Screening for obstructive sleep apnea in stroke patients: a cost-effectiveness analysis
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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.

Health technology
The study compared polysomnography (PSG), a screening strategy for detecting obstructive sleep apnoea (OSA), against no screening. Patients found positive subsequently received continuous positive airway pressure (CPAP) treatment.

Type of intervention
Screening and treatment.

Economic study type
Cost-utility analysis.

Study population
As this was a modelling study, the target population comprised a hypothetical cohort who had experienced a recent stroke and who had a moderate deficit. No further inclusion or exclusion criteria were reported.

Setting
The setting was not explicitly reported. The economic study was carried out in the USA.

Dates to which data relate
The effectiveness data were derived from studies published in 1996. The cost data were derived from official sources published in 2003 and 2005. The price year was not explicitly reported.

Source of effectiveness data
The effectiveness data were derived from published studies.

Modelling
A decision analytic model was constructed using Data 4.0 software (TreeAge Inc.) to estimate the associated costs and health utility of the screening strategy against no screening. The time horizon of the model was 3 months. It was assumed that patients who screened positive received CPAP treatment for 3 months, while no patients died and no patients experienced recurrent stroke over the time horizon of the model. It was also assumed that no patients would be diagnosed with symptomatic OSA in the "no screening" arm and, therefore, no patients in this arm would receive CPAP treatment.

Outcomes assessed in the review
The parameters used in the model were prevalence of OSA in stroke and CPAP acceptance.
Study designs and other criteria for inclusion in the review
Not reported.

Sources searched to identify primary studies
Not reported.

Criteria used to ensure the validity of primary studies
No criteria were used to ensure the validity of the primary studies.

Methods used to judge relevance and validity, and for extracting data
No methods were used to judge the relevance and the validity of the extracted data.

Number of primary studies included
Two primary studies provided the effectiveness data.

Methods of combining primary studies
The results of the individual primary studies were not combined.

Investigation of differences between primary studies
The authors did not investigate possible differences between the primary studies.

Results of the review
The prevalence of OSA stroke was 79% in the base-case scenario.
CPAP acceptance was 90% in the base-case scenario.

Measure of benefits used in the economic analysis
The measure of health benefit used was the quality-adjusted life-years (QALYs) gained. These were obtained from the model. All utilities were extracted from a published study. The basic method of valuation of health states was not reported in the current study, although further information can be obtained from an earlier study (Post et al. 2001, see 'Other Publications of Related Interest' below for bibliographic details).

Direct costs
The health care costs included in the analysis were PSG, CPAP titration, and CPAP plus supplies for 3 months. The cost estimates were reported separately from other model parameters. The unit costs were reported but the quantities of resources used were not. All costs were derived from official published sources, but it seems that the costs were not appropriately adjusted for inflation and the price year was not reported. As the time horizon of the model was less than two years, discounting was not relevant. The incremental costs were estimated by modelling.

Statistical analysis of costs
The costs were treated deterministically.

Indirect Costs
The indirect costs were not included in the analysis.
Currency
US dollars ($).

Sensitivity analysis
A one-way sensitivity analysis was conducted to test variability in the data. The method used to select the ranges was not reported. A two-way sensitivity analysis, in which two variables were simultaneously varied over plausible ranges with respect to utility estimates, was also conducted.

Estimated benefits used in the economic analysis
The "no screening" strategy resulted in 0.1105 QALYs and the PSG screening strategy in 0.146 QALYs. The incremental QALYs gained with the screening strategy were 0.0355.

Cost results
The total costs per patient were reported. There were no costs incurred in the "no screening" strategy, while the total cost with the PSG strategy was $1,757.

Synthesis of costs and benefits
The incremental analysis demonstrated that the screening strategy resulted in an incremental cost of $49,421 per additional QALY gained.

The two-way sensitivity analysis demonstrated that the PSG strategy remained under the threshold of $50,000 per QALY if the utility of patients with OSA on CPAP was 0.2 or higher in comparison with patients with OSA who were not on CPAP.

For a willingness-to-pay of $50,000 per QALY, the screening strategy remained cost-effective as long as the treatment of stroke patients resulted in an improvement of 50% or more in quality of life.

Equally, for a willingness-to-pay of $100,000 per QALY, the incremental utility due to treatment would have to be 25% or more.

Authors’ conclusions
Screening is cost-effective as long as the treatment of stroke patients with obstructive sleep apnoea (OSA) by continuous positive airways pressure (CPAP) improves patient utilities by more than 0.2 for a willingness-to-pay of $50,000 per quality-adjusted life-year (QALY) and 0.1 for a willingness-to-pay of $100,000 per QALY. "A clinical trial assessing the effectiveness of CPAP in improving stroke outcome is warranted from a cost-effectiveness standpoint.”

CRD COMMENTARY - Selection of comparators
The authors compared the PSG screening options against no screening and no alternative options were discussed. The strategy of no screening was included for comparative purposes.

Validity of estimate of measure of effectiveness
A systematic review of the literature does not appear to have been undertaken. Although this is common practice with models, in the current study it appears that studies have been selected from the literature according to convenience or the authors’ preferences. Therefore, the effectiveness estimates derived may not be the best available. In addition, data from the available studies appear to have been used selectively. The study designs, other inclusion criteria for the review, and the sources searched to identify primary studies were not reported, and possible differences between the
primary studies were not investigated. The estimates were investigated in a sensitivity analysis, but the authors did not justify the ranges selected based on the literature. Therefore, it is possible that the quality of the estimates of effectiveness is poor.

Validity of estimate of measure of benefit
The authors used utility (QALYs) as the measure of benefit in the economic analysis. The utility values were derived from the literature. The use of QALYs as a measure of benefit enables comparisons with other studies performed with other populations. However, the authors did not report the methodological approach used to derive the utility weights. The authors explored a range of utility values in the sensitivity analysis. The benefits were not discounted, which was appropriate given the short time period of the study analysis.

Validity of estimate of costs
The authors reported that the study had been conducted from a societal perspective, but the indirect costs were not included. The authors used summary costs, thus it was not possible to determine what categories of costs were included (e.g. overhead costs). The costs and the quantities were not reported separately, which means that the analysis could not be easily reworked for other settings. The unit costs were reported but it seems that they were not appropriately adjusted for inflation. The authors used published national reference costs as the source of all cost data. The costs were treated stochastically, and sensitivity analyses were conducted to assess the robustness of the results when the estimated costs were modified. However, the method used to select the ranges used was not reported. No price year was given, hence impeding any future reflation exercises. Discounting was not necessary as the costs were incurred during less than two years.

Other issues
The authors did not compare their findings with those from other studies, so it is not known how far their results agree with other published results. The issue of the generalisability of the results to other settings was also not directly addressed. The authors reported that the results cannot be extended to patients with very mild or very severe strokes. The authors do not appear to have presented their results selectively. The study considered patients who had experienced a recent stroke with moderate deficit and this was reflected in the authors’ conclusions. The authors reported further limitations to their study. For example, they reported that utility estimates were of low validity since they were derived from patients at risk for stroke, and not from those who had already experienced a stroke.

Implications of the study
The authors did not make any explicit recommendations for changes in policy or practice. However, they suggested that future research should focus on the evaluation of quality of life and the precise estimation of costs for patients with OSA. In addition, they recommended that a trial on the effectiveness of CPAP should be performed to provide more information, and that the feasibility of performing split-night studies in stroke patients should be assessed as a cost-saving mechanism.

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None stated.

Bibliographic details

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Other publications of related interest

Indexing Status
Subject indexing assigned by NLM

MeSH
Cost-Benefit Analysis; Decision Trees; Humans; Mass Screening /economics; Polysomnography /economics /methods; Positive-Pressure Respiration /economics; Quality-Adjusted Life Years; Sensitivity and Specificity; Sleep Apnea, Obstructive /complications /diagnosis /therapy; Stroke /complications /pathology /therapy; Treatment Outcome

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