A health economic analysis of screening and optimal treatment of nephropathy in patients with type 2 diabetes and hypertension in the USA

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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 study examined the cost-effectiveness of a screening and treatment strategy for nephropathy (microalbuminuria and overt nephropathy), compared with no screening, in patients with Type 2 diabetes and hypertension in a primary care setting. The authors concluded that screening for nephropathy, followed by optimal antihypertensive therapy with renoprotective agents, was a cost-effective strategy. The analysis was characterised by limited reporting of the clinical and economic inputs of the model. Nevertheless, good presentation of the results and the well-conducted sensitivity analyses enhance the validity of the authors' conclusions.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to assess the cost-effectiveness of a screening and treatment strategy for nephropathy (microalbuminuria and overt nephropathy), compared with no screening, in patients with Type 2 diabetes and hypertension in a primary care setting.

Interventions
The screening and treatment strategy consisted of using annual semi-quantitative urine dipsticks to test for microalbuminuria and overt nephropathy, followed by optimal renoprotective-based antihypertensive therapy (irbesartan 300 mg) in addition to other conventional antihypertensive agents, if required. Standard care consisted of conventional antihypertensive medication to achieve a target blood-pressure of 120/80 mmHg.

Location/setting
USA/primary care.

Methods
Analytical approach:
This economic evaluation used a Markov model to simulate the progression from no renal disease to end-stage renal disease (ESRD) in hypothetical patients with Type 2 diabetes and hypertension. A 25-year time horizon was considered. The authors stated that the perspective of a third-party payer was adopted in the study.

Effectiveness data:
The clinical data were derived from a selection of known relevant studies. Transition probabilities were taken from randomised clinical trials such as the BENEDICT, IRMA-2 and IDNT studies. The sensitivity and specificity of screening for nephropathy were taken from a study conducted at Sheffield University. All-cause mortality was based on US life tables, while mortality associated with model health states were obtained from several published studies, some conducted outside the USA.

Monetary benefit and utility valuations:
Utility valuations were derived from published studies, details of which were not given.

Measure of benefit:
The summary benefit measures was the quality-adjusted life-years (QALYs). These were derived using the decision
model. Other model outputs, such as the incidence of ESRD, ESRD-free survival and life-years (LYs), were also presented. QALYs were discounted at an annual rate of 3%.

Cost data:
The health services included in the analysis were screening (general practitioner and test strips), irbesartan and ESRD treatment (dialysis and transplantation). The costs and quantities associated with treatment of ESRD were taken from the US Renal Data Service. The cost of irbesartan came from the Drug Topics Red Book using the average wholesale price. The sources of the screening costs were not given. The costs were in US dollars ($). The price year was 2000. An annual discount rate of 3% was applied.

Analysis of uncertainty:
A second-order Monte Carlo simulation was performed by assigning distributions to the most uncertain parameters (e.g. patients' baseline characteristics, screening accuracy). Two additional simulations were performed in which sampling of age did not occur for patients with baseline ages of 40 or 75 years. Finally, the proportion of patients with early and advanced overt nephropathy was varied. Cost-effectiveness acceptability curves were generated.

Results
Screening reduced the cumulative incidence of ESRD by 44% and improved the discounted life expectancy by 0.16 (± 0.12) years per patient over a 25-year time horizon.

The expected QALYs were 7.57 (± 3.13) without screening and 7.75 (± 3.28) with screening and treatment (difference 0.18 ± 0.15).

The expected costs per patient were $11,200 (± 11,534) without screening and $11,444 (± 8,278) with screening and treatment (cost-difference: $244 ± 3,499).

The median incremental cost per QALY gained with screening and treatment over no screening was $20,011.

The cost-effectiveness acceptability curve showed that the probability of screening and treatment being cost-effective was 77% at a threshold of $50,000 per QALY and 93% at a threshold of $100,000.

The sensitivity analysis demonstrated the robustness of the base-case findings. In general, the strategy of screening and treatment had the greatest benefits in younger patients and with a longer time horizon.

Authors' conclusions
The authors concluded that screening for nephropathy, followed by optimal antihypertensive therapy with renoprotective agents, was a cost-effective alternative to no screening in patients with Type 2 diabetes and hypertension, from the perspective of a US third-party payer.

CRD commentary
Interventions:
The selection of the comparators was appropriate as the newly proposed intervention was compared against usual care in the authors’ setting. Both interventions (screening and not screening) were appropriately described.

Effectiveness/benefits:
The approach used to derive the clinical estimates was not clear. The primary studies appear to have been identified selectively rather than through a review of the literature, and the authors did not justify the selection of these specific studies. Clearly, the use of clinical trials represents a valid source of data but, in general, there was little information on these studies or on the methods used to combine the published estimates. This limits the possibility of judging the validity of these estimates. Similarly, there were few details of the derivation of utility valuations. For example, the method used to elicit patient preferences and whose values were used were not described.

Costs:
The analysis of the costs was not carried out transparently. The unit costs and the resource quantities were not presented
separately, and a breakdown of the cost items was not reported. These characteristics will limit the possibility of replicating the analysis in other settings. The sources of the cost data were not reported for all categories. The price year was reported and discounting was appropriately performed. The sensitivity analysis investigated the issue of uncertainty surrounding the cost estimates.

Analysis and results:
The health states used in the Markov model were described clearly, together with transition probabilities and other details. The synthesis of the costs and benefits was appropriately performed and reported. The issue of uncertainty was satisfactorily addressed and discussed. Overall, the results of the analysis were presented clearly.

Concluding remarks:
The analysis was characterised by limited reporting around the clinical and economic inputs of the model. Nevertheless, good presentation of the results and the well-conducted sensitivity analyses enhance the validity of the authors’ conclusions.

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Bibliographic details

Other publications of related interest


Indexing Status
Subject indexing assigned by CRD

MeSH
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