Cost-effectiveness of liraglutide versus rosiglitazone, both in combination with glimepiride in treatment of type 2 diabetes in the US

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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 liraglutide (1.2 or 1.8mg) compared with rosiglitazone (4mg), both combined with glimepiride, for the management of adults with type 2 diabetes mellitus. The authors concluded that liraglutide (particularly 1.2mg), was cost-effective for improving glucose control. The analysis had a robust cost-effectiveness framework and the uncertainty was satisfactorily investigated, using a comprehensive approach. The authors' conclusions appear to be valid.

Type of economic evaluation
Cost-utility analysis

Study objective
This study examined the cost-effectiveness of liraglutide (1.2 or 1.8mg), compared with rosiglitazone (4mg), both combined with glimepiride, for the management of adults with type 2 diabetes mellitus.

Interventions
The treatments were liraglutide 1.2mg, liraglutide 1.8mg, and rosiglitazone 4mg. All treatments were combined with glimepiride.

Location/setting
USA/primary care.

Methods
Analytical approach:
The analysis was based on the published and validated CORE Diabetes Model, which simulated the long-term clinical and economic outcomes of the management of type 2 diabetes. A time horizon of 35 years was considered. The authors stated that the perspective of the payer for the US private health care system was adopted.

Effectiveness data:
Most of the data on disease progression were already included in the decision model and were from well-known published clinical and epidemiological sources, such as the UK Prospective Diabetes Study and the Framingham Heart Study. The key clinical evidence for the treatment efficacy and baseline patient characteristics (mean age 56.1 years) were from the Liraglutide Effect and Action in Diabetes (LEAD-1) trial. This was a six-month multicentre, double-blind, randomised controlled trial of 1,041 diabetes patients. A key assumption was the risk of congestive heart failure while on rosiglitazone and this was based on a meta-analysis.

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

Measure of benefit:
Quality-adjusted life-years (QALYs) were used as the summary benefit measure and they were discounted at an annual rate of 3%. Life-years were reported.

Cost data:
The economic analysis included the direct medical costs of the management of type 2 diabetes and its complications. The costs of adverse events associated with the medications for type 2 diabetes were included. The drug costs were based on their wholesale acquisition prices and included the injection needles and self-monitoring of blood glucose. The costs of events and complications were from US published sources. All costs were in US $. The price year was 2008 and a 3% annual discount rate was applied.

Analysis of uncertainty:
Non-parametric bootstrapping was used to investigate uncertainty, in a Monte Carlo simulation, and to calculate the mean and standard deviation for each model outcome. One-way sensitivity analyses were carried out on several inputs or assumptions, using published ranges of values or authors’ opinions.

Results
The lifetime costs were $107,300 with liraglutide 1.2mg, $128,247 with liraglutide 1.8mg, and $81,205 with rosiglitazone. The QALYs were 8.828 with liraglutide 1.2mg, 8.901 with liraglutide 1.8mg, and 8.064 with rosiglitazone.

Compared with rosiglitazone, the incremental cost per QALY gained was $34,147 with liraglutide 1.2mg, and $56,190 with liraglutide 1.8mg.

The cost-utility ratio for each liraglutide dose increased with shorter time horizons or when reducing the liraglutide efficacy. Assuming a time horizon of 10 years the incremental cost per QALY gained rose to $65,850 for liraglutide 1.2mg and $117,183 for 1.8mg. Excluding the increased risk of heart failure with rosiglitazone, the incremental cost per QALY gained increased to $60,902 for liraglutide 1.2mg and to $99,070 for 1.8mg.

Authors’ conclusions
The authors concluded that liraglutide (particularly at a dose of 1.2mg) with glimepiride, was cost-effective, compared with rosiglitazone plus glimepiride, for improving glucose control in patients with type 2 diabetes.

CRD commentary
Interventions:
The rationale for the selection of the comparators was clear, as they were the treatments examined in the LEAD-1 trial, but the authors stated that rosiglitazone was no longer used in the authors setting due to its increased risk of congestive heart failure.

Effectiveness/benefits:
The treatment effect was appropriately based on a head-to-head randomised controlled trial of a large number of patients, which should have provided valid estimates. Typical sources and a validated model were used to extrapolate the short-term data to the long term. Extensive sensitivity analysis was conducted on all the model parameters. QALYs were a valid benefit measure, given the impact of diabetes and its complications on mortality and morbidity, and they allow comparisons with other disease areas. No information on the sources for the utility weights was provided.

Costs:
The cost items were consistent with the perspective of the health care payer. The unit costs were clearly presented for the drugs. Other medical costs were reported as category totals and were from publications, the methods of which were not reported. The discounting was appropriately reported as was the price year, allowing reflation exercises. No variation in the economic inputs was considered in the sensitivity analyses, but bootstrapping was applied to calculate standard deviations for the total costs.

Analysis and results:
The projected costs and benefits were clearly presented and were appropriately combined, using an incremental approach. The conventional threshold of $50,000 per QALY was used to identify the best strategy, but the authors pointed out that higher benchmarks could also be used. Both probabilistic and deterministic analyses were used to assess uncertainty, and the methods and results were clearly reported. The results were highly dependent on the inclusion or exclusion of the risk of congestive heart failure with rosiglitazone. The findings might be transferred to settings with similar relative drug prices.
Concluding remarks:
The analysis had a robust cost-effectiveness framework and the uncertainty was satisfactorily investigated, using a comprehensive approach. The authors’ conclusions appear to be valid.

Funding
Funded by NovoNordisk, manufacturer of liraglutide.

Bibliographic details
Lee WC, Conner C, Hammer M. Cost-effectiveness of liraglutide versus rosiglitazone, both in combination with glimepiride in treatment of type 2 diabetes in the US. Current Medical Research and Opinion 2011; 27(5): 897-906

PubMedID
21348806

DOI
10.1185/03007995.2011.559444

Original Paper URL
http://www.ingentaconnect.com/content/apl/cmro/2011/00000027/00000005/art00002

Indexing Status
Subject indexing assigned by NLM

MeSH
Costs and Cost Analysis; Diabetes Mellitus, Type 2 /drug therapy /economics; Drug Therapy, Combination /economics; Female; Glucagon-Like Peptide 1 /administration & dosage /analogs & derivatives /economics; Humans; Hypoglycemic Agents /administration & dosage /economics; Liraglutide; Male; Middle Aged; Quality of Life; Sulfonylurea Compounds /administration & dosage /economics; Thiazolidinediones /administration & dosage /economics; United States

AccessionNumber
2201100830

Date bibliographic record published
03/08/2011

Date abstract record published
19/11/2012