Cost-utility analysis of tiotropium versus usual care in patients with COPD in the UK and Belgium

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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
The objective was to assess the cost-effectiveness of adding tiotropium to usual care, for patients with moderate to very severe chronic obstructive pulmonary disease. The authors concluded that at a willingness-to-pay threshold of £30,000 (or 50,000 Euros) per quality-adjusted life-year gained, adding tiotropium to usual care was cost-effective. On the whole, the methods were valid and the authors' conclusions are appropriate.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to assess the cost-effectiveness of adding tiotropium to usual care, for patients with moderate to very severe chronic obstructive pulmonary disease (COPD).

Interventions
Tiotropium with usual care was compared with usual care alone. Usual care included respiratory medications, such as inhaled long-acting beta-agonists, inhaled corticosteroids and theophyllines, and it excluded inhaled anticholinergics.

Location/setting
UK and Belgium/primary and secondary care.

Methods
Analytical approach:
The analysis was based on a published COPD Markov model. The time horizon was four years. The authors reported that a health care payer perspective was adopted.

Effectiveness data:
The effectiveness data came from a four-year double-blind randomised controlled trial (RCT) – the Understanding Potential Long-term Impacts on Function with Tiotropium (UPLIFT) trial (see Other Publications of Related Interest). There were 2,986 patients randomised to receive tiotropium and 3,006 randomised to receive usual care. Patient characteristics were comparable at baseline. The primary outcome measure was COPD disease severity, assessed by the forced expiratory volume in one second (FEV1) after bronchodilation.

Monetary benefit and utility valuations:
The utility weights were from a subset of patients, who were participating in the UPLIFT trial and completed the EQ-5D questionnaire.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary measure of benefit. They were discounted at an annual rate of 3.5% for the UK, or 1.5% for Belgium.

Cost data:
The economic analysis included the costs of the management of COPD and exacerbation events. For the UK analysis, the resource use was estimated by a Delphi panel, and the unit costs were from a variety of sources, including the
Personal Social Services Research Unit. For the Belgian analysis, the resource use was from a longitudinal database of COPD patients, together with two prospective surveys of general practitioners. The unit cost estimates were from a variety of sources, including a local sickness fund and the literature. The price year was 2011. A discount rate of 3.5% was applied for the UK analysis, and 3% was applied for the Belgian analysis. The UK costs were reported in £, and the Belgium costs were reported in Euros (EUR).

Analysis of uncertainty:
Monte Carlo simulation was used to assess the uncertainty in the model outputs. Cost-effectiveness acceptability curves were generated, for various willingness-to-pay thresholds. A number of one-way sensitivity analyses were carried out on the key model inputs.

Results
In England, tiotropium cost £6,475 per patient and provided 2.645 QALYs; usual care cost £5,679 per patient and provided 2.594 QALYs. The incremental cost-effectiveness ratio with tiotropium was £15,567 per QALY gained. Similar results were obtained for Scotland, Wales and Northern Ireland.

In Belgium, tiotropium cost EUR 13,213 and provided 2.609 QALYs, while usual care cost EUR 12,244 and resulted in 2.557 QALYs. The incremental cost-effectiveness ratio for tiotropium was EUR 18,617 per QALY gained.

In the UK, the likelihood of tiotropium being cost-effective, at a willingness-to-pay threshold of £30,000 per QALY gained, was over 60%. In Belgium, the likelihood of tiotropium being cost-effective, at a threshold of EUR 50,000, was 62%.

Authors’ conclusions
The authors concluded that at a threshold of £30,000 (or EUR 50,000) per QALY gained, adding tiotropium to usual care was cost-effective, over four years.

CRD commentary
Interventions:
The selection of interventions was appropriate, in that the two options were the comparators in the RCT that supplied the effectiveness data. The comparators included usual care and were adequately described.

Effectiveness/benefits:
The effectiveness data were from a randomised, double-blind controlled trial, which is generally regarded as the gold standard for clinical research, and should ensure a high degree of internal validity. The details of the trial, such as the sample size calculation and the method of randomisation, were not reported, making it difficult to meaningfully comment on the validity of the data. The two groups were shown to be comparable at baseline. QALYs were an appropriate outcome measure, capturing the impact of the intervention on quality of life and allowing comparison with other diseases.

Costs:
The relevant costs for the stated perspective were included. Details of the sources for the resource use and unit costs were given and appear to have been appropriate. The costs that were reported were generally given as category totals, rather than unit costs, reducing the transparency of the analysis. The price year was stated, and the costs were appropriately adjusted for inflation. They were appropriately discounted, at different rates for the UK and Belgium, reflecting the different recommendations in each country.

Analysis and results:
The Markov model was described. The results were clearly presented, with an incremental approach used to combine the cost and outcome data. Valid approaches were used to investigate uncertainty. The authors discussed a number of limitations to their analysis, which were mainly concerned with the model. The results should be generalisable to other similar settings.

Concluding remarks:
On the whole, the methods were valid and the authors’ conclusions are appropriate.
**Funding**
Funding received from Boehringer Ingelheim, the manufacturer of tiotropium.

**Bibliographic details**

**PubMedID**
23040833

**DOI**
10.1016/j.rmed.2012.09.006

**Original Paper URL**

**Other publications of related interest**

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Bronchodilator Agents /economics /therapeutic use; Cost-Benefit Analysis; Disease Progression; Drug Costs; Female; Health Resources /economics /utilization; Humans; Male; Markov Chains; Middle Aged; Pulmonary Disease, Chronic Obstructive /drug therapy /economics; Quality of Life; Quality-Adjusted Life Years; Scopolamine Derivatives /economics /therapeutic use; Severity of Illness Index; Tiotropium Bromide; Treatment Outcome

**AccessionNumber**
22012040301

**Date bibliographic record published**
25/01/2013

**Date abstract record published**
01/05/2013