Assessment of health economics in Alzheimer's disease (AHEAD): galantamine treatment in Canada
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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 use of galantamine, a cholinesterase inhibitor, to restore cognitive ability or to slow cognitive deterioration in patients with Alzheimer's disease (AD). Galantamine also has a modulating effect on nicotinic receptors.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients suffering from mild to moderate AD.

Setting
The setting was the community and an institution. The economic study was carried out in Canada.

Dates to which data relate
The effectiveness evidence was collected in 2000. The resource use data were gathered in 1997 and 2000. The price year was 1999.

Source of effectiveness data
The effectiveness evidence was derived from published studies.

Modelling
The authors used a Canadian adaptation of the Assessment of Health Economics in Alzheimer's Disease (AHEAD) model, which was developed to estimate long-term outcomes for patients with AD from shorter-term data. The AHEAD model comprised two parts:

- a 6-month term module based directly on trial data; and
- a 10-year term module to predict when a patient will deteriorate to full-time care (FTC) either at home or in a nursing home, or to death.

The costs and the benefits in the model were discounted at a rate of 3%.
Outcomes assessed in the review
Some of the effectiveness data were derived from the literature, and were used as inputs for the model. Only the modelled scores on the cognitive subscale of the AD assessment scale (ADAS-cog) were reported in the study. The health utility values for the two states of the model, pre-FTC and FTC, were also derived from the published data.

Study designs and other criteria for inclusion in the review
The data inputs for the model were derived from randomised double-blind clinical trials. The utility values for specific AD states were derived from a cross-sectional study.

Sources searched to identify primary studies
Not reported.

Criteria used to ensure the validity of primary studies
Not reported.

Methods used to judge relevance and validity, and for extracting data
Not stated.

Number of primary studies included
Three primary studies were selected for the effectiveness analysis.

Methods of combining primary studies
The data from two clinical trials were pooled, but the method used to combine the data was not reported.

Investigation of differences between primary studies
Not stated.

Results of the review
The average modelled ADAS-cog score was 24.9 for patients treated with galantamine and 27.5 for non-treated patients. The utility value was 0.60 for the pre-FTC state and 0.34 for the FTC state.

Measure of benefits used in the economic analysis
The benefit measures used in the economic analysis were the percentage reduction in the time requiring FTC, the percentage increase in the time spent in the pre-FTC state, and the number of quality-adjusted life-years (QALYs) gained.

Direct costs
The costs were incurred over a period of 10 years and were discounted at a rate of 3%. The quantities and the unit costs were reported separately by visit or per day. The resource/cost boundary adopted was that of the health service. Only the costs of formal care were included in the analysis. These included the drugs, medical costs and paid home help. The costs of adverse events associated with galantamine were excluded because the impact on resource use was very low. The unit cost data were taken from different sources. These included insurance plan listings, professional organisations, government agencies, physician fee schedules, and the Canadian Coordinating Office for Health Technology Assessment. The total costs in each health state were estimated by modelling. The resource use data were gathered in 1997 and 2000. The price year was 1999.
Statistical analysis of costs
No statistical analysis of costs was reported.

Indirect Costs
Indirect costs were not included.

Currency
Canadian dollars (Can$). Canadian dollars were converted into US dollars ($) at the 1999 exchange rate, Can$1 = $0.67.

Sensitivity analysis
Univariate sensitivity analyses were carried out in order to investigate the impact of variability in the data on cost. The key model parameters investigated were the discount rate (0, 5, 10%), the cost of galantamine (+/-50%), and the cost of each model state (+/-50%). In addition, numerous multivariate analyses were conducted to assess the uncertainty in cost of care assumptions. The impact of the effect of galantamine on psychotic symptoms was also assessed.

Estimated benefits used in the economic analysis
The patients on galantamine remained 5.3% longer in the pre-FTC state, and spent 9.9% less time requiring FTC than the non-treated patients. The differences in the QALYs were less modest, given that the model assumed no survival advantage for galantamine patients. A net QALY gain of 0.05 years (0.04 discounted) was predicted for galantamine-treated patients over non-treated patients.

Cost results
The total monthly costs in the pre-FTC state were Can$417. The total monthly costs in the FTC state were Can$872 if the patient were located in the community, and Can$3,797 if they were in a nursing home. Overall, the delay of FTC due to the adoption of galantamine treatment realised a saving of Can$4,910 when the cost of galantamine was excluded. The saving was Can$788 when the cost of galantamine was included.

Synthesis of costs and benefits
The costs and the benefits were not combined because galantamine was both more effective and less costly than placebo. In the sub-population of patients with moderate AD, the results remained the same. The sensitivity analyses indicated that the costs of galantamine and care in nursing homes were the most important determinants of the analysis. The results showed that a 19% increase in the drug cost, and a 15% increase in the cost of the nursing home, would completely eliminate the cost-savings associated with galantamine.

Authors’ conclusions
The adoption of treatment with galantamine increased the time before patients required full-time care (FTC) and led to substantial cost-savings for the health care system.

CRD COMMENTARY - Selection of comparators
The reason for the selection of the comparator was clear. Placebo was chosen as the comparator because the objective of the study was to assess the active value of the treatment.

Validity of estimate of measure of effectiveness
The effectiveness measures, used as model parameters, were not derived from a systematic review of the literature.
Instead, they were derived from estimations from different studies. However, although these studies were pooled, the method used to combine them was not stated clearly. No details were provided of the search strategies used to identify the studies. In addition, the criteria used to ensure the validity of the primary studies were not reported.

**Validity of estimate of measure of benefit**
The estimated benefits (reduction or increase in time, and QALYs) used in the economic analysis were modelled. However, it would have been interesting to use utility values from patients, as well as informal caregivers whose quality of life is heavily affected by AD patients.

**Validity of estimate of costs**
The cost estimates were quite specific to the study setting. The unit costs and the quantities were reported separately, although statistical analyses on the quantities were not conducted. The perspective of the study was not stated. Some of the costs relevant to the analysis could, therefore, have been omitted or erroneously included. A limitation of the analysis could have been the exclusion of indirect costs, which appear to have been relevant, due to the high expenditures borne by people caring for patients suffering from AD.

**Other issues**
The generalisability of the results to other settings was specifically addressed by a sensitivity analysis, although the ranges were arbitrary. However, the authors did not compare their findings with those from other studies. The authors acknowledged some limitations of the study. For example, data relating to the burden on the informal caregiver, in terms of the cost of their time and their quality of life, were excluded.

**Implications of the study**
The authors stated that the economic analysis in the study has demonstrated that galantamine could delay FTC, and may also reduce the overall cost of caring for patients with AD in Canada. Further research should focus on a formal meta-analysis, to derive more reliable effectiveness data on galantamine. Additional research assessing the caregiver's quality of life would also be helpful. These suggestions seem reasonable given the limitations identified.

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None stated.

**Bibliographic details**

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**Other publications of related interest**

**Indexing Status**
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