Long-term cost-utility analysis of a multidisciplinary primary care diabetes management program in Ontario


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 present study evaluated the cost-effectiveness of a multidisciplinary primary care diabetes management programme in Ontario, combining data from a local primary study with data from the Ontario Diabetes Economic Model. The authors concluded that this multifaceted intervention in diabetes was cost-effectiveness according to usual criteria. Despite some limitations concerning the evaluation of effectiveness and thus benefits, the authors’ conclusions appear reasonable.

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

Study objective
The objective of the study was to evaluate the short- and long-term cost-effectiveness of a multidisciplinary primary care diabetes management programme implemented in Ontario, using the Ontario Diabetes Economic Model (ODEM).

Interventions
The multifaceted programme undertaken in the Group Health Centre (GHC) in Sault Ste Marie (non-profit capitated system), and directed at the patients, GHC providers and GHC health care system, lasted 18 months. Its components included a specialty diabetes nurse liaison, patient and provider education, and the programming of a diabetes tracker computer screen into the existing electronic medical record. This programme was compared with the situation before its implementation.

Location/setting
Ontario. Outpatient/inpatient care.

Methods
Analytical approach:
Using the Ontario Ministry of Health perspective and a 40-year time horizon, and cost and effectiveness data obtained from the multidisciplinary programme, the ODEM calculated cost-effectiveness data. The model was an adaptation of another model, the United Kingdom Prospective Diabetes Study (UKPDS) outcome model, to Ontario. The UKPDS model is a probabilistic, discrete-time model that predicts diabetes-related complications (i.e. myocardial infarction, ischaemic heart disease, stroke, heart failure, amputation, renal failure and blindness) based on individual patient characteristics and time-varying risk factors.

Effectiveness data:
A retrospective chart review (historical case series) was performed on 401 patients undergoing the programme, both before and after its implementation. Data gathered to populate the model included demographic characteristics, diabetes medical history, history of other medical conditions and five key intermediate outcomes (haemoglobin A1C, blood-pressure, total cholesterol, high-density lipoprotein cholesterol and smoking status). Multiple imputation techniques were used for missing data. The main clinical effectiveness estimates were based on the difference for each participant in each of the intermediate outcome, from the beginning- to end-of-study value (average changes were statistically compared using paired t-tests). The base-case analysis assumed a 1-year treatment effect. The equations predicting long-term outcomes were already contained in the model.
Monetary benefit and utility valuations:
Diabetes-related complications and quality of life values were taken from a survey of 3,192 patients in the UKPDS that used the EQ-5D health status questionnaire.

Measure of benefit:
Intermediate outcomes were translated into two primary measures of benefit: life-years (LY) and quality-adjusted life-years (QALYs). A discount rate of 3% was used.

Cost data:
Costs categories included diabetes-related complications and programme implementation costs (including patient and provider education, specialty nurse liaison, diabetes template programming in the electronic record, and medication change during the programme). The costs of complications were extracted from actual Ontario resource use profiles for a large prospective cohort of individuals with diabetes (n=734,113) over a 10-year time period. The cost of inpatient and outpatient hospital, outpatient physician visits, prescription drugs and home care services were included. The unit costs were collected from various Canadian sources. Costs included those of the first year (immediate) as well as those of long-term follow-up. The costs were reported in 2004 Canadian dollars, using a discount rate of 3%. Various sources were used to collect costing data relating to programme implementation. These ranged from the change in diabetes-related medication costs extracted from the chart review, to wages and salaries in the other components.

Analysis of uncertainty:
One-way, two-way and scenario analyses were evaluated. These included simultaneous variation of both the programme and treatment effect duration, and different durations of treatment and effectiveness.

Results
The control group had 10.8929 LYs and 8.2371 QALYs, while the programme resulted in 11.0070 LYs and 8.3446 QALYs.

The costs of implementing the programme for 401 individuals were CAD 266,236 in total, an average of CAD 664 per patient.

Annual costs of complications were also reported.

The mean lifetime cost per patient was CAD 46,078 in the control group and CAD 46,722 in the programme group. Thus, the estimated incremental cost-effectiveness of the programme was CAD 5,640/LY or CAD 5,992/QALY.

The authors reported that the results were robust in the sensitivity analyses.

Authors' conclusions
The authors concluded that the application of the ODEM to this multifaceted intervention in diabetes predicted that it represented good value for money. They encourage the use of the model for other local applications.

CRD commentary
Interventions:
Although the authors described the different components of this intervention, which seemed relevant for diabetes care, they were not described in sufficient detail to allow their replication. The reader is referred to the previous paper for more details (Lee et al. 2006, see ‘Other Publications of Related Interest’ below for bibliographic details). The choice of the interventions was implicitly justified as the study compared the implementation of a new programme with the previous programme.

Effectiveness/Benefits:
As the authors acknowledged, the main effectiveness estimates were based on a weak study design (historical case series), as a randomised controlled trial was not feasible. The authors also stated that Canadian utilities would have been better suited to the study than those for UK patients, and they plan to include them in the future. The absence of
randomisation or a concurrent control group suggests that the reader will need to exercise some caution when interpreting the effectiveness results. Also, although the authors stated that imputation of missing data was performed, they did not describe or quantify the magnitude of this problem.

Costs:
In general, the costing section of the paper appears quite sound. It included actual resource use profiles for over 4.4 million patient-years, to measure the cost of treating diabetes and its complications. As the commentary related to the interventions, the level of reporting was not too detailed in terms of the intervention costs. The costs were relevant to the perspective chosen, although there was a minor issue around the fact that they included patient costs related to medications, even though the perspective was that of the Ministry of Health.

Results and Analysis:
: The model, which is an established model, was adequately reported. Similarly, the level of reporting of the results was adequate, ranging from intermediate outcomes and costs to final cost-effectiveness data. The authors acknowledged a limitation in the ODEM in that only the first event in any single category of diabetes-related complications could be accounted for. Another limitation was that probabilistic analyses could not be performed using the current version of the model.

Concluding remarks:
Despite some limitations about the evaluation of effectiveness and thus benefits, the authors carried out a methodologically sound study and a transparent analysis. The authors' conclusions appear reasonable.

Funding
Ontario Ministry of Health and Long-Term Care.

Bibliographic details

Other publications of related interest


Indexing Status
Subject indexing assigned by CRD

MeSH
Cost-Benefit Analysis; Diabetes Mellitus, Type 2 /complications /economics /prevention & control; Disease Management; Models, Economic; Quality-Adjusted Life Years; Risk Factors; Treatment Outcome

AccessionNumber
22007002223

Date bibliographic record published
23/10/2007
Date abstract record published
01/09/2008