Cost-utility of 2 maintenance treatments for older adults with depression who responded to a course of electroconvulsive therapy: results from a decision analytic model

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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 present study compared two maintenance treatments for recurrent depression in elderly patients who responded to a course of electroconvulsive therapy (ECT). The treatments studied were maintenance pharmacotherapy (MPT) and maintenance electroconvulsive therapy (MECT).

Type of intervention
Treatment.

Economic study type
Cost-utility analysis.

Study population
The target populations for the model were two hypothetical cohorts of individuals aged 65 years who had experienced a relapse of MDD and who responded to an initial course of ECT.

Setting
The setting was primary and secondary care. The economic study was carried out in Michigan, USA.

Dates to which data relate
The studies providing effectiveness evidence dated from 1978 to 2000. For resource use and cost data, the studies dated from 1991 to 1998. The price year was not reported.

Source of effectiveness data
The evidence was derived from a review or synthesis of completed studies and estimates based on authors’ assumptions.

Modelling
A Markov (state transition) decision model was used to simulate and compare the MPT and MECT cohorts. The health states included full remission of depressive symptoms, partial remission or subsyndromal depression, no response to treatment, death by suicide, or death by another cause. The model cycled every 6 months to simulate the average length of an MDD episode and continued to cycle until all patients had died. The model assumed that all patients would respond to initial ECT treatment, no patient would cross over into the other treatment arm, no patient would commit suicide during the first cycle, and that patients in full remission did not commit suicide.

Outcomes assessed in the review
The parameters used in the model included:
the probabilities of full remission, partial remission and overall remission in each arm; and
the probabilities of suicide for no depression, partial depression and depression.

**Study designs and other criteria for inclusion in the review**
The authors used randomised controlled trials, retrospective cohort studies and other published literature.

**Sources searched to identify primary studies**
Not reported.

**Criteria used to ensure the validity of primary studies**
With the exception of one study (McDonald et al. 1998, see 'Other Publications of Related Interest' below for bibliographic details), the criteria used to ensure the validity of the primary studies were not reported. The authors stressed that, although this study comprised a small sample of patients, the analysis was conducted on an intention to treat basis. The results may therefore be considered fairly conservative.

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

**Number of primary studies included**
Nineteen studies provided data on effectiveness.

**Methods of combining primary studies**
The studies were combined in a narrative.

**Investigation of differences between primary studies**
No differences between the primary studies were investigated.

**Results of the review**
The percentages of patients who responded to treatments used in the model were:

- **in the MPT arm**, 25% (range: 15 to 50) for full remission, 8% (range: 2 to 20) for partial remission, and 33% (no range) for overall remission;

- **in the MECT arm**, 63% (range: 55 to 75) for full remission, 26% (range: 20 to 30) for partial remission, and 89% (no range) for overall remission;

- **for suicide**, 0% for no depression, and 0.25% (range: 0 to 25) for partial depression and depression.

For all model parameters included, the authors gave the base-case value and the range used in the sensitivity analysis, and adequately referenced the sources.

**Methods used to derive estimates of effectiveness**
Given the scarcity of data in the literature, the authors made several assumptions in their model, mainly for utility scores and probability values. These were tested by varying values over a wide range in the sensitivity analysis. Assumptions made on each parameter value were not reported in the text.
Estimates of effectiveness and key assumptions
The authors based their estimates of utility scores for MPT mainly on the results of a study reporting a self-report scale (McDonald et al. 1998). They then multiplied each MPT utility score by 0.2 to calculate the utility score for MECT.

Measure of benefits used in the economic analysis
The authors used quality-adjusted life-years (QALYs) as a measurement of benefit. As recommended by mental health reports, the authors used subjective reports of life satisfaction and self-rated depression for utility measures in the sense that assessment of outcomes in late-life depression should include more than measurement of depressive symptoms.

The preference values for an acute episode of depression (untreated) were assigned a mean value of 0.43. In the model, 0.02 were subtracted from that score to account for medication side effects. The score for full remission of depressive symptoms during pharmacotherapy was calculated to be 0.75 for MPT. The score for partial remission of depressive symptoms during pharmacotherapy was 0.55. The required scores for the comparable health states in the MECT treatment arm were calculated from published literature (McDonald et al 1998) reporting that patients treated with MECT improved 20% more on average than patients treated with medication. Based on this information, scores for MECT were calculated by multiplying each MPT score by 0.2 (or 20%) and adding this product to each health state's value.

Preference values were discounted at an annual rate of 3%. The authors gave the base-case value and the range used in the sensitivity analysis, and adequately referenced the sources.

Direct costs
The authors followed the National Institute of Mental Health recommendations in order to include a wide range of services to assess the costs of depression and its treatment. Such services included clinician time, medication, laboratory tests, hospital costs and outpatient visits. The cost of ECT included the professional costs of a psychiatrist and an anaesthesiologist. The authors used gross costing by assigning an average figure such as Diagnoses-Related Group tables for facility costs of hospital services, Relative Value Unit tables for physician charges for inpatient services and outpatient visits, and Ambulatory Program Centers tables for the facility component of outpatient procedures.

The costs were appropriately discounted at an annual rate of 3% since they were incurred during more than 2 years. For all cost items, the authors gave the base-case value and the range used in the sensitivity analysis, and adequately referenced the sources. The quantities and the costs were analysed separately, and estimations were derived through modelling. The price year was not reported.

Statistical analysis of costs
No statistical analysis of the costs was reported.

Indirect Costs
The authors reported a societal perspective, thus the indirect costs were appropriately included. Since the population used in this model included only patients aged 65 years, many were likely to be no longer in the workforce. As suggested by published literature, the authors used lost-wage estimates when accounting for time burdens and emotional costs (i.e. the value of lost leisure time and activities). Wages lost by caregivers were also included. In addition, although patients themselves did not incur a cost from suicide, the model reflected the societal perspective and, therefore, included the post-mortem medical examination or autopsy costs incurred by society when a patient commits suicide. The cost of deaths from other sources was also included in the model (i.e. average funeral costs).

The costs were appropriately discounted at an annual rate of 3% since they were incurred during more than 2 years. For all cost items, the authors gave the base-case value and the range used in the sensitivity analysis, and adequately referenced the sources. The quantities and the costs were analysed separately, and were estimated through modelling. The price year was not reported.
Currency
US dollars ($).

Sensitivity analysis
The authors investigated areas of uncertainty related to variability in the data through sensitivity analyses. It appears that both one-way and two-way sensitivity analyses have been used. The ranges selected and reported came from published literature or authors' assumptions. The parameters investigated were a wide range of plausible estimates of quality of life scores, costs and probabilities. No further details were reported.

Estimated benefits used in the economic analysis
In the base-case analysis, the MPT strategy resulted in 7.55 QALYs and the MECT strategy 11.43 QALYs.

Cost results
The model estimated the average lifetime cost associated with MPT to be $436,102 per patient and that of MECT to be $281,356.

Synthesis of costs and benefits
Average cost-effectiveness ratios were estimated for both treatment options by dividing the total costs by the number of QALYs.

The average cost was $57,762 per QALY for MPT and $24,616 per QALY for MECT.

A sensitivity analysis was performed by varying all cost and utility variables across their plausible ranges. No cost or utility variable was found to be sensitive. MECT remained the preferred treatment strategy across the ranges of these variables. MPT became the preferred treatment option only when the probability that depression would recur while patients received MECT exceeded 75%, a value outside the range suggested by the medical literature.

Authors' conclusions
The model suggested that maintenance electroconvulsive therapy (MECT) might be a more cost-effective strategy than maintenance pharmacotherapy treatment (MPT) in elderly patients with depression who have responded to initial electroconvulsive therapy (ECT).

CRD COMMENTARY - Selection of comparators
The authors justified their choice of the comparators. The limitations of pharmacotherapy for elderly patients with depression have become more evident recently, and the need to prevent relapses and recurrences in patients with depression and suicidal tendencies has become more urgent. You should judge whether these strategies are relevant in your setting, or whether other comparators could also be relevant.

Validity of estimate of measure of effectiveness
The authors did not state that a systematic review of the literature had been undertaken. Although this is a common practice with models, it does not always ensure that the best data available are used in the model and that all relevant literature is identified. In particular, the authors stated that most of the relevant literature is in the form of case reports, retrospective studies and non-randomised prospective studies. The authors used data from the available studies selectively. The estimates of effectiveness were derived credibly from the studies identified. The authors justified their assumptions with reference to the medical literature. The estimates were investigated in sensitivity analyses using ranges from the literature, and the authors justified the ranges selected and reported. However, they did not provide specific details of the types of analyses used.
Validity of estimate of measure of benefit
The authors used QALYs as a measure of benefits, which were derived from modelling. This measure of benefit enables cross health technology comparisons. The methods used to derive the utility scores were reported. Sensitivity analyses on utilities scores were conducted and the ranges were reported.

Validity of estimate of costs
The authors reported that the study had been conducted from a societal perspective. Both direct and indirect costs were appropriately included and reported in sufficient detail. The resource quantities and the costs were reported separately, which would make it simple to replicate the calculations or to gauge the accuracy of the estimation of quantities. The unit costs were taken from published sources, and the authors used gross costing by assigning an average figure taken from government published sources. A statistical analysis of the costs was not undertaken. To assess the robustness of the estimates used, sensitivity analyses of the cost variables were conducted and reported. The costs were appropriately discounted at an annual rate of 3% since they were incurred during more than 2 years. Both the estimations of the quantities and costs were derived using modelling. The lack of a price year and revaluation of costs will not aid any future reflation exercises.

Other issues
The authors did not make appropriate comparisons of their findings with those from other studies. Their conclusions reflected the scope of the analysis. The authors explicitly addressed the generalisability of the results and considered assessing the impact of population heterogeneity. In particular, limitations related to the analysis were highlighted. First, the results could only be applied to elderly patients with depression who respond to acute ECT treatment. Second, the parameter estimates in the model were derived from the available literature and are subject to uncertainty. Third, the treated patients assigned to MECT without medication might not reflect current clinical practice in the psychiatric community, where some patients receive both interventions at the same time.

Implications of the study
Despite the growing body of evidence supporting the effectiveness of ECT in elderly depression patients, its use is limited because of unfavourable media portrayals, its history of abuse, increased scrutiny by the legal system, and the powerful support of anti-ECT activists. ECT is not commonly used for continuation management; it is usually discontinued once initial response has been achieved. Two additional limiting factors in the potential widespread use of MECT as a prophylactic management option were identified. One, the cognitive dysfunction associated with ECT, especially recent memory impairment. Two, the degree of noncompliance with MECT basically explained by the current cost of ECT, the unavailability of ECT facility providers outside academic institutions, the lack of caregivers for the elderly population, and intolerance of ECT side effects. For this promising treatment to be adopted more widely, it will be necessary to increase the number of facilities that provide ECT. It will also be necessary to minimise the stigma associated with its use by offering teleconferences, symposiums, and presentations. Finally, more research will be needed in the area of MECT to answer many of the unresolved questions related to its use.

Source of funding
None stated.

Bibliographic details

Other publications of related interest
Indexing Status
Subject indexing assigned by NLM

MeSH
Aged; Cost-Benefit Analysis; Decision Making; Depressive Disorder, Major /economics /therapy; Electroconvulsive Therapy /economics; Humans; Markov Chains; Mental Health Services /economics; Middle Aged; Quality-Adjusted Life Years; Recurrence; United States

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