Clinical and cost-effectiveness of primary prevention of type 2 diabetes in a 'real world' routine healthcare setting: model based on the KORA Survey 2000


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 assessed the cost-effectiveness of two primary prevention strategies, lifestyle modification versus metformin, for Type 2 diabetes in a "real world" setting using population-based data for an elderly high-risk population in Germany. The authors concluded that primary prevention was not considered cost-effective, especially with metformin, owing to the low participation and high cost of education. Overall, the study methodology was good in terms of the sources used and presentation of results.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The objective of the study was to determine the cost-effectiveness of two primary prevention strategies, lifestyle modification versus metformin, for Type 2 diabetes in a "real world" setting using population-based data in Germany. The interventions were directed to an elderly high-risk population, which comprised people aged 60 to 74 years with a body mass index of \( \geq 24 \text{ kg/m}^2 \) and pre-diabetic status.

Interventions
The prevention strategies under examination were metformin versus staff education, targeted screening and lifestyle modification (lifestyle programme). Both strategies were compared with no intervention.

Location/setting
Germany/primary care.

Methods
Analytical approach:
The current economic evaluation was based on a decision analytic model that used primary data from a German population-based study, supplemented with other published sources. The time horizon of the analysis was 3 years. The authors stated that the analysis was carried out from the perspectives of the statutory health insurance and society.

Effectiveness data:
The clinical estimates came from multiple sources, which the authors appear to have identified selectively. Patient characteristics and epidemiological estimates were derived from the KORA Survey 2000, a stratified sample of 4,261 persons aged 60 to 74 years identified in the area of Augsburg in Germany. Data on the effect of the prevention strategies came from the Diabetes Prevention Program, a randomised clinical trial (RCT). Patient participation data were taken from German databases and published studies, the designs of which were not explicitly reported.

Monetary benefit and utility valuations:
None.

Measure of benefit:
The summary benefit measure was the number of cases of Type 2 diabetes prevented. No discounting was applied.

Cost data:
The analysis included direct and indirect costs. The direct costs were for the education of health care professionals, the screening programme (testing and participation), metformin and outpatient visits to professionals for lifestyle modification. The indirect costs related to productivity loss due to time spent by patients in performing exercise or attending visits. The unit costs and quantities of resources used were presented for some items. The source of the resource use data was unclear. The medical costs came from official sources for the German health care system. The cost of time was based on wage rates. The costs for the education of health care professionals were borne by the associations of professionals. The price year was 2004. The costs were presented in euros (EUR) and also in UK pounds sterling (£). Discounting was not applied as only the short-term costs were considered.

Analysis of uncertainty:
The issue of uncertainty was addressed by means of both deterministic (univariate) and probabilistic (multivariate) sensitivity analyses. These considered variations in the following model inputs: rate of participation in the screening programme and the subsequent intervention, prevalence of disease, incidence of disease in the pre-diabetic group, relative reduction of Type 2 diabetes incidence as a result of the intervention, and costs of patient time. Ranges of values were generally based on published confidence intervals. The probabilistic analysis was based on a first-order Monte Carlo simulation with 1,000 iterations.

Results
In comparison with no intervention, the number of diabetes cases prevented over 3 years would be 42 with metformin and 184 with lifestyle modification.

From the perspective of the statutory health insurance, the total costs would be EUR 797,539 (£534,706) with metformin and EUR 856,507 (£574,241) with lifestyle modification.

From the perspective of society, the total costs would be EUR 1,335,204 (£895,181) with metformin and EUR 4,961,340 (£3,326,307) with lifestyle modification.

Incremental cost-effectiveness ratios (ICERs; i.e. the additional cost per case prevented) were calculated. The ICER for lifestyle modification over no intervention was EUR 4,664 (£3,127) from the perspective of the statutory health insurance and EUR 27,015 (£18,112) from the perspective of society. Metformin had a very high ICER in comparison with lifestyle modification.

The sensitivity analysis showed that the most influential model inputs were patient participation and intervention effectiveness. The probabilistic sensitivity analysis corroborated the base-case findings and confirmed that metformin was often dominated (less effective and more costly) by a strategy of lifestyle modification (96% of simulations in the health care perspective and 62% of simulation in the societal perspective).

Authors’ conclusions
The authors concluded that, owing to the high costs for staff education and screening and the low participation in a routine programme, neither prevention strategy prevented a significant number of diabetes cases in comparison with no intervention. Thus, primary prevention was not considered to be cost-effective.

CRD commentary
Interventions:
The strategies selected for examination appear to have been appropriate as they are the relevant options for the primary prevention of diabetes. However, the authors did not provide an extensive description of these alternatives, and the reader was referred to an RCT. The choice of a baseline strategy of no intervention reflects a common pattern of care in several settings.

Effectiveness/benefits:
The sources of the clinical data were identified selectively in order to ensure that the model included the most relevant data. Therefore, a large German dataset was selected for baseline values of the population under study, while the effect of the prevention strategy was based on an RCT, which represents a valid source of evidence because of the strength of the design. This approach has the typical limitations of those economic evaluations that use data from multiple sources,
for example, heterogeneity of patient populations and types of interventions. In addition, while the benefit measure used represents a typical outcome for diabetes, it is not comparable with other diseases.

Costs:
The categories of costs included in the analysis were consistent with the perspectives adopted in the study. Key unit costs were presented, but little information on resource use was given. The sources of the costs were reported, as were other details of the economic analysis, such as the currency and price year. In general, caution will be required if extrapolating the results of this analysis to other locations.

Analysis and results:
The approach used to synthesise the costs and benefits was appropriate. The issue of uncertainty was addressed extensively and appropriately in the sensitivity analysis. The authors provided a rather good presentation of the study results, but the analysis reflected only the German situation.

Concluding remarks:
Overall, the quality of the study methodology was good and the study results were presented clearly. Primary sources of the data were extensively described, although more information on the derivation of resource use data would have been helpful.

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Bibliographic details

Other publications of related interest


Indexing Status
Subject indexing assigned by NLM

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