Clinical and Economic Outcomes Associated with Teriparatide Adherence in Medicare Part D Recipients: A Retrospective Cohort Study

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Objective

The objective of this study was to evaluate the utilization patterns of Medicare Part D beneficiaries newly started on teriparatide (TPTD) and the association of adherence with fracture outcomes and healthcare utilization.

Background

Improper medication adherence is associated with increased morbidity, healthcare costs, and fracture risk among patients with osteoporosis.[1] Osteoporosis (OP), a breakdown and weakening of the bones, affects over 10 million individuals in the U.S. Proper medication adherence may delay and prevent fracture, future bone loss, and other negative outcomes.[1] Poor adherence or discontinuation may result from patient concerns about side effects, inconvenience of drug regimens, and drug costs. Costs are especially relevant to patients prescribed injectable medications such as TPTD, which may be costlier than oral agents.[2,3] The cost sharing attributes of the Medicare Part D prescription drug plan may pose an additional financial challenge to patients with OP who are prescribed costlier medications.[3]

Methods

- This was a retrospective cohort analysis of medical and pharmacy claims of 761 Medicare members aged 18 – 89 with first fills for TPTD from 1/2008 to 12/2009. The index date was the date of the first TPTD claim.
- Participants had at least 18 months of enrollment, i.e., at least 6 months before index date (baseline period), and at least 12 months post index (follow-up period).
- Medicare Low Income Subsidy (LIS) enrollees were excluded.
- Baseline characteristics, healthcare use, and costs at 12 and 24 months post TPTD initiation were summarized.
- Adherence was measured by Proportion of Days Covered (PDC), categorized as high (PDC ≥80%), intermediate (50% ≤ PDC <80%), and low (PDC <50%).
- Descriptive statistics were produced to summarize demographic and clinical characteristics.
- Multivariate logistic regression was used to evaluate associations of adherence and discontinuation with outcome of fracture rates; demographic and clinical characteristics were used as covariates in the models.

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Results

Figure 1: Sample Attrition

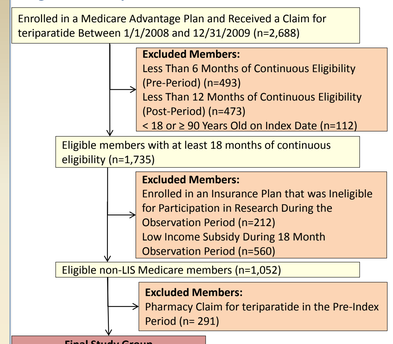


Table 1: Demographic Characteristics

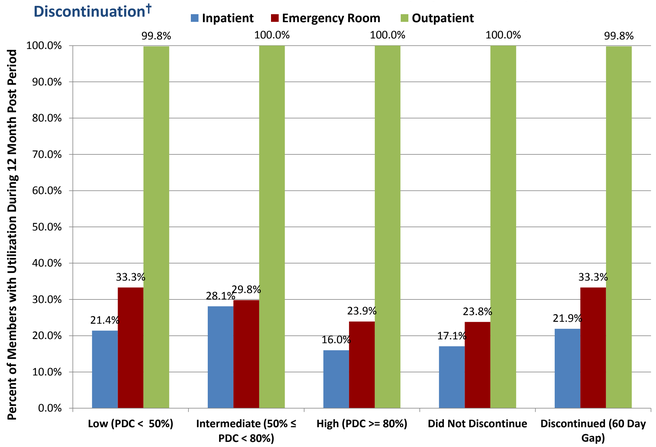
Characteristic	Count
Total Patients	761
Age, years (Mean, Standard Deviation)	73.3 (±8.4)
Age Distribution (n, %)	
18-39	0
40-49	6 (0.8%)
50-59	31 (4.1%)
60-69	223 (29.3%)
70-79	316 (41.5%)
80-89	185 (24.3%)
Female (n, %)	675 (88.7%)
Ethnicity (n, %)	
White	711 (93.4%)
Black	23 (3.0%)
Hispanic	8 (1.1%)
Other	19 (2.5%)
Geographic Region (n, %)	
Northeast	17 (2.2%)
Midwest	160 (21%)
South	502 (66%)
West	82 (10.8%)

Table 2: Clinical Characteristics

Characteristics	Counts
Total Patients	761
Charlson Comorbidity Index*	1.1 (± 1.6)
	1 [0 - 12]
Osteoporosis Drug Utilization in Pre-Period n,(%)	353 (46.4%)
Bisphosphonate n,(%)	283 (80.2%)
Calcitonin n,(%)	39 (11.0%)
Selective Estrogen Receptor Modulator (SERM) n,(%)	42 (11.9%)
Conjugated Estrogen n,(%)	22 (6.2%)
Fracture in the 6 Month Pre-Period n,(%)	386 (50.7%)
Fracture in the 12 Month Pre-Period n, (%)**	443 (58.2%)
Fracture in the 12 Month Post-Period n,(%)	222 (29.2%)
Time Between Index Date and First Fracture Days)*	200 (± 81)
	181 [91 - 364]
Proportion of Days Covered (PDC) Between Index Date and First Fracture*	0.46 (± 0.3)
	0.38 [0.08 - 1.0]
Comorbidity (Top 10 Identified) n,(%)	
Other disorders of bone and cartilage (733.)	752 (98.8%)
Essential hypertension (401.)	546 (71.7%)
Disorders of lipid metabolism (272.)	529 (69.5%)
General symptoms (780.)	474 (62.3%)
Other and unspecified disorders of back (724.)	402 (52.8%)
Symptoms involving respiratory system and other chest symptoms (786.)	391 (51.4%)
Other and unspecified disorders of joint (719.)	382 (50.2%)
Osteoarthritis and allied disorders (715.)	361 (47.44%)
Other disorders of soft tissues (729.)	333 (43.8%)
Cataract (366.)	281 (36.9%)
Reached Part D Coverage Gap During 12 Month Follow-up Period n,(%)	586 (77%)
OOP† Cost for All Prescription Claims During 12 Month Follow-up Period*	$2,082 (± $2,189)
	$991 [$30 - $10,894]
OOP Cost for Teriparatide Prescription Claims During 12 Month Follow-up Period (Mean , SD)	$1,247 (± $1,832)

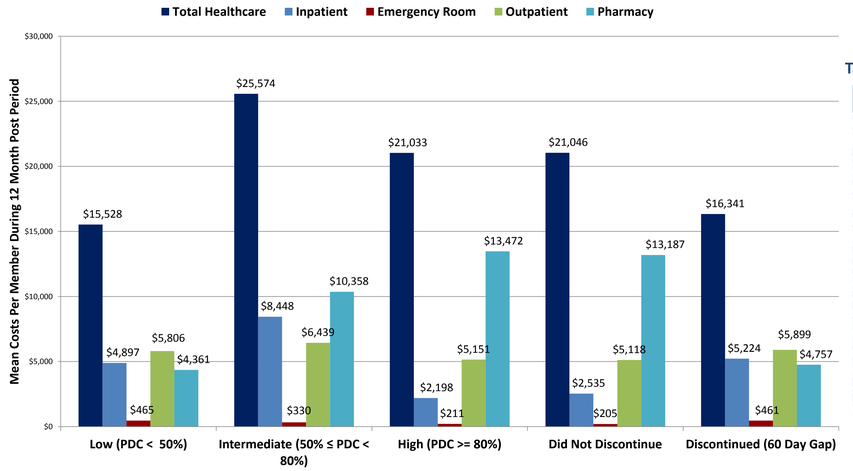
*Mean, standard deviation (SD), median, [range]
**Data for fracture in 12-month pre-period not available for entire cohort
† OOP= Out of Pocket

Figure 2: Healthcare Utilization at 12-month Follow Up by Adherence (PDC*) and Discontinuation†



*PDC = Proportion of Days Covered; † Discontinuation = discontinuation of teriparatide

Figure 3: Healthcare Costs at 12-Month Follow Up By Adherence (PDC*) and Discontinuation†



*PDC = Proportion of Days Covered ; † Discontinuation = discontinuation of teriparatide

Table 3: Fracture-Related Healthcare Resource Utilization and Cost

Measure	12 Month Post Period	24 Month Post Period
Total Patients	222	134
Fracture-Related Inpatient Hospitalization		
Members with Hospitalization n,(%)	21 (9.5%)	11 (8.2%)
Hospitalizations Per Member**	0.1 (± 0.4)	0.1 (± 0.4)
	0 [0 - 2]	0 [0 - 2]
Fracture-Related Emergency Room Visits		
Members with Visit n,(%)	35 (15.8%)	33 (24.6%)
Visits Per Member**	0.2 (± 0.5)	0.3 (± 0.6)
	0 [0 - 3]	0 [0 - 3]
Fracture-Related Outpatient Visits		
Members with Visit n,(%)	213 (95.9%)	126 (94.%)
Visits Per Member**	4.1 (± 7.4)	4.6 (± 8.55)
	2 [0 - 65]	2 [0 - 61]
Fracture-Related Pharmacy Claims		
Pain Medications		
Members with Pharmacy Claim n,(%)	161 (72.5%)	110 (82.1%)
Pharmacy Claims Per Member**	5.6 (± 7.7)	9.2 (± 11.9)
	2 [0 - 43]	4 [0 - 55]
Osteoporosis Medications		
Members with Pharmacy Claim n,(%)	222 (100.%)	134 (100.%)
Pharmacy Claims Per Member**	5.8 (± 4.5)	10. (± 8.7)
	4 [1 - 18]	6 [1 - 29]
Total Fracture-Related Cost**	$6,198 (± $6,578)	$8,389 (± $8,650)
	$3,260 [$854 - $40,637]	$3,944 [$854 - $47,033]
Inpatient Hospitalization Cost**	$1,123 (± $4,506)	$967 (± $3,582)
	$0 [$0 - $37,355]	$ [$0 - $22,387]
Emergency Room Visit Cost**	$35 (± $117)	$100 (± $674)
	$0 [$0 - $753]	$ [$0 - $7,692]
Outpatient Cost**	$829 (± $2,297)	$1,007 (± $3,128)
	$179 [$0 - $23,383]	$141 [$0 - $23,545]
Osteoporosis Medication Cost**	$3,965 (± $3,640)	$6,061 (± $6,737)
	$2,459 [$779 - $14,910]	$2,603 [$784 - $22,965]
Pain Medication Cost**	$246 (± $758)	$253 (± $605)
	$24 [$0 - $6,276]	$35 [$0 - $3,575]

**Mean, standard deviation, median, [range].

Table 4: Logistic Regression of Adherence and Fracture Risk*

Variable	Odds Ratio	95% Confidence Interval	p value
PDC (>= 80% vs. <50%)	0.81	(0.515, 1.231)	0.48
PDC (>= 50%-<80% vs. < 50%)	0.91	(0.479, 1.741)	0.94
Age	1.00	(0.976, 1.016)	0.66
Gender (Female vs. Male)	1.37	(0.796, 2.368)	0.25
Race (Black vs. White)	1.41	(0.558, 3.538)	0.48
Race (Hispanic vs. White)	0.42	(0.048, 3.599)	0.29
Race (Other vs. White)	1.80	(0.689, 4.703)	0.22
Fracture in 6 Month Period before Initiating Teriparatide	2.93	(2.084, 4.122)	<.0001
Charlson Comorbidity	0.96	(0.861, 1.07)	0.46
Geographic Region (West vs. Northeast)	1.38	(0.347, 5.513)	0.99
Geographic Region (Southeast vs. Northeast)	2.07	(0.566, 7.531)	0.05
Geographic Region (Midwest vs. Northeast)	1.29	(0.341, 4.889)	0.76
Bisphosphonate Use	1.04	(0.738, 1.469)	0.82
Calcitonin Use	0.62	(0.283, 1.378)	0.24
Selective Estrogen Receptor Modifier Use	1.16	(0.551, 2.433)	0.70
Estrogen Use	0.61	(0.197, 1.891)	0.39

*Results of multivariate logistic regression analyses, with 'Fracture in 12 Month Post-Period' as the outcome variable.

Discussion

- Overall, adherence to TPTD was suboptimal. At 1 year follow-up, only 21% of the patient cohort had a PDC ≥ 80%, and 24% continued to take TPTD. Some studies report higher adherence rates; the difference in these results may be due to the composition of this patient pool (Non-LIS Medicare Part D beneficiaries). Higher out of pocket costs for TPTD during the coverage gap may have contributed to lower adherence rates.
- Although the results suggested that there were no significant differences in fracture outcomes whether patients discontinued or continued to take the drug, or regardless of adherence status, this study identified specific patterns of utilization and cost based on adherence and discontinuation.
- There was a trend for greater healthcare resource utilization among patients who discontinued TPTD or were non-adherent (PDC < 50%). Conversely, patients who were highly-adherent and continued TPTD had higher overall costs, most of which were attributable to pharmacy expenses.
- There was high discontinuation after first fracture during follow-up, i.e., only 28% continued TPTD. Underlying causes for discontinuation could not be investigated using claims data; however, patients may have discontinued if they attributed the fracture to treatment failure, or if prescribers opted for another treatment strategy.
- The results were inconclusive with regard to the exact relationship between poor adherence and negative outcomes such as increased utilization of inpatient hospitalizations, ER visits, and fracture rates.
- The finding of a higher risk of fractures among patients who had fracture episodes at baseline is consistent with previous studies.[4]

Limitations

- Study limitations are common to research using administrative claims data (e.g., potential errors in claims coding and a lack of data for indirect costs).
- Causal inferences cannot be made from this observational retrospective claims study.
- Data are derived from a single large national health insurance company exclusively; the results might not be generalizable to the entire U.S. population.

Conclusions

These findings suggest that to improve adherence to teriparatide, a greater understanding of the influences on patient adherence is required. Increased knowledge of barriers and enhancers of patient adherence to critical medications can aid in the design of interventions that both improve adherence and support the management of healthcare costs. Such strategies may lead to reduction in healthcare resource use and costs, and reduction of future fracture risk among Medicare patients with osteoporosis.

References

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