional patient management. The authors did not provide a clear description of the interventions, but stated that various approaches had been reported in the literature.

Effectiveness/benefits:
The approach used to derive the clinical inputs was not clearly described. The authors did not state that a systematic literature search was undertaken. The methods used in the data sources and the criteria used to select the most appropriate estimates were not reported and no information on the sources of the utility values was given. This makes it difficult to objectively assess the quality of the evidence used in the model. QALYs are an appropriate benefit measure, given the impact of the disease on both survival and quality of life. They also allow cross-disease comparisons to be made.

Costs:
The economic analysis was consistent with the perspective stated in both the data sources and the categories of costs. The costs were presented as total categories without unit costs and resource quantities, which limits the transparency and ability to reproduce the analysis for other settings. Other aspects of the study, such as the price year and the use of discounting, were reported. The cost estimates were treated deterministically, but the impact of variations in disease costs was tested in the sensitivity analysis.

Analysis and results:
The results were clearly presented and the incremental analysis was appropriate for identifying the best strategy. The costs and benefits were not synthesised, given the dominance of the programme over standard care. The issue of
uncertainty was partly investigated, using a limited approach, which considered variations in individual inputs only, except for mortalities, which were varied in a two-way analysis. The authors acknowledged some limitations of their analysis, such as the use of UK data for the US population, and the exclusion of adverse events for drugs. The analysis focused on patients who were newly diagnosed with diabetes and who had known hypertension. It is not clear whether the results will generalise to all patients with diabetes and hypertension.

Concluding remarks:
The methods appear to have been valid, which should ensure that the conclusions are robust, despite the limited reporting of the data sources.

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