Cost-effectiveness of rasagiline compared with first-line early Parkinson disease therapies
Farkouh RA, Wilson MR, Tarrants ML, Castelli-Haley J, Armand C

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 study examined the cost-effectiveness of rasagiline compared with four common first-line strategies for the treatment of early Parkinson's disease. The authors concluded that, from a US managed-care perspective, starting Parkinson's disease treatment with rasagiline was cost-effective compared with starting treatment with levodopa or either of two ropinirole formulations (dopamine agonists). The analysis used a valid and transparent methodology that considered alternative assumptions for model parameters. The authors’ conclusions appear robust.

Type of economic evaluation
Cost-utility analysis

Study objective
The cost-effectiveness of rasagiline was compared with four common first-line strategies for the treatment of early Parkinson's disease.

Interventions
Rasagiline (once-daily irreversible monoamine oxidase type-B inhibitor) was compared with four of the commonly used first-line therapies for early Parkinson's disease: levodopa, pramipexole, generic ropinirole, and ropinirole XL. Pramipexole and the two formulations of ropinirole belong to the category of dopamine agonists.

Patients who started on rasagiline could switch to a dopamine agonist or levodopa; patients who started on levodopa remained on levodopa, even if the drug was co-administered with a dopamine agonist; and patients who started on a dopamine agonist could switch to levodopa.

Location/setting
USA/Primary and secondary care.

Methods
Analytical approach:
The analysis was based on a Markov model with a five-year time horizon. Health states were based on starting therapies with possible switches in case of unsuccessful treatment. The authors stated that the analysis was from the perspective US managed care.

Effectiveness data:
A selective approach appeared to have been used to identify relevant data sources, which might have been known to the authors. Most transition probabilities for treatment success or switch were based on the TVP-1012 in Early Monotherapy for Parkinson Disease Outpatients (TEMPO) clinical trial (Hauser, et al. 2009, see ‘Publications of Related Interest’ below for bibliographic details), which compared rasagiline with dopamine agonists. Other data came from another clinical trial on ropinirole. Other prospective studies and some assumptions were also used. The percentage of patients with dyskinesia was a key input of the model. A key assumption of the model was the equal efficacy of dopamine agonists.

Monetary benefit and utility valuations:
Utility valuations were taken from a Parkinson's disease study using the visual analogue scale (VAS) instrument in a sample of patients.
Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary benefit measure and were discounted at an annual rate of 3%.

Cost data:
The costs of drugs and treatment for dyskinetic and non-dyskinetic health states (inpatient admissions, emergency department and outpatient visits, long-term care, outpatient therapy, and medical equipment) were included; these were reported as total costs. Drug costs were based on average wholesale prices. Other health care costs were taken from the non-pharmaceutical components of a managed care database analysis of early Parkinson's disease patients. Some published studies were used for the ratio of costs between dyskinetic or non-dyskinetic patients. Costs were in US dollars ($). A 3% annual discount rate was applied. The price year was 2010.

Analysis of uncertainty:
One-way sensitivity analyses were carried out on model inputs using plausible ranges of values. Alternative utility values were based on standard gamble estimates from the same study. A probabilistic analysis was carried out and was based on a second-order Monte Carlo simulation in which all parameters were varied simultaneously using conventional probability distributions.

Results
For rasagiline versus ropinirole XL, the total costs were $91,027.38 with rasagiline and $94,168.04 with ropinirole XL; the QALYs were 3.45 with rasagiline and 3.34 with ropinirole XL. Thus, rasagiline was the dominant strategy as it was both more effective and less expensive.

For rasagiline versus pramipexole, the total costs were $89,845.25 with rasagiline and $90,678.56 with pramipexole; the QALYs were 3.45 with rasagiline and 3.34 with pramipexole. Thus, rasagiline was the dominant strategy.

For rasagiline versus generic ropinirole, the total costs were $87,366.78 with rasagiline and $84,674.50 generic ropinirole; the QALYs were 3.45 with rasagiline and 3.34 with generic ropinirole. The incremental cost per QALY gained with rasagiline over generic ropinirole was $25,938.61.

For rasagiline versus levodopa, the total costs were $91,027.38 with rasagiline and $91,598.45 with levodopa; the QALYs were 3.45 with rasagiline and 3.21 with levodopa. Rasagiline was the dominant strategy.

In the comparison between rasagiline and generic ropinirole, the key parameters were utility values and dyskinesia cost multiplier. However, rasagiline remained the most cost-effective treatment in almost all sensitivity analyses at a threshold of $50,000 per QALY gained, except when the cost of dyskinetic and non-dyskinetic patients was set to equal. The probability of rasagiline being cost-effective was 60.5% when compared with generic ropinirole. Rasagiline was more effective regardless of costs in 69.1% of simulations.

Authors’ conclusions
From a US managed-care perspective, starting Parkinson's disease treatment with rasagiline was cost-effective compared with starting treatment with levodopa or either of the two ropinirole formulations.

CRD commentary
Interventions:
The selection of the comparators was appropriate. The authors stated that levodopa represented the gold standard pharmacological treatment for controlling motor symptoms of Parkinson's disease, but it had many disadvantages as a first-line therapy. Dopamine agonists were often replaced by levodopa within a few years of initially being prescribed. Rasagiline had been indicated recently as a first-line treatment for Parkinson's disease, so was the intervention under examination.

Effectiveness/benefits:
Clinical inputs were mainly taken from randomised head-to-head clinical trials that were likely to be characterised with high internal validity, although they were not described. Some assumptions were made and tested in sensitivity analysis; these showed the robustness of the model. QALYs represented a valid outcome measure for the patient population under study. Utility weights were obtained from patients using the visual analogue scale, but estimates obtained through
standard gamble (which might have been a more appropriate instrument) were used in the sensitivity analysis.

Costs:
The analysis was consistent with the perspective stated by the authors for cost categories and data sources, which appeared to reflect the viewpoint of the US third-party payer. The unit costs and quantities of resources used were not reported separately; only total costs were presented. Data sources reflect the US context, but the ratio in costs between dyskinetic and non-dyskinetic patients was obtained from European studies, from which some conservative assumptions were made. The price year was reported, which would allow reflation exercises in other time periods. Variations in cost estimates were considered in the sensitivity analyses.

Analysis and results:
An incremental approach was used to synthesise the expected costs and benefits of the various strategies. The selection of a Markov model to simulate disease progression and the length of the time horizon (which corresponded to the maximum follow-up of available clinical trials) were appropriately justified. The authors stated that the model was bias against rasagiline whenever possible to achieve conservative estimates of model outcomes. Both deterministic and probabilistic approaches were used to deal with the issue of uncertainty. The results of the sensitivity analyses were clearly reported. The results were extensively presented. The study findings appeared specific to the USA, but might be similar in other settings as long as drug costs were similar.

Concluding remarks:
The analysis used a valid and transparent methodology that considered alternative assumptions for the model parameters. The authors’ conclusions appear robust.

Bibliographic details

Original Paper URL

Other publications of related interest

Indexing Status
Subject indexing assigned by CRD

MeSH
Parkinson Disease; Humans; Cost-Benefit Analysis; Indans; Neuroprotective Agents; Monoamine Oxidase Inhibitors; Markov Chains; United States; Quality-Adjusted Life Years; Antiparkinson Agents

AccessionNumber
22012025548

Date bibliographic record published
16/11/2012

Date abstract record published
05/12/2012