Model of complications of NIDDM II Analysis of the health benefits and cost-effectiveness of treating NIDDM with the goal of normoglycemia


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.

Health technology
Using comprehensive care (average HbA1c 7.2% maintained for life) versus standard care (average HbA1c 10% maintained for life) for treating patients with non-insulin-dependent diabetes mellitus (NIDDM) with the goal of normoglycemia.

Type of intervention
Treatment.

Economic study type
Cost-utility analysis.

Study population
Patients (age range 19-75) with newly diagnosed NIDDM.

Setting
Hospital. The economic study was carried out in the USA.

Dates to which data relate
The main effectiveness data were derived from national survey data and clinical trials (the dates were not given). Resource and cost data were mainly taken from 1992-96 sources. Resource were measured in 1994 values.

Source of effectiveness data
Estimates of the clinical probabilities, comprehensive treatment results, cardiovascular disease risk, life expectancy, complications, and QALYs were derived from national survey data, clinical trials and a probabilistic model.

Modelling
A probabilistic model (Monte Carlo technique) was used to simulate the history of the patients with NIDDM and to predict the cost-effectiveness ratio.

Outcomes assessed in the review
Increased rates for retinopathy, nephropathy, and neuropathy for the standard care and background retinopathy, macular edema, proliferative retinopathy, microalbuminuria, gross proteinuria, neuropathy for the comprehensive care, probability of annual dilated eye examination, and utilities attributed to the health states of life without any complications, death, blindness, end-stage renal disease (ESRD), and lower-extremity amputation (LEA) were among the parameters assessed in the review.
Study designs and other criteria for inclusion in the review
Not stated.

Sources searched to identify primary studies
Not stated.

Criteria used to ensure the validity of primary studies
Not stated.

Methods used to judge relevance and validity, and for extracting data
Not stated.

Number of primary studies included
At least 4 studies, but the total number of studies included was not specified.

Methods of combining primary studies
Not stated.

Investigation of differences between primary studies
Not stated.

Results of the review
Increased rates for retinopathy, nephropathy, and neuropathy for the standard care were not specified. Relative hazard rates for background retinopathy, macular edema, proliferative retinopathy, microalbuminuria, gross proteinuria, and neuropathy for the comprehensive care were 10.1, 1.20, 6.30, 3.25, 7.95, and 5.30, respectively. The probability of annual dilated eye examination for standard care was 0.5 and 1.0 if macular edema or proliferative retinopathy is detected. The corresponding figure for comprehensive care was 1.0. Utilities attributed to the health states of life without any complications, death, blindness, end-stage renal disease (ESRD), and lower-extremity amputation (LEA) were 1.0, 0, 0.69, 0.61, 0.8, respectively.

Estimates of effectiveness and key assumptions
Two assumptions were made in the model: no use of ACE inhibitors for proteinuria and no effect of HbA1c on CVD risk.

Measure of benefits used in the economic analysis
The comprehensive treatment results related to incidence of blindness, end-stage renal disease and lower-extremity amputation, cardiovascular disease risk, life expectancy, QALYsand complications. The utilities were derived from the literature.

Direct costs
Costs were discounted. The resource quantities were not reported separately from the prices. Cost of general and diabetes-related and non-related medical care were included in the analysis. Cost items were analysed separately. The quantity/cost boundary adopted was the single payer. Cost and resource data were derived from clinical trials, national surveys, and expert opinion. The price date was 1994.
Indirect Costs
Not included.

Currency
US dollars ($).

Sensitivity analysis
A one-way sensitivity analysis was performed on the parameters of the model.

Estimated benefits used in the economic analysis
Comprehensive treatment of NIDDM was estimated to reduce the cumulative incidence of blindness, end-stage renal disease and lower-extremity amputation by 72%, 87% and 67%, respectively. Cardiovascular disease risk was estimated to increase by 3%. The comprehensive care increased life expectancy by up to 1.32 years (undiscounted). Discounted quality-adjusted life years (QALYs) were estimated to be 11.43 and 12.30 for the standard and comprehensive care, respectively. The discount rate was 3%.

Cost results
The discount rate was 3%. The cost of general and diabetes-related medical care were estimated to be $32,365 and $58,312 for the standard and comprehensive care, respectively. The non-diabetes related medical care costs were estimated to be $1,855/year. The total costs were estimated to be $62,769 and $76,922 for the standard and comprehensive care, respectively.

Synthesis of costs and benefits
The estimated incremental cost/QALY gained was estimated to be $16,002. The range of values for the incremental cost/QALY estimated under the sensitivity analyses was from $7,793 to $36,209.

Authors’ conclusions
The incremental effectiveness of treating NIDDM with the goal of normoglycemia is estimated to be in the range of interventions that are generally considered cost-effective.

CRD COMMENTARY - Selection of comparators
The reason for the choice of comparator is clear.

Validity of estimate of measure of benefit
Given the lack of information regarding the literature review, the internal validity of the estimates of the benefit measures adopted in the study cannot be assessed.

Validity of estimate of costs
The resource quantities were not reported separately from the prices. Adequate details of the methods of quantity/cost estimation were given.

Other issues
The authors’ conclusions were justified, given the uncertainties in the data. The issue of generalisability to other settings or countries was not addressed although appropriate comparisons were made with other studies.
Source of funding
None stated.

Bibliographic details

PubMedID
9135935

Other publications of related interest
Comment in: Diabetes Care 1997;20(5):685-6

Indexing Status
Subject indexing assigned by NLM

MeSH
Adult; Aged; Blindness /economics /epidemiology /prevention & control; Blood Glucose /metabolism; Cardiovascular Diseases /epidemiology /prevention & control; Clinical Trials as Topic; Cost-Benefit Analysis; Diabetes Mellitus, Type 2 /complications /economics /epidemiology /therapy; Diabetic Angiopathies /epidemiology /prevention & control; Diabetic Nephropathies /economics /epidemiology /prevention & control; Diabetic Neuropathies /economics /epidemiology /prevention & control; Diabetic Retinopathy /economics /epidemiology /prevention & control; Ethnic Groups; Female; Humans; Incidence; Insurance Benefits; Kidney Failure, Chronic /epidemiology; Male; Mass Screening; Middle Aged; Models, Theoretical; Proteinuria /epidemiology /prevention & control; Quality of Life; Risk Factors; United States /epidemiology

AccessionNumber
21997000661

Date bibliographic record published
31/03/1999

Date abstract record published
31/03/1999