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Cost-effectiveness of Rasagiline Compared With Other First-Line Treatment Options for Early Parkinson's Disease in the United States

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BACKGROUND

- Parkinson's disease (PD) is a common disease that affects approximately 1 million people in the United States (US).[1]
- The incidence of PD is approximately 60,000 new cases per year.[1]
- Pharmacologic interventions available for PD include:
  - Levodopa (LD)
  - Dopamine agonists (DA)
  - Selective irreversible monoamine oxidase type-B inhibitor
    - Once-daily rasagiline mesylate (rasagiline[2])
- Dyskinesias (involuntary body movements) are linked to poor quality of life[3] and higher health care costs.[4,5,6]

OBJECTIVE

- Postponing the appearance of dyskinesias could be an effective strategy for reducing costs and improving the quality of life of patients with PD.
- The purpose of this study was to evaluate the cost-effectiveness of initiating first-line treatment of early PD with once-daily rasagiline monotherapy compared with initiating treatment with ropinirole XL, pramipexole, generic ropinirole, or first-line LD.

METHODS

Model Structure

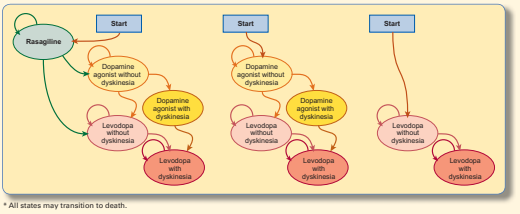
- Markov model
- 5-year time horizon
- 6-month cycles
- US managed care perspective
- Costs and outcomes discounted at 3% per annum

Input Parameters

Patient Characteristics

- Early PD requiring a pharmacologic intervention
- Hoehn and Yahr stage 1.5[7]
- Average age of 61[7]

Figure 1. Markov Model: Early PD Treatment Pathways*



* All states may transition to death.

Transition Probabilities

Table 1. Health State Transition Probabilities (%)

Cycle	Rasagiline to DA	Rasagiline to LD	DA to LD	DA to DA With Dyskinesias	LD to LD With Dyskinesias	Any State to Death[8,9]
1	4.03	2.42	10.20	2.74	7.37	1.22
2	15.05	7.77	10.20	0.87	6.82	1.28
3	20.00	7.33	10.20	1.09	6.10	1.34
4	13.21	2.83	10.20	3.09	6.75	1.41
5	11.63	5.81	10.20	0.68	11.14	1.47
6	14.93	4.48	10.20	5.73	2.19	1.53
7	18.87	3.77	10.20	3.16	11.54	1.59
8	5.56	0.00	10.20	7.79	10.51	1.65
9	3.23	9.68	10.20	5.18	9.72	1.72
10	7.69	7.69	10.20	2.01	7.62	1.78

Utility Weights

Table 2. Health State Utility Weights[3]

Utilities	VAS	SG
Rasagiline	0.83	0.85
DA	0.83	0.85
DA with dyskinesias	0.63	0.76
LD without dyskinesias, as first-line treatment	0.83	0.85
LD without dyskinesias, as second-line treatment	0.72	0.78
LD with dyskinesias	0.48	0.71

SG = standard gamble; VAS = visual analogue scale.

Costs

Health State Costs

- We assumed all nondyskinetic health states had the same nonpharmacy direct medical costs of $8,836.[11]
- Total nondyskinetic nonpharmacy direct medical costs were multiplied by **1.679** to obtain dyskinetic nonpharmacy direct medical costs of $14,836.[6]

Pharmaceutical Costs

Table 3. Pharmaceutical Costs per 6-Month Cycle[12]

Treatment	Dosing	Cost per Cycle
Rasagiline[1]	1 mg once daily	$1,506.00
DAs		
Ropinirole XL[13]		
Cycle 1	8 mg per day	$1,171.50
Cycle 2	12 mg per day	$1,757.25
Cycles 3-10	16 mg per day	$2,343.00
Pramipexole[14]		
Cycle 1	1.5 mg per day	$410.02
Cycle 2	2.25 mg per day	$615.03
Cycles 3-10	3 mg per day	$820.04
Generic ropinirole[13]		
Cycle 1	9 mg per day	$281.83
Cycle 2	12 mg per day	$375.77
Cycles 3-10	18 mg per day	$563.65
Coformulated carbidopa/LD[15]	100 mg/400 mg per day	$480.81

RESULTS

Base-Case Cost-effectiveness Results

Table 4. Cost-effectiveness Results Over 5 Years of Early PD Treatment by First-Line Therapies

Result	Rasagiline	Generic Ropinirole	Rasagiline	Ropinirole XL	Rasagiline	Pramipexole	Rasagiline	LD First-Line Therapy
Total costs	$82,339	$82,099	$82,339	$90,468	$82,821	$83,336	$85,566	$88,565
Drug costs	$8,040	$3,952	$11,267	$12,321	$8,521	$5,188	$11,267	$3,899
Other resource costs	$74,299	$78,148	$74,299	$78,148	$74,299	$78,148	$74,299	$84,667
QALYs	3.45	3.32	3.45	3.32	3.45	3.32	3.45	3.21
Incremental costs		$239		–$4,902		-$516		–$2,999
Incremental QALYs		0.13		0.13		0.13		0.24
Incremental cost per QALY		$1,907		Rasagiline dominates		Rasagiline dominates		Rasagiline dominates

QALY = quality-adjusted life-year.

Figure 2. Clinical Outcomes After 5 Years

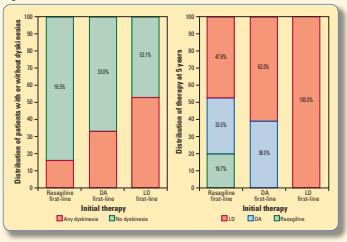
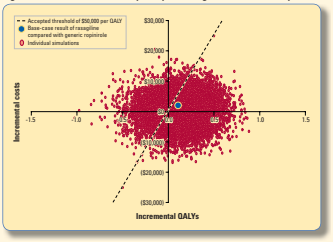


Figure 4. Probabilistic Sensitivity Analysis: Rasagiline vs. Generic Ropinirole



Sensitivity Analysis Results

Figures 3 and 4 display sensitivity analyses of rasagiline as compared with generic ropinirole. Generic ropinirole was selected because it was the least cost-effective comparison. Results show that initiating treatment with rasagiline remained cost-effective or became cost-saving in nearly all sensitivity analyses. Probabilistic results show rasagiline was cost-effective (< $50,000/QALY) in 66.6% of simulations.

Figure 3. One-Way Sensitivity Analysis Results: Rasagiline vs. Generic Ropinirole

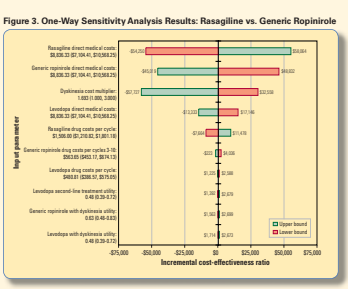


Table 5. Additional Sensitivity Analyses

Analysis Name	ICER Result
SG utility values	$3,949
Rasagiline utility: lower bound	Generic ropinirole dominates
Rasagiline utility: upper bound	$474
Generic ropinirole utility: lower bound	$803
Generic ropinirole utility: upper bound	Generic ropinirole dominates
Transition probability: lower bound of DA to LD[a]	$6,302
Transition probability: upper bound of DA to LD[a]	Rasagiline dominates
Transition probability: lower bound of DA without dyskinesias to DA with dyskinesias[c]	$14,990
Transition probability: upper bound of DA without dyskinesias to DA with dyskinesias[c]	Rasagiline dominates
Transition probability: lower bound of LD without dyskinesias to LD with dyskinesias[c]	$6,396
Transition probability: lower bound of rasagiline to DA[c]	$5,966
Transition probability: upper bound of rasagiline to DA[c]	Rasagiline dominates
Transition probability: lower bound of rasagiline to LD[c]	$176
Transition probability: upper bound of rasagiline to LD[c]	$5,140

[a]Lower bound calculated from the intent-to-treat population, where 92 out of 179 patients received LD.[4]
[b]Upper bound calculated by assuming that all patients who withdrew prematurely from the clinical trial required LD: 94 withdrew and 56 received LD out of 179 patients over 5 years.[4]
[c]Lower bound and upper bound assumes a 50% relative decrease and increase respectively in the time-dependant transition probability.

CONCLUSIONS

Initiating treatment of early PD with rasagiline:

- Is predicted to be a cost-effective strategy when compared with initiating treatment with generic ropinirole
- Is predicted to be a cost-saving strategy when compared with initiating treatment with ropinirole XL, pramipexole, or LD
- Reduces the appearance of costly and uncomfortable dyskinesias by a relative 50% and 69% when compared with initiating therapy with a DA or LD, respectively, thus improving patients' quality of life.

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