Cost-effectiveness of implementing the chronic care model for diabetes care in a military population

Kuo S, Bryce CL, Zgibor JC, Wolf DL, Roberts MS, Smith KJ

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 multifaceted programme to manage diabetes, based on the chronic care model, in a military population. The authors concluded that, compared with usual care, the chronic care model for diabetes was effective, at a reasonable cost, from both the perspectives of the health care system and society. The methods were valid and transparent, the sources of data were valid, and the uncertainty was investigated. The authors’ conclusions appear to be robust.

Type of economic evaluation
Cost-utility analysis

Study objective
This study examined the cost-effectiveness of a multifaceted programme to manage diabetes, based on the chronic care model, which changed daily medical practice and enhanced health care delivery, in a military population.

Interventions
The chronic care model was delivered through the Diabetes Outreach Clinic (DOC), which provided health care, for all military personnel with diabetes, in one central location. The staff were an endocrinologist, a nurse practitioner, a counsellor, an ophthalmologist, a dietician, a certified diabetes educator, and support staff. It was implemented by the US Air Force, at the Wilford Hall Medical Center, from 2006 to 2008, and it was compared with usual care.

Location/setting
USA/military clinic.

Methods
Analytical approach:
The analysis was based on a Markov model, with a 20-year time horizon. The authors stated that the perspectives of the health care system and society were adopted.

Effectiveness data:
The clinical inputs for long-term disease progression (microvascular and macrovascular events) were from the UK Prospective Diabetes Study (UKPDS). For the impact of the programme, on health outcomes, in diabetes patients, the inputs were from a sample of 9,405 diabetes patients from the centre that implemented the intervention; 1,171 received the intervention and 8,234 received usual care. Of these, 1,417 patients (196 for the intervention and 1,221 for usual care) were included in the study. The populations of these two sources were matched to provide evidence for the model. Other published sources were used for other inputs. The change in glycated haemoglobin was the main input for the analysis.

Monetary benefit and utility valuations:
The utility values were from a published source.

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 health care system perspective included the direct medical costs to health care providers of laboratory tests, physician office visits, diabetes complications, deaths, and medications. Most of these costs were from Medicare reimbursement data or official wages for health care professionals, as well as estimates from the Centers for Disease Control and Prevention. The societal perspective also included the non-medical costs, such as patient time, and payments for physician visits and diabetes education classes. Most of these costs were from the literature, with some from the intervention databases and official US tariffs. All costs were in US $ and the price year was 2010. A 3% annual discount rate was applied.

Analysis of uncertainty:
One-way sensitivity analyses were performed to identify those inputs that changed the incremental cost-utility ratio by more than 20%. A probabilistic sensitivity analysis was carried out, from the health care system perspective, by varying the inputs over predefined distributions (beta for probabilities; uniform, triangular, or log normal for costs; and normal or uniform for utilities). The process was repeated using 10,000 Monte Carlo simulations to generate cost-effectiveness acceptability curves.

Results
From the health care system perspective, the expected costs were $116,242 with usual care and $121,553 with the intervention. The QALYs were 8.351 with usual care and 8.467 with the diabetes care centre intervention. The incremental cost per QALY gained with the intervention, over usual care, was $45,495. This figure was slightly lower at $42,051, from the societal perspective.

In scenarios that mirrored the intervention or usual care cohort, but not all patients were assumed to be without complications at baseline, the incremental cost per QALY gained with the intervention was around $61,000, from the societal perspective. The most influential inputs were the yearly cost for specialist care visits, for each group.

At a threshold of $50,000 per QALY gained, the intervention was preferred in 51% of model iterations, and at $100,000 per QALY gained it was preferred in 72% of iterations.

Authors' conclusions
The authors concluded that, compared with usual care, in a military setting, the chronic care model for diabetes was effective, at a reasonable cost, from both the perspectives of the health care system and society.

CRD commentary
Interventions:
The selection of the comparators was appropriate as the care model was compared with the usual care in the authors' setting, but the usual care was not clearly described.

Effectiveness/benefits:
The impact of the care model on the clinical outcomes was from a retrospective review of a large sample of diabetes patients, in the US military. Adjustments were needed to account for differences at baseline between the two study groups. Selection bias cannot be ruled out, given the weak design of the study. Long-term disease progression was calculated using well-known equations, which appears to have been appropriate. Extensive sensitivity analysis was conducted on the clinical parameters. QALYs were an appropriate benefit measure for patients with diabetes. Some information on the derivation of the utility values was reported, but the instrument used to elicit the preferences was not given.

Costs:
Two distinct perspectives were adopted and the types of costs included, for each analysis, were appropriate. The authors pointed out that the indirect costs were not included, as they were assumed to have been included in the QALYs. Key details of the unit costs and quantities of resources were reported, with additional information in an appendix. The data sources were provided for each set of costs and they appear to have been relevant to the authors' context. The analysis was transparently carried out. The price year was reported, allowing reflation exercises. The cost estimates were varied in the sensitivity analyses.
Analysis and results:
The results were clearly reported for both the main analysis and the alternative scenarios. The costs and QALYs were appropriately combined, using an incremental approach. Both deterministic and probabilistic analyses were used to assess uncertainty. An appropriate model appears to have been used to simulate the management of diabetes and its complications. The authors stated that conservative assumptions were made; the effects of the care model and usual care were assumed to be identical for the progression of disease in patients who had already developed diabetes complications. They stated that their results were relevant to the US military population and might not be transferable to other populations or other settings.

Concluding remarks:
The methods were valid and transparent, the sources of data were valid, and the uncertainty was investigated. The authors’ conclusions appear to be robust.

Funding
Funded by the US Air Force.

Bibliographic details

PubMedID
21722566

Original Paper URL
http://www.journalofdst.org/May2011/

Indexing Status
Subject indexing assigned by NLM

MeSH
Adult; Chronic Disease; Cohort Studies; Cost-Benefit Analysis; Decision Trees; Diabetes Mellitus /economics /therapy; Disease Progression; Female; Humans; Male; Markov Chains; Middle Aged; Military Personnel; Outcome Assessment (Health Care); Quality-Adjusted Life Years; Risk; Sensitivity and Specificity; Treatment Outcome; United States

AccessionNumber
22012014218

Date bibliographic record published
09/05/2012

Date abstract record published
18/12/2012