

BACKGROUND & OBJECTIVE

- The spectrum of neuropsychiatric symptoms in Parkinson's disease psychosis (PDP) includes dementia and cognitive impairment [1]. While studies have shown that PDP magnifies the underlying burden of the disease, resulting in increased utilization, there is limited research examining incremental health care resource utilization (HCRU) and cost of incident dementia (PDP+D) among patients with PDP [2,3].
- Real world data is needed to supplement the current gap in literature for PDP+D patients.
- The objective of this analysis was to evaluate incremental hospitalizations and associated costs among Medicare PDP patients without incident dementia compared to PDP patients with incident dementia.

METHODS

Study Design & Data Source

- A retrospective cohort analysis of Parts A, B, and D claims from 100% Medicare sample of PDP patients from January 1, 2013, to December 31, 2019, was conducted.

Study Population

- Two study cohorts were created: (PDP+D) patients with incident dementia diagnosis within 12-month post PDP diagnosis (index date) vs. PDP patients without incident dementia (PDP) during 01/01/14 to 12/31/18, formed the initial patient sample.

Exclusion Criteria

- Patients with a diagnosis of dementia, psychosis, secondary parkinsonism, delirium, other psychotic disorders, alcohol/drug-induced psychosis, schizophrenia, paranoia, or personality disorder were excluded from study sample during 12-months pre-index. Those with co-existing dementia at baseline were excluded.

Study Measures & Outcomes

- Demographics:** Age, sex, race, and comorbidities
- HCRU Outcomes and Associated Costs**

All-cause Inpatient Hospitalizations Outcomes: Inpatient hospitalization (IP) outcomes were identified during the 12 months post-index period: rates and mean per patient per year (PPPY) costs of all-cause IP hospitalizations, and by type of IP stay (i.e., short-term [ST-stay], skilled nursing facility [SNF-stay] and long-term [LT-stay]).

Statistical Methods

- PDP+D vs. PDP patients were propensity score matched (PSM) 1:1 using 31 variables (age, sex, race, region and 27 Elixhauser comorbidity characteristics). Covariate balance were assessed using standardized mean difference (SMDs) value of <0.1 between PDP+D and PDP beneficiaries.
- Descriptive statistics were reported as frequencies and percentages for categorical variables; mean, median, and range for continuous variables. Chi-square tests and t-tests were used to describe differences in outcomes associated with PDP+D vs. PDP patients.
- All-cause hospitalization rates and mean PPPY cost differences were examined using logistic and gamma log-link regression models, respectively, controlling for demographic characteristics, comorbidities, and coexisting insomnia.
- Analyses were performed using SAS® Enterprise Server via the CMS Virtual Research Data Center.

RESULTS

- There were 12,484 patients eligible for the study with 12 months of continuous follow-up and non-missing data, thus creating 10,609 PDP+D and 1,875 PDP patients (Figure 1).
- Patient selection/characteristics and descriptive statistics for the matched groups are described in Figure 1 and Table 1, respectively. Prior to PSM, the mean age and percentage of females was 76 and 47.4%, and 71 years and 52%, in the PDP+D and PDP groups, respectively.

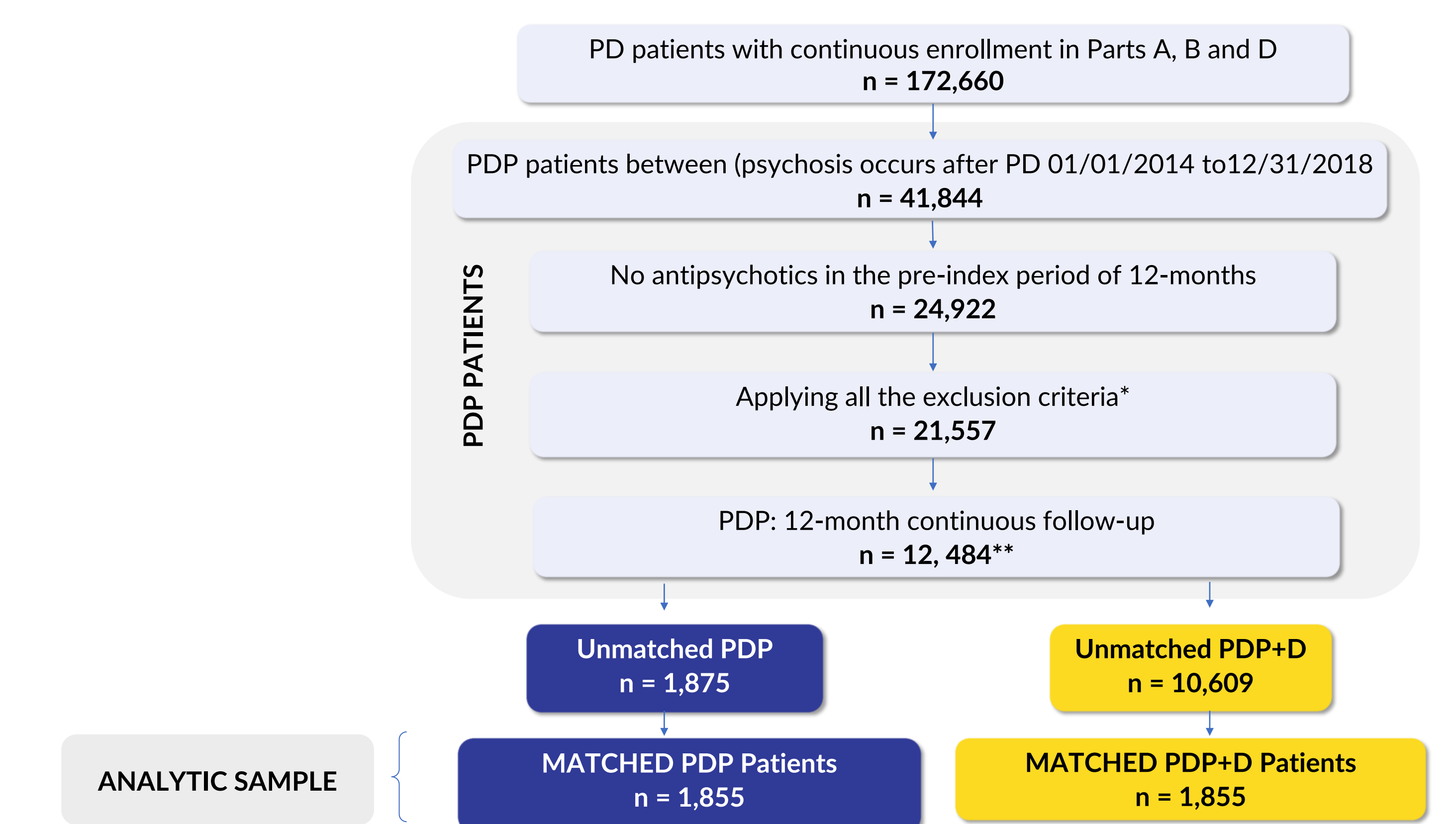
Table 1: Demographic Characteristics of PDP Patients with Dementia (PDP+D) or without Dementia (PDP) Post Matching

Characteristics	PDP (n = 1,855)	PDP+D (n = 1,855)	SMD
Age (in years)			
Mean (SD)	71.68 (8.07)	71.77 (7.99)	0.01
Median (IQR)	72 (66, 77)	72 (67, 77)	
Minimum, Maximum	41, 99	41, 95	
Female, n (%)	962 (51.86%)	923 (49.76%)	0.042
Race, n (%)			
White	1,639 (88.36%)	1,649 (88.89%)	0.017
Black	71 (3.83%)	91 (4.91%)	0.053

PDP, Parkinson's disease psychosis; PDP+D, Parkinson's disease psychosis with Dementia; SD, standard deviation; IQR, interquartile range; SMD, standardized mean differences

RESULTS (Cont.)

Figure 1. Patient Disposition Flow Chart



*Diagnosis of secondary parkinsonism, delirium, other psychotic disorder, alcohol/drug-induced psychosis, schizophrenia, paranoia, or personality disorders, co-existing dementia at baseline; **Delete additional records with missing data (n=4,159)

PD, Parkinson's Disease; PDP, Parkinson's Disease Psychosis; PDP+D, Parkinson's Disease Psychosis with Dementia

Table 2. Comorbidities among PDP Patients without Dementia (PDP) and PDP Patients with Dementia (PDP+D)

Comorbidities n (%)	PDP (n = 1,855)	PDP+D (n = 1,855)	SMD
Congestive Heart Failure	205 (11.05%)	189 (10.19%)	0.028
Cardiac Arrhythmia	377 (20.32%)	359 (19.35%)	0.024
Valvular Disease	159 (8.57%)	127 (6.85%)	0.065
Pulmonary Circulation Disorder	60 (3.23%)	56 (3.02%)	0.012
Peripheral Vascular Disease	296 (15.96%)	268 (14.45%)	0.042
Hypertension Uncomplicated	1,178 (63.50%)	1,119 (60.32%)	0.066
Hypertension Complicated	229 (12.35%)	205 (11.05%)	0.04
Paralysis	37 (1.99%)	34 (1.83%)	0.012
Other Neurological Disorders	1,701 (91.70%)	1,675 (90.30%)	0.049
Chronic Pulmonary Disease	283 (15.26%)	262 (14.12%)	0.032
Diabetes Uncomplicated	390 (21.02%)	360 (19.41%)	0.04
Diabetes Complicated	231 (12.45%)	200 (10.78%)	0.052
Hypothyroidism	419 (22.59%)	368 (19.84%)	0.067
Renal Failure	226 (12.18%)	199 (10.73%)	0.046
Liver Disease	45 (2.43%)	31 (1.67%)	0.053
Peptic Ulcer Disease excluding bleeding	12 (0.65%)	14 (0.75%)	0.013
Lymphoma	22 (1.19%)	17 (0.92%)	0.026
Metastatic Cancer	19 (1.02%)	15 (0.81%)	0.023
Solid Tumors without Metastasis	150 (8.09%)	140 (7.55%)	0.02
Rheumatoid Arthritis	108 (5.82%)	104 (5.61%)	0.009
Coagulopathy	87 (4.69%)	61 (3.29%)	0.072
Obesity	172 (9.27%)	131 (7.06%)	0.081
Weight Loss	136 (7.33%)	110 (5.93%)	0.056
Fluid and Electrolyte Disorders	336 (18.11%)	192 (15.74%)	0.063
Blood Loss Anemia	25 (1.35%)	23 (1.24%)	0.01
Deficiency Anemia	151 (8.14%)	147 (7.92%)	0.008
Depression	706 (38.06%)	656 (35.36%)	0.056

PDP, Parkinson's disease psychosis; PDP+D, Parkinson's disease psychosis with Dementia; SMD, standardized mean differences

- After 1:1 PSM was conducted, there were PDP+D (n=1,855) and PDP (n=1,855) patients identified. Per Table 1, mean age (72 years), gender (50% females), and comorbidity profile were similar in both groups (Table 2).

RESULTS (Cont.)

- Approximately, 50.3% with PDP+D reported ≥1 all-cause IP hospitalizations vs. 36.0% with the PDP group (p<0.05).
- SNF stays, and LT-stays were significantly higher for PDP+D patients compared to PDP (p<0.05) (Figure 2a).

Figure 2a. Rates of All-cause Hospitalizations (By Type of Stay) Among PDP+D vs PDP

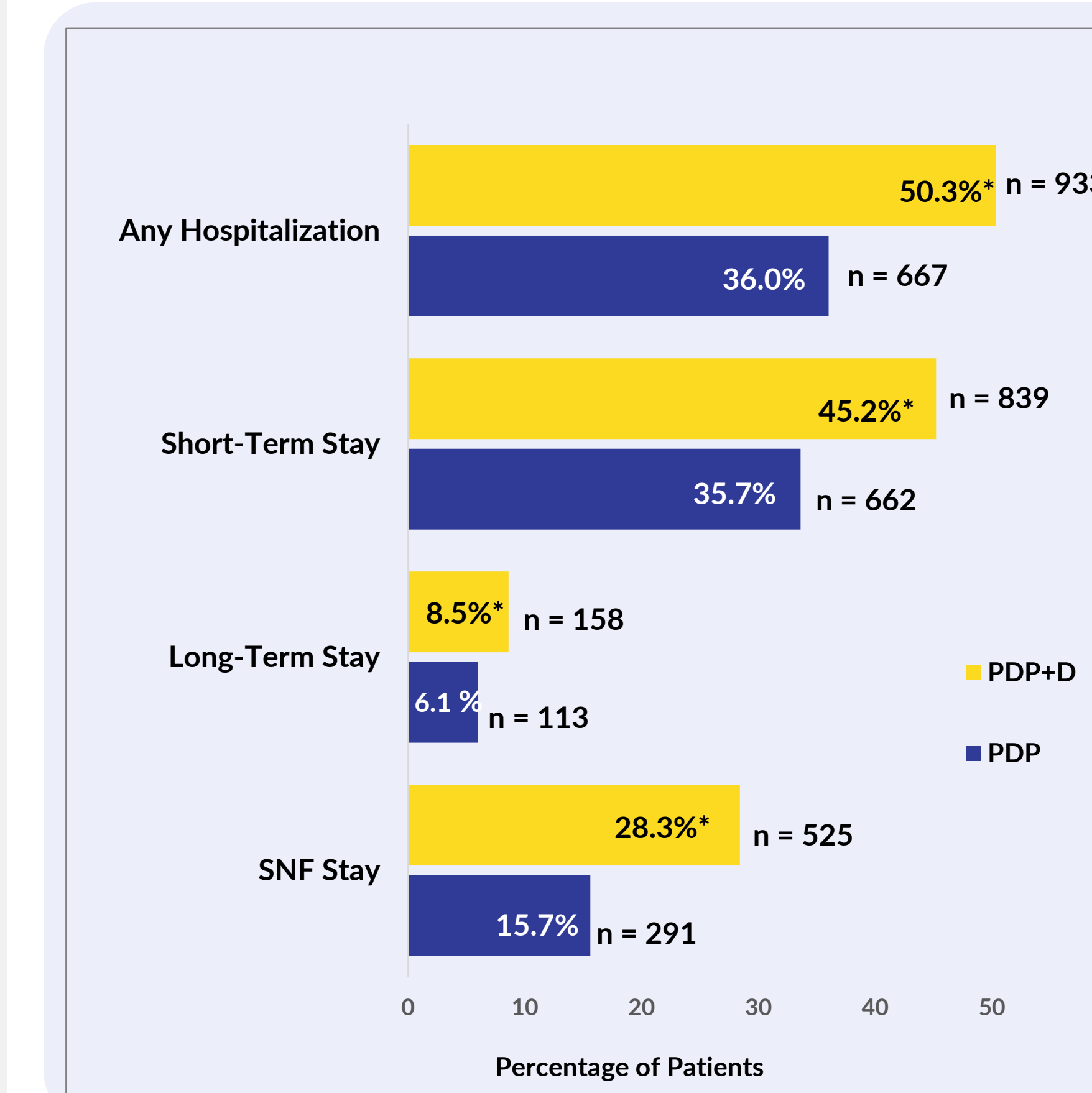
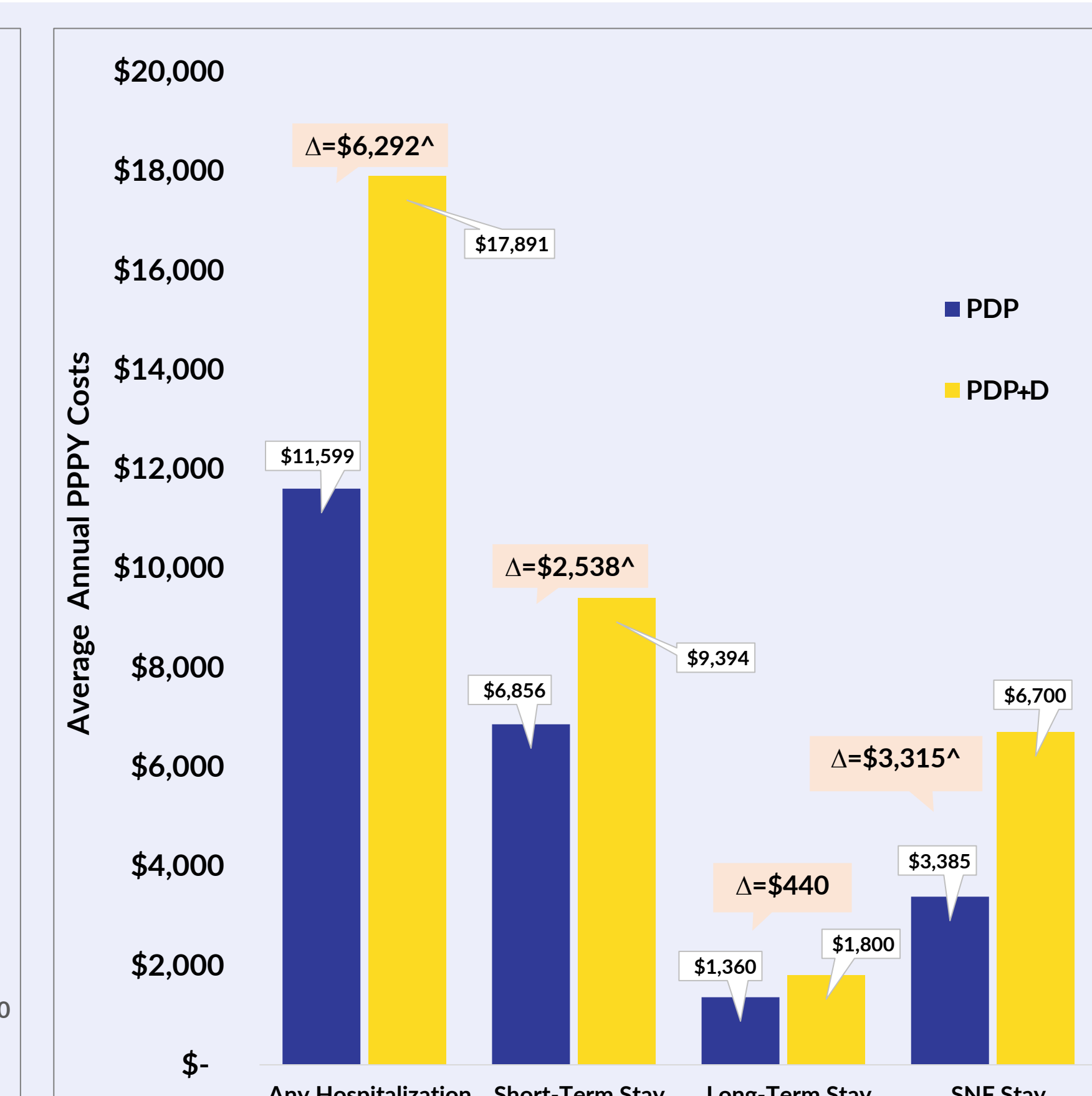


Figure 2b. Mean PPPY All-cause Hospitalization costs (By Type of Stay) Among PDP+D vs PDP



*All the group differences were significant in Figure 2a; ^For Figure 2b, significant group differences (<0.05).

HCRU, healthcare resource utilization; PDP, Parkinson's disease psychosis; PDP+D, Parkinson's disease psychosis with Dementia; SNF, skilled nursing facility; PPPY, per-patient per year; NS, not significant

- Specifically, all-cause ST-stay, SNF-stay, and LT-stay among PDP+D vs. PDP patients were: 45.2% vs. 35.7%, 28.3% vs. 15.7%, and 8.5% vs. 6.1% (p<0.05), respectively.
- Mean PPPY IP hospitalization costs for PDP+D patients vs. PDP patients was \$17,891(±29,882) vs \$11,599 (±\$25,247) (p<0.05). Mean PPPY costs among patients with PDP+D vs. PDP were: \$6,700 (±14,409) vs. \$3,385 (±10,056) for SNF-stays and \$9,394 (±18,360) vs. \$6,856 (±16,339) for ST-stays, respectively (p<0.05) (Figure 2b).
- No significant differences in mean PPPY LT-stay costs were seen.

Limitations

- The study has limitations such as coding errors, missed claims, and biases introduced by omission of variables that are common to administrative claims database analyses
- PDP diagnosis rates may be underestimated since psychosis diagnosis was based on a diagnosis of psychosis-related hallucinations and delusions.
- Residual confounding may still exist, even though the study was adjusted for potential confounding issues through appropriate propensity score matching and covariate adjustment.

CONCLUSIONS

- In this analysis of Medicare claims within the US, patients with PDP and incident dementia reported 54% greater mean PPPY IP hospitalization costs compared to patients with PDP.
- The mean PPPY SNF-stay costs were nearly two times greater among patients with PDP+D vs PDP.
- Our findings suggest that patients with PDP+D may experience a higher rate of all-cause IP hospitalizations.

REFERENCES

- 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 Relat Disord.* 2019;68:95-101. doi:10.1016/j.parkreidis.2019.10.018
- Segal GS, Xie SJ, Paracha SU, Grossberg GT. Psychosis in Parkinson's Disease: Current Treatment Options and Impact on Patients and Caregivers. *J Geriatr Psychiatry Neurol.* 2021 Jul;34(4):274-279. doi: 10.1177/08919887211018280. PMID: 34219522.
- Fredericks D et al. Parkinson's disease and Parkinson's disease psychosis: a perspective on the challenges, treatments, and economic burden. *Am J Manag Care.* 2017; 23(5):S83-S92.

