Cost-effectiveness of continuous positive airway pressure therapy in patients with obstructive sleep apnea-hypopnea in British Columbia


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 aim was to assess the cost-effectiveness of continuous positive airway pressure (CPAP) therapy in comparison with no treatment for patients with moderate to severe obstructive sleep apnoea-hypopnoea. The authors concluded that, compared with no treatment, CPAP was an efficient strategy from the perspectives of both society and the third-party payer. The study methodology appears to have been sound and was based on a robust decision model. The authors' conclusions are likely to be valid.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to assess the cost-effectiveness of continuous positive airway pressure (CPAP) therapy in comparison with no treatment, for patients with newly diagnosed moderate to severe obstructive sleep apnoea-hypopnoea (OSAH), and who were drivers. Patients were aged between 30 and 59 years.

Interventions
CPAP, the first-line treatment for OSAH, was compared with no treatment.

Location/setting
Canada/home and secondary care.

Methods
Analytical approach:
This economic evaluation was based on a Markov model with a five year time horizon. The authors stated that the analysis was carried out from two perspectives, that of society and that of the third-party payer.

Effectiveness data:
Some clinical data were derived from a selection of known, relevant studies. Treatment effect was based on a systematic review. Demographic data were provided by the Vancouver General Hospital in British Columbia. Treatment effectiveness (the impact of CPAP on motor vehicle crashes, MVCs) was derived from a meta-analysis based on a literature review key details of which were reported. Other sources were the Insurance Corporation of British Columbia (the insurer for all licensed motorists in the province) and Canadian life tables.

Monetary benefit and utility valuations:
Utility valuations were derived from a previous study which used the standard gamble approach. Quality weights for injury levels were obtained from the Functional Capacity Index in a sample of people who had sustained injuries which resulted in functional limitations lasting for longer than one year.

Measure of benefit:
Quality-adjusted life-years (QALYs) were used as the summary benefit measure and were calculated by means of the Markov model.

Cost data:
The analysis included the costs of CPAP (device, mask, tubing, headgear, and heated humidifier), specialist consultations, physician follow-up visits, and lifetime costs associated with MVCs (direct costs such as medical services and ongoing care; indirect costs such as losses in market productivity). The cost of CPAP was derived from an established vendor in Vancouver. Other direct medical costs were obtained from the British Columbia Medical Association. Costs of injury were derived from a cost-of-illness study, namely the Economic Burden of Unintentional Injury in Canada study. An Ontario study and the state insurer were used to derive costs of property damage only collisions. The costs were in Canadian dollars (CAD) and the price year was 2005.

Analysis of uncertainty:
The issue of uncertainty was mainly addressed by means of a probabilistic sensitivity analysis based on a second-order Monte Carlo simulation, which assigned stochastic distributions to model inputs and generated cost-effectiveness acceptability curves. A one-way sensitivity analysis was also carried out to explore the impact of individual model inputs on cost-utility ratios. In an alternative scenario, utility values were based on a study that used the EuroQol 5D instrument.

Results
The CPAP strategy produced a gain of 0.75 QALYs over no treatment.

From the perspective of the third-party payer, the additional cost of CPAP over no CPAP was CAD 2,716 and the incremental cost per QALY gained was CAD 3,636 (95% confidence interval, CI: CAD 1,911, CAD 9,175).

From the perspective of society, the additional cost of CPAP over no CPAP was CAD 2,230, and the incremental cost per QALY gained was CAD 2,979 (95% CI: CAD 1,597, CAD 8,078).

The results of the probabilistic sensitivity analysis were only displayed graphically and showed that the probability of CPAP being cost-effective over no CPAP was higher than 95% for a willingness-to-pay of CAD 10,000 from the societal perspective. The deterministic sensitivity analyses suggested that the most influential model inputs were the utility weights. How these were derived affected the cost-utility ratio. Using the EQ-5D values, the incremental cost per QALY of CPAP was CAD 19,401 from the payer perspective and CAD 15,935 from the societal perspective.

Authors' conclusions
The authors concluded that CPAP was a highly efficient strategy in comparison with no treatment for patients with OSAH from the perspectives of both society and the third-party payer.

CRD commentary
Interventions:
The authors stated that CPAP was the first-line therapy for OSAH, while no treatment might be the standard care in some settings. Thus, the selection of the comparators appears valid.

Effectiveness/benefits:
The selection of the data sources was intended to include the most relevant data known to the authors. Furthermore, a review of the literature was undertaken to identify the most relevant sources of evidence on treatment effectiveness. A meta-analysis was performed to synthesise the evidence coming from different studies the main details of which were reported. This represents a strong characteristic of the study. The derivation of utility estimates was reported and makes the estimation of QALYs transparent. Different utility weights were used in the sensitivity analysis.

Costs:
The use of two perspectives means that the study findings are relevant to different payers. It appears that all relevant categories of costs have been included in the analysis. The authors provided a description of the costs and their estimation. Some details on resource use and unit costs were provided, which will permit the replication of the study in other settings. Some assumptions were also required, but their impact was investigated in the sensitivity analysis. It was unclear whether discounting was applied to future cost estimates, although the use of discounting was required given the time horizon of the study. The price year was reported, which enhances the possibility of making reflation exercises.
Analysis and results:
The synthesis of costs and benefits was appropriately performed and clearly presented. The issue of uncertainty was extensively addressed in the sensitivity analyses, although the results of the probabilistic analysis were only presented graphically. Details of the decision model were clearly reported, including health states, cycle length, time horizon and possible transitions. The authors discussed some limitations of the study, such as the inclusion of before and after studies in the meta-analysis.

Concluding remarks:
The study methodology appears to have been sound and was based on a robust decision model. The authors’ conclusions are likely to be valid.

Funding
Supported by an award from the Michael Smith Foundation for Health Research and a grant from the British Columbia Lung Association.

Bibliographic details

PubMedID
18437259

Other publications of related interest


Indexing Status
Subject indexing assigned by NLM

MeSH
Accidents, Traffic /economics /prevention & control /statistics & numerical data; British Columbia; Continuous Positive Airway Pressure /economics; Cost of Illness; Cost-Benefit Analysis; Humans; Markov Chains; Quality of Life; Quality-Adjusted Life Years; Sleep Apnea, Obstructive /economics /therapy

AccessionNumber
22008101137

Date bibliographic record published
01/12/2008

Date abstract record published
02/03/2009