ER Visits and Hospitalizations Among Patients Treated with Pimavanserin or Other-AAPs for Parkinson's Disease Psychosis: Analysis of Medicare Beneficiaries

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INTRODUCTION & OBJECTIVE

- Approximately 25-50% of patients with Parkinson's Disease (PD) suffer from symptoms of hallucinations and delusions, a characteristic hallmark of Parkinson's Disease Psychosis (PDP), resulting in increased hospitalizations, emergency room (ER) visits, and accelerated nursing home placement.[1]
- To date, pimavanserin (PIM) is the only FDA-approved atypical antipsychotic (AAP) for the treatment of hallucinations and delusions associated with PDP. Real-world evidence studies of PIM are needed.
- The objective of this analysis was to compare healthcare resource utilization (HCRU) outcomes among PDP patients treated with PIM versus other-AAPs used off-label.

METHODS

Study Design & Data Source

- A retrospective analysis of Parts A, B, and D claims from 100% Medicare sample of PDP patients from January 2013 to December 2019 was conducted.

Study Population & Cohorts

- PDP patients initiating (i.e., index date) continuous monotherapy of PIM or other-AAPs (aripiprazole, risperidone, quetiapine (QUE), olanzapine) for ≥12-months during January 2014 to December 2018.
- PDP patients were excluded with any history of 12-month pre-index AAP use, diagnosis of psychosis, secondary parkinsonism, delirium, other psychotic disorders, alcohol/drug-induced psychosis, schizophrenia, paranoia, or personality disorders were selected. A secondary analysis of 1:1 matched PIM vs QUE cohort comparisons on selected outcomes was also conducted.

Study Measures & Outcomes

- **Demographics:** age, sex, race, geographic region and comorbidities
- **HCRU Measures**

  Hospitalizations Outcomes: all-cause and psychiatric-related inpatient hospitalizations (including type of stay -short-term stay, long-term stay, or skilled nursing facility (SNF) stay), all-cause and psychiatric-related long-term care (LTC) admissions (long-term stay or SNF stay), average length-of-stay (ALOS), mean per-patient per-year (PPPY) hospitalizations and hospital stays by type

  ER Outcomes: all-cause ER visits and psychiatric-related ER visits
- **Time to SNF/LTC stay**

Statistical Methods

- Patients on PIM or other-AAPs were 1:1 propensity score-matched on 31 variables (age, sex, race, region, and 27 Elixhauser comorbidities). Similar matching for PIM or QUE was conducted.
- Descriptive statistics were reported as frequencies and percentages for categorical variables; mean, median, and range for continuous variables. Chi-square tests (categorical measures), t-tests, and Wilcoxon-Rank Sum tests (continuous measures) were used to describe differences in outcomes associated with PIM versus other-AAPs.
- All HCRU differences between PIM vs. other-AAPs were analyzed using generalized linear models (GLM) adjusted for demographic characteristics, comorbidities, dementia, or insomnia at index date.
- The secondary analysis of PIM vs. QUE was conducted for all-cause hospitalizations and ER visits.
- Analyses were performed using SAS® Enterprise Server via the CMS Virtual Research Data Center.

RESULTS

- Of the 21,557 eligible PDP patients, 9,652 patients initiated continuous monotherapy for ≥12 months (i.e., study population), 48.41% (n=5,889) of patients were female, and the mean age was >77.75 (±8.14) years.
- From the total study population, patients initiating 12-month continuous monotherapy with PIM (n=842) or other-AAPs (n=842) or QUE (n=842) were propensity score-matched in a 1:1 ratio. Mean age was similar, and nearly half of the population was female in PIM, QUE, and other-AAP groups (Table 1 & Figure 1).

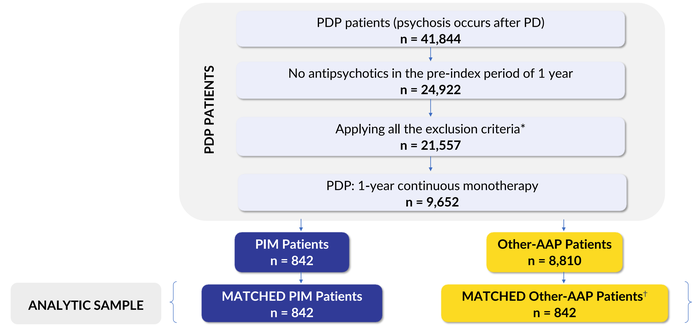
Table 1. Patient Demographics, PIM vs. Other-AAP (Matched to PIM) Groups

Characteristics	PIM (n= 842)	Other-AAPs (n= 842)	
Age (in years)			
Mean (SD)	77.36 (7.20)	77.52 (7.22)	p=0.65
Median (IQR)	77 (73, 82)	78 (73, 82)	p=0.47
Minimum, Maximum	53, 98	45, 98	
Female, n (%)	396 (47.03%)	384 (45.61%)	p=0.59
Select Comorbid Conditions, n (%)			
Insomnia	246 (29.22%)	308 (36.58%)	p<0.01
Dementia	600 (71.26%)	716 (85.04%)	p<0.0001

PIM, pimavanserin; AAPs, atypical antipsychotics; SD, standard deviation; IQR, interquartile range

RESULTS (Cont.)

Figure 1. Patient Disposition Flow Chart



PDP (Parkinson's Disease Psychosis) Diagnosis is based on ≥1 ICD-9(332.0) or ICD-10 (G20) diagnostic claim for PD (Parkinson's Disease) along with occurrence of ≥1 psychosis or psychotic disorder diagnostic claim (F06.0, F06.2, F22, F23, F28, F29, H53.16, R44.0, R44.1, R44.2, R44.3) following PD diagnosis were selected

*Diagnosis of secondary parkinsonism, delirium, other psychotic disorder, alcohol/drug-induced psychosis, schizophrenia, paranoia, or personality disorders

†Other-AAPs (Matched to PIM) group included quetiapine (n=639), aripiprazole (n=34), olanzapine (n=61), and risperidone (n=108).

Table 2. Baseline Comorbidities, Pre & Post Matched Groups

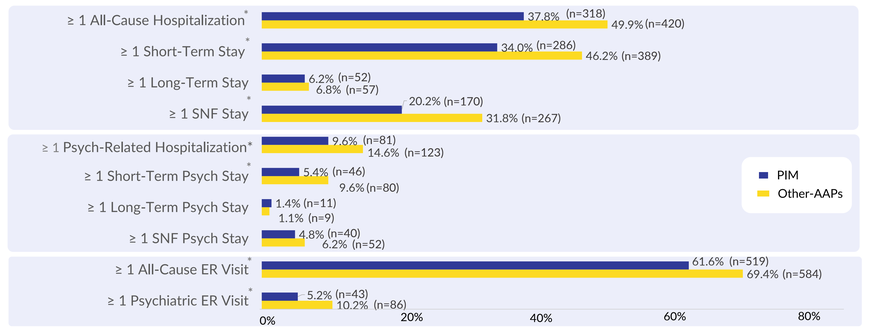
	PIM (n=842)	Other-AAPs, Unmatched to PIM (n= 8,810)	Other-AAPs, Matched to PIM (n= 842)
Comorbidities n (%)			
Congestive Heart Failure	59 (7.01%)	1084 (12.3%)	57 (6.77%)
Cardiac Arrhythmia	114 (13.54%)	1919 (21.78%)	113 (13.42%)
Valvular Disease	50 (5.94%)	711 (8.07%)	61 (7.24%)
Peripheral Vascular Disease	116 (13.78%)	1553 (17.63%)	131 (15.56%)
Hypertension Uncomplicated	350 (41.57%)	5076 (57.62%)	350 (41.57%)
Hypertension Complicated	70 (8.31%)	1029 (11.68%)	66 (7.84%)
Paralysis	5 (0.59%)	167 (1.90%)	15 (1.78%)
Other Neurological Disorders	534 (63.42%)	6354 (72.12%)	566 (67.22%
Chronic Pulmonary Disease	53 (6.29%)	1228 (13.94%)	51 (6.06%)
Diabetes Uncomplicated	108 (12.83%)	1820 (20.66%)	105 (12.47%)
Diabetes Complicated	71 (8.43%)	953 (10.82%)	63 (7.48%)
Hypothyroidism	102 (12.11%)	1614 (18.32%)	128 (15.20%)
Renal Failure	68 (8.08%)	1111 (12.61%)	79 (9.38%)
Liver Disease	3 (0.36%)	139 (1.58%)	2 (0.24%)
Solid Tumors without Metastasis	37 (4.39%)	645 (7.32%)	56 (6.65%)
Rheumatoid Arthritis	16 (1.90%)	398 (4.52%)	16 (1.90%)
Obesity	26 (3.09%)	469 (5.32%)	31 (3.68%)
Weight Loss	41 (4.87%)	738 (8.38%)	68 (8.08%)
Fluid and Electrolyte Disorders	102 (12.11%)	1687 (19.15%)	104 (12.35%)
Deficiency Anemia	42 (4.99%)	698 (7.92%)	56 (6.65%)
Depression	184 (21.85%)	3072 (34.87%)	187 (22.03%)

PIM, pimavanserin; AAPs, atypical antipsychotics

- Before matching, other-AAPs had significantly higher rates of comorbidities (e.g., cardiac arrhythmia, diabetes) vs. PIM (p<0.0001). After matching, both groups were balanced with these differences being no longer significant (p<0.7348) (Table 2).
- PIM patients had 12% and 5% lower annual rates of all-cause hospitalizations and psychiatric-related hospitalizations compared to other-AAPs (p<0.05). All-cause short-term stays and SNF stays as well as psychiatric-related short-term stays were also significantly lower for PIM patients compared to other-AAPs (p<0.05). AAP patients had nearly twice as many psychiatric ER visits (p<0.05) compared to PIM patients (Figure 2).
- In a 1:1 matched pair-wise comparison of PIM (n=842) vs. QUE (n=842), PIM patients had more than 10% lower all-cause hospitalizations (p<0.05): 37.8% (n=319) vs. 48.6% (n=410). In particular, PIM patients reported 11% lower short-term stays and 11% lower SNF stays (p<0.05): 34% (n=286) vs. 45.4% (n=383) and 20.2% (n=170) vs. 31.4 (n=265), respectively. QUE patients reported almost twice as many all-cause ER visits as compared to PIM patients (p<0.05): 5.2% (n=43) vs. 9.6% (n=81).

RESULTS (Cont.)

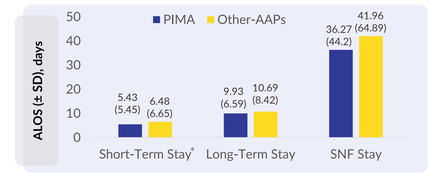
Figure 2. HCRU, *% of Patients with All-Cause Hospitalizations, Psychiatric-Related Hospitalizations, ER Visits*



*Group differences significant (p<0.05)

HCRU, healthcare resource utilization; PIM, pimavanserin; AAPs, atypical antipsychotics; SNF, skilled nursing facility; ER, emergency room

Figure 3. ALOS, *All-Cause Hospitalizations*



*Group differences significant (p<0.001)

ALOS, average length of stay; SD, standard deviation, PIM, pimavanserin; AAPs, atypical antipsychotics; SNF, skilled nursing facility

- **Mean PPPY short-term stay** (0.59 ± SD:1.0 vs. 0.89 ± SD:1.35; p<0.001), **SNF stay hospitalizations** (0.28 ± SD:0.66 vs. 0.50 ± SD:0.90; p<0.001) and **psychiatric-related short-term stay hospitalizations** (0.06 ± SD:0.26 vs. 0.11 ± SD:0.37; p<0.05) were **significantly lower** among PIM patients vs. other-AAP.
- Overall length of stay outcomes by different stay-type was significantly lower for PIM vs. other-AAP patients (Figure 3).
- Fewer PIM patients (23.2% vs. 34.6%; p<0.05) had all-cause **LTC admissions (LTC/SNF stay)** compared to AAP patients. These patients took about **1 month longer** (36 days; 113 vs. 149 days) to get there as compared to patients on other-AAPs. **Psychiatric-related LTC admissions** were similar for both groups (Other-AAPs: 3.50% (n=59), PIM: 2.90% (n=48)).
- The study has limitations that are common to all administrative claims database analyses. Any secondary data, including administrative claims data, may contain coding errors, missed claims, bias introduced by omission of variables, and these should be considered as limitations to these data.
- Identification of psychosis was based on a diagnosis of psychosis-related hallucinations and delusions given there is no diagnostic code for PDP, so it is likely that PDP diagnosis is underestimated.
- While the study addressed potential confounding issues through appropriate matching and covariate adjustment, residual confounding may exist.

CONCLUSIONS

- In this analysis of PDP patients, PIM monotherapy resulted in statistically significantly lower all-cause and psych-related hospitalizations, all-cause and psych-related ER visits, and SNF stays versus other-AAPs.
- In pair-wise comparison of PIM vs. Quetiapine, we observed similar results as PIM vs. Other-AAPs.
- Mean PPPY short-term hospitalizations and SNF stays were also statistically significantly lower for PIM monotherapy versus other-AAPs.
- These results suggest that PDP patients treated with PIM have better real-world HCRU outcomes versus patients treated with other-AAPs used off-label.

REFERENCE

1. Wetmore JB, Li S, Yan H, et al. Increases in institutionalization, healthcare resource utilization, and mortality risk associated with parkinson disease psychosis: retrospective cohort study. Parkinsonism & related disorders. 2019;68:95-101. doi:10.1016/j.parkreldis.2019.10.018