Cost-utility analysis of liraglutide compared with sulphonylurea or sitagliptin, all as add-on to metformin monotherapy in Type 2 diabetes mellitus
Davies MJ, Chubb BD, Smith IC, Valentine WJ

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 assessed the cost-effectiveness of liraglutide compared with glimepiride or sitagliptin in type 2 diabetes patients with failing treatment with first-line metformin. The authors concluded that liraglutide added to metformin monotherapy was a cost-effective alternative to glimepiride or sitagliptin for treatment of such patients. The analysis was based on valid methods and sources of clinical evidence. The conclusions appear to be robust but it is not clear that all relevant clinical data were identified and used.

Type of economic evaluation
Cost-utility analysis

Study objective
This study assessed the cost-effectiveness of liraglutide compared with glimepiride or sitagliptin in patients with type 2 diabetes. All the treatments were given in addition to metformin.

Interventions
The treatments were liraglutide 1.2mg and 1.8mg daily, glimepiride/sulphonylurea 4mg daily and sitagliptin 100 mg daily. Each treatment was given in addition to the patient's metformin prescription. Treatment effectiveness was assumed to last for five years in the base case.

Location/setting
UK/primary care.

Methods
Analytical approach:
The analysis was based on the published Centre for Outcomes Research (CORE) Diabetes Model. This was a Markov model that projected the risk of complications due to diabetes over time. A lifetime horizon was considered. The stated perspective was that of the UK NHS.

Effectiveness data:
Clinical data and patient characteristics were from published phase III clinical studies. Two main randomised controlled trials (RCTs) were used. One RCT (Nauck et al., see Other Publications of Related Interest) compared liraglutide with sulphonylurea (91 patients in the liraglutide 1.2mg group, 83 in the liraglutide 1.8mg group and 89 in the sulphonylurea group). The other RCT (Pratley et al., see Other Publications of Related Interest) compared liraglutide with sitagliptin (214 patients in the liraglutide 1.2 mg group, 211 in the liraglutide 1.8 mg group and 210 in the sitagliptin group). These trials provided data on short-term effects and tolerability. Long-term projections were based on validated estimates used in the CORE Diabetes Model. The main clinical endpoints were change in HbA1c.

Monetary benefit and utility valuations:
Utility values were mostly from the UK Prospective Diabetes Study (UKPDS Study No. 65) supplemented with other published sources.

Measure of benefit:
The summary benefit measure quality-adjusted life-years (QALYs). These were discounted at a rate of 3.5%.
Cost data:
The economic analysis included direct costs for costs of drugs, blood glucose self-monitoring and treatment of diabetes complications. Unit costs of medications and blood glucose self-monitoring were from the Monthly Index of Medical Specialties (MIMS). The costs for complications were from UK-specific published sources. The price year was 2008. Costs were discounted at an annual rate of 3.5%. All costs were in UK pounds sterling (£).

Analysis of uncertainty:
One-way sensitivity analyses varied the time horizon, alternative weight progression, body mass index (BMI) disutility, hypoglycaemia disutility, clinical effects and discount rate. The ranges of values were from published sources or expert opinions. Nonparametric bootstrapping using Monte Carlo simulation was used to assess uncertainty. The results were presented with cost-effectiveness acceptability curves.

Results
Total costs and QALYs for each strategy and incremental results were presented.

Incremental QALYs for treatment with liraglutide 1.2mg compared with glimepiride were 0.32 and compared with sitagliptin were 0.19. Incremental costs for liraglutide 1.2mg compared with glimepiride were £3,003 and compared with sitagliptin were £1,842.

Incremental QALYs for treatment with liraglutide 1.8mg compared with glimepiride were 0.28 and compared with sitagliptin were 0.31. Incremental costs for liraglutide 1.8mg compared with glimepiride were £4,688 and compared with sitagliptin were £3,224.

The incremental cost-effectiveness ratio (ICER) for liraglutide 1.2mg compared with glimepiride was £9,449 per QALY gained and compared with sitagliptin was £9,851 per QALY gained.

The ICER for liraglutide 1.8 mg was £16,501 per QALY gained compared with glimepiride and £10,465 per QALY gained compared with sitagliptin.

Sensitivity analysis showed that systolic blood pressure, weight and cholesterol were the key drivers of cost-effectiveness in the liraglutide versus glimepiride comparison, with a relatively small contribution from HbA1c. HbA1c and weight were the key drivers of cost-effectiveness in the liraglutide versus sitagliptin comparison, with only small effects from systolic blood pressure and cholesterol.

Authors' conclusions
The authors concluded that liraglutide added to metformin monotherapy was a cost-effective alternative to glimepiride or sitagliptin for the treatment of patients with type 2 diabetes.

CRD commentary
Interventions:
The rationale for selection of the comparators was clear and they were valid treatments for patients with type 2 diabetes mellitus.

Effectiveness/benefits:
The clinical inputs were based on two RCTs. Key information on the trials was provided. It was possible that an indirect comparison would have been an appropriate approach, given the lack of head-to-head comparisons. This might have enabled a full incremental analysis but was not discussed. Epidemiological data were from the RCTs. Long-term effects were based on a well-known validated CORE Diabetes Model. Utilities were derived from the literature but no details were provided. QALYs were an appropriate benefit measure given the impact of diabetes on survival and quality of life, but assessing their appropriateness and validity was not possible given the lack of reporting.

Costs:
The cost categories appeared appropriate for the stated perspective. Costs were based on official rates and published UK-specific studies. Unit costs for drugs used and self-monitoring were provided. Costs of treating complications were reported as macro-categories and no information was provided on resource consumption. The price year was reported
and reflation exercises would be possible. The impact of alternative assumptions for the costs was investigated in the sensitivity analyses.

Analysis and results:
The methods and results were clearly reported. The CORE Diabetes Model had been validated in numerous studies was appropriate for simulating disease progression and predicting long-term outcomes. Uncertainty was investigated satisfactorily in deterministic sensitivity analysis and Monte Carlo simulation and the results were clearly presented. There was no full incremental analysis and this may be a limitation for the decision-maker.

Concluding remarks:
The analysis was based on valid methods and valid sources of clinical evidence. The authors’ conclusions appear to be robust but it is not clear that all relevant clinical data were identified and used.

Bibliographic details
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Other publications of related interest


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