Benefits of information technology-enabled diabetes management

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 investigated the clinical and monetary benefit of information technology-enabled diabetes management (ITDM) for patients aged over 25 years. The authors concluded that ITDM has the potential to improve process of care, prevent the development of diabetes complications, and generate cost-savings. Provider-based registry was the most beneficial technology. The study methodology appears appropriate and was generally reported clearly, although more transparent reporting of the costing would have been beneficial. The conclusions appear to reflect the available evidence.

Type of economic evaluation
Cost-benefit analysis

Study objective
The study investigated clinical and monetary benefit of information technology-enabled diabetes management (ITDM) for patients aged over 25 years.

Interventions
The six information technologies investigated in the study were as follows:

- payer-sponsored system that connected to electronic claim system to track and monitor diabetes-specific information;
- provider-based diabetes registries that tracked patients and their diabetes-specific information;
- provider-based clinical decision support systems that produced warning of potential errors and presented treatment options through comparing patient information with electronic medical recorders;
- remote monitoring technologies that facilitated clinical information transfer from the patient’s home to the provider's office;
- self-management technologies that improve the patient’s ability in disease management between provider visits through the use of education resources and a data-gathering system; and
- integrated management systems that were assumed to support a full range of diabetes management activities.

Location/setting
USA/primary care.

Methods
Analytical approach:
A computer simulation model was created to project the clinical outcomes and monetary benefit of the disease management technologies over 10 years. This model assumed that the diabetes management technologies were developed at an annual rate of 20% until full national implementation was attained in the 5th year. The burden of disease was estimated through use of a Markov model based on diabetes disease states (e.g. diabetic retinopathy, treated retinopathy and blindness). The cycle length used in the Markov model was not stated. The authors did not state the perspective of the study.
Effectiveness data:
The authors reported the conduct of a systematic review of the literature in order to collect effectiveness data. Methodology developed at the Evidence-Based Practice Center at Stanford University was used. The primary outcomes included control of A1C, systolic blood-pressure and cholesterol, as well as compliance with foot, eye and microalbuminuria screening.

Monetary benefit and utility valuations:
None.

Measure of benefit:
The primary measure of benefit was the cost-savings produced by each disease management technology. The authors also reported rates of death, blindness, amputations, end-stage renal disease, cardiac arrest and myocardial infarction.

Cost data:
The model projected the impact of disease management technologies on economic burden of diseases, including coronary artery disease, cerebrovascular disease, neuropathy, nephropathy and retinopathy. The costs of the interventions appear to have been reported in a previous paper. The costs were adjusted to 2004 at an annual rate of 5%.

Analysis of uncertainty:
One-way sensitivity analysis was performed on key variables such as the ITDM impact rate, patient turnover rate and discount rate.

Results
Over 10 years, the integrated provider-patient systems produced the most cost-savings ($16.9 billion), followed by diabetes registries ($14.5 billion), computerised decision support ($10.7 billion), payer-centred technologies ($7.10 billion), remote monitoring ($326 million), and self-management ($285 million).

The number of deaths avoided over 10 years were 920,000 for the integrated system, 710,000 for the registries, 380,000 for the payer technologies, 270,000 for remote monitoring, 210,000 for clinical decision support systems and 170,000 for self-management.

The results were robust to the one-way sensitivity analysis.

Authors' conclusions
The authors concluded that ITDM has the potential to improve process of care, prevent the development of diabetes complications, and generate cost-savings. Provider-based registry was the most beneficial technology.

CRD commentary
Interventions:
The interventions were described in full. All of the technologies, except the integrated system, were forms of ITDM that existed in the marketplace.

Effectiveness/Benefits:
The authors stated that the effectiveness data were obtained from a systematic review of the literature using methodology developed by the Evidence-Based Practice Center at Stanford University. However, neither the sources used for the literature search nor the inclusion and exclusion criteria were reported. The primary outcomes were well reported, along with baseline characteristics of the diabetes population.

Costs:
The costs of diabetes-related diseases were estimated based on a published model. However, the cost categories and relevant resources used were not reported, and nor was the study perspective. Hence, the level of reporting makes the costing less transparent and thus limits the reader's ability to ascertain fully what has been included. It would appear that the cost of the interventions were not included in the analysis because it was too complicated for this analysis; it could.
therefore be argued that this is not a full economic evaluation. Discounting was conducted and the price year was reported, thereby simplifying future reflation exercises. The cost results were reported in full.

Results and Analysis:
The analytic approach was generally well reported, the model components being described in detail. In addition, the results were presented clearly and fully. A one-way sensitivity analysis was appropriately conducted to determine the robustness of the results. However, the uncertainty around model input parameters was not addressed. Overall, the level of reporting was good, including the model outcomes. The authors also acknowledged and discussed a number of limitations to their analysis.

Concluding remarks:
The study methodology appears appropriate and was generally reported clearly, although more transparent reporting of the costing would have been beneficial. The conclusions appear to reflect the scope of the analysis.

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Bibliographic details

Other publications of related interest


Indexing Status
Subject indexing assigned by NLM

MeSH
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