Levodopa and Dopamine Agonist Medication Utilization among Patients with Parkinson's Disease Enrolled in Commercial and Medicare Advantage Part D Health Plans

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CONCLUSIONS

- Levodopa was taken by a higher number of patients compared to the dopamine agonist cohort, and patients on levodopa were more persistent with their therapy.
- Monotherapy was prescribed for higher percentages of patients in the levodopa cohort than for the dopamine agonist cohort.
- Results suggest levodopa treatment occurs more consistently than dopamine agonist treatment, as dopamine agonist patients had relatively high treatment modification and discontinuation rates, and low medication adherence.
- Patients in the dopamine agonist cohort were prescribed more non-index medications than patients in the levodopa cohort. Dopamine agonist treatment was discontinued sooner and by higher percentages of patients compared to levodopa treatment.
- Time-to-event analyses estimated that patients prescribed dopamine agonists discontinue treatment sooner than patients prescribed levodopa.

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INTRODUCTION

- About 1% of individuals age 60+, or 1.5 million persons, are diagnosed with Parkinson's disease (PD) in the US.
- PD is a long-term degenerative neurological disease characterized principally by tremor, as well as by bradykinesia, limb rigidity, dystonia, gait disturbance, deteriorating dexterity, dysphagia, laryngeal dysfunction, and psychosis.
- The cause of PD is largely unknown but both genetic and environmental factors appear to be at play. There is no known cure.
- Levodopa and dopamine agonists are the most common PD treatments. An updated analysis of PD medication use is needed.

OBJECTIVE

- Perform an updated characterization of medication utilization among PD patients prescribed levodopa or dopamine agonist treatments.
- Estimate predictors of medication discontinuation among patients prescribed levodopa and dopamine agonist treatments.

METHODS

STUDY DESIGN

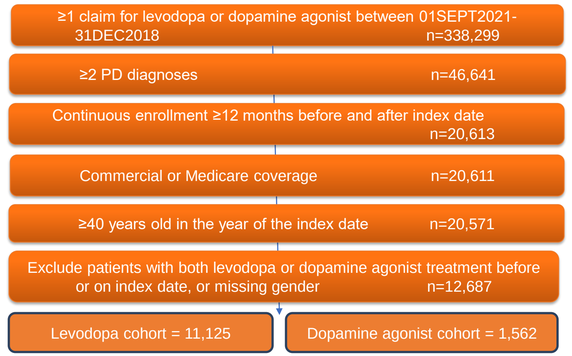
Retrospective analysis using medical and pharmacy claims data from commercial and Medicare Advantage with Part D (MAPD) insurance enrollees with coverage between 09/01/2011-12/31/2019.

- Inclusion criteria:
  - ≥1 claim for levodopa or dopamine agonist; first claim=index date;
  - ≥2 PD diagnoses; ≥1 during the pre-index and ≥1 during the post index period;
  - Continuous enrollment for 12 months pre- and post-index;
  - Age 40 or older.
- Patients were excluded if prescribed the index treatment during the pre-index period, or both levodopa and a dopamine agonist on index date.

Patients were assigned to levodopa or dopamine agonist cohorts based on their index medication.

Descriptive methods were used. Kaplan-Meier analysis estimated time to index treatment discontinuation and Cox Proportional Hazards modeling estimated the risk for discontinuation. The study period ended 12/31/2019 to avoid use of data collected during the COVID-19 pandemic.

Figure 1. Attrition diagram



RESULTS

BASELINE CHARACTERISITICS

The levodopa cohort was older and had higher percentages with MAPD coverage, a higher pre-index mean Elixhauser score, and higher percentages with diagnoses for depressive disorder, cognitive decline, and dementias.

Table 1. Patient demographics and characteristics

Demographic characteristics		Levodopa (N=11,125)	Dopamine agonist (N=1,562)	p-value
Age (continuous)	n	11,125	1,562	
	mean	74.97	67.91	<0.001
	SD	8.41	10.21	
	median	76.00	68.00	
Gender				0.193
Female	n (%)	4422 (39.8)	594 (38.0)	
Male	n (%)	6703 (60.3)	968 (62.0)	
Insurance type				<0.001
Commercial	n (%)	1964 (17.7)	628 (40.2)	
MAPD	n (%)	9161 (82.4)	934 (59.8)	
Geographic setting				0.278
Urban	n (%)	10606 (95.3)	1492 (95.5)	0.747
Rural	n (%)	511 (4.6)	67 (4.3)	0.590
Multiple/Missing	n (%)	8 (0.1)	3 (0.2)	0.131
Elixhauser score	n	11,125	1,562	
	mean	9.72	8.76	<0.001
	SD	8.84	7.70	
	median	8.00	6.00	
Targeted comorbid condition (≥ 1 medical claim with corresponding diagnosis)				
Depressive disorder	n (%)	2985 (26.8)	372 (23.8)	0.011
Anxiety disorder	n (%)	2496 (22.4)	340 (21.8)	0.552
Insomnia	n (%)	868 (7.8)	137 (8.8)	0.184
Cognitive decline	n (%)	1374 (12.4)	136 (8.7)	<0.001
Dementia	n (%)	2249 (20.2)	164 (10.5)	<0.001

LIMITATIONS

- Medical claims data are collected for service payment and not for research.
- PD treatment persistence and adherence were measured from pharmacy claims. Patients may not have consumed medications as prescribed.
- A clean pre-index period was used to identify newly diagnosed patients, but some patients may have had a PD diagnosis more than 1 year before the index date.
- Differences in outcomes could be explained by disease severity and there is no measure for disease severity in claims data; however, age and comorbidity score were used in the Cox Proportional Hazards model as proxies for disease severity.

TREATMENT UTILIZATION

Patients prescribed levodopa had a higher proportion of days covered (PDC), and higher percentages were persistent, treated with monotherapy, and continued their index treatment throughout the post-index period.

Table 2. Treatment adherence and persistence by cohort

Post-index measure		Levodopa (N=11,125)	Dopamine agonist (N=1,562)	p-value
Index medication ONLY during post-index period (monotherapy)	n (%)	8,716 (78.4)	642 (41.1)	<0.001
Persistent patients (index medication through post-index period)	n (%)	7200 (64.7)	776 (49.7)	<0.001
Discontinued all PD treatment (no concomitant use or switch to any medication after discontinuation)	n (%)	1,748 (15.7)	229 (14.7)	0.283
PDC with index therapy	n	11,125	1,562	
	mean	0.73	0.61	<0.001
	SD	0.31	0.35	
	median	0.88	0.72	
PDC adherent (PDC ≥ .80)	n (%)	6498 (58.4)	705 (45.1)	<0.001

Pearson chi-square test was used for binary measures

The dopamine agonist cohort had higher percentages with concomitant treatment, switched treatment, discontinuation, and a shorter mean time to treatment change.

Table 3. First treatment change by cohort

First treatment change		Levodopa (N=11,125)	Dopamine agonist (N=1,562)	p-value
Concomitant treatment	n (%)	562 (5.1)	275 (17.6)	<0.001
Switch to new treatment	n (%)	507 (12.9)	292 (37.2)	<0.001
Discontinued index PD treatment	n (%)	3925 (35.3)	786 (50.3)	<0.001
Time to first treatment change (days)	n	5,201	1,180	
	mean	100.07	77.25	<0.001
	SD	85.84	79.74	
	median	72.00	40.00	
Time to concomitant treatment (days)	n	1,743	601	
	mean	92.11	74.72	<0.001
	SD	93.33	87.55	
	median	58.00	34.00	
Time to switch (days)	n	130	96	
	mean	63.91	66.68	0.753
	SD	65.60	65.15	
	median	34.00	45.50	
Time to discontinuation of index PD treatment (days)	n	3,328	483	
	mean	105.65	82.49	<0.001
	SD	81.69	71.54	
	median	90.00	60.00	

Two-sample t-test was used for continuous measures
Pearson chi-square test was used for binary measures

TIME TO TREATMENT DISCONTINUATION MODELS

Figure 2. Kaplan-Meier analysis of time to index treatment discontinuation

A higher proportion of patients in the dopamine agonist cohort were predicted to discontinue the index treatment during the 12-month post-index period compared to patients in the levodopa cohort (p<0.001).

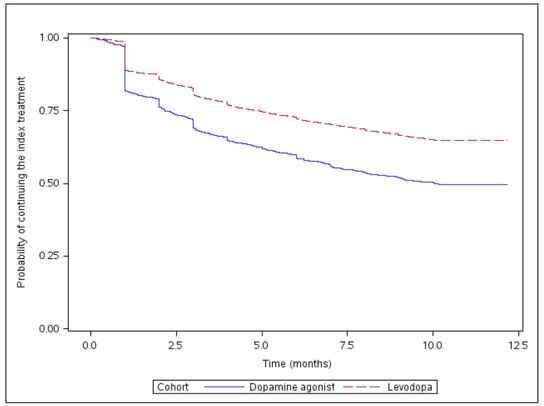


Table 4. Cox Proportional Hazards model of risk for discontinuation of index treatment

Patients in the dopamine agonist cohort had a 62% higher risk of discontinuing their index treatment compared to patients in the levodopa cohort (p<0.001). Holding other covariates constant, a diagnosis of depression increased the risk of treatment discontinuation.

Measure	Discontinue Index Medication			
	hazard ratio	lower 95% CI	upper 95% CI	p-value
Index medication cohort				<0.001
Levodopa	ref.	–	–	–
Dopamine agonist	1.620	1.491	1.759	<0.001
Age	1.002	0.998	1.006	0.265
Gender				0.205
Female	ref.	–	–	–
Male	0.962	0.907	1.021	0.205
Other PD medication	1.087	0.993	1.191	0.072
Elixhauser score	1.003	0.999	1.006	0.146
Targeted comorbid condition (≥ 1 medical claim with corresponding disorder)				
Depressive disorder	1.085	1.010	1.165	0.025
Anxiety disorder	0.953	0.883	1.029	0.217
Insomnia	0.981	0.880	1.093	0.729
Cognitive decline	0.966	0.880	1.060	0.467
Dementia	0.966	0.891	1.046	0.394

Observations read = 12,687, Observations used= 12,687
Overall proportionality test 0.529.
INDX_PD_COHORT proportionality test 0.156.