Research Article

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All's Well that End's Well in Physical Therapy? The relative importance of Copays in Patients with Low Back Pain attending Physical Therapy

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ABSTRACT

Background: *Various factors have been shown to influence attendance to physical therapy (PT), including various psychosocial factors. Anecdotally, it is believed that higher copays are associated with fewer PT visits and shorter duration, but limited research is available to support this.*

Objective: *To determine if higher copays for patients attending outpatient PT for low back pain is associated with lower number of total treatment visits and duration of treatment in months.*

Design: *Retrospective review.*

Methods: *A random sample of 117 patient visits to PT for low back pain prior to COVID-19 were gathered including various demographic data points, co-pay dollar amounts, duration of care, and total number of visits. Data were analyzed to determine if higher copays for patients attending outpatient PT for low back pain is associated with fewer visits and shorter total treatment time, using correlation coefficients ($\rho \geq 0.4$ taken to indicate moderate correlation) to examine relationship strength, multiple linear regression, and generalized Poisson regression.*

Results: *The variables Total Number of Visits and Copay Amount failed to have a significant correlation coefficient ($\rho = -0.06$). The variables Duration of Treatment (months) and Copay Amount failed to have a significant correlation coefficient ($\rho = -0.15$). Copay did not have a significant impact on number of treatments or duration of visit for patients being treated for LBP.*

Conclusion: *Higher co-pays for patients attending PT for LBP are not associated with fewer visits and shorter durations of care. The result from this study calls for more research into the relative importance of PT copays, and what other factors determine patient attendance in PT.*

Keywords
Copay, Physical Therapy, Low back pain, Patient satisfaction, Psychosocial variables.

Introduction

It is well documented that low back pain (LBP) is still the most widely reported musculoskeletal disorder in the world and accounts for significant healthcare expenditures [1,2]. With the prevalence of LBP comes the care seeking behaviors of patients including consultation with a healthcare provider such as a physician, physical therapist, chiropractor, etc.[3]. In the United States (US) LBP accounts for 25 percent of outpatient physical therapy (PT) visits and it's estimated over 170 000 people on a daily basis in the US consult a PT for LBP [4-7].

Traditional biomedical models focusing solely on the health of tissues would imply that patients with more comprehensive injury, surgery or pathological processes would be associated with protracted care and more cost [8]. This is not always the case. For example, in a classic study in 1992 at the Boeing™ aircraft factory, it was shown that the biggest predictor of return to work was not the severity of an injury or presence of high intensity of pain, but rather job satisfaction [9]. Since then, various psychosocial aspects have been associated with the cost and duration of care for LBP including fear-avoidance, pain catastrophizing, occupational and social factors, etc. [10,11]. It is now well-established that these non-biological factors are key determents in how many visits a patient will have in PT for LBP [12,13].

Another, often overlooked area is healthcare cost [14]. With ever-increasing healthcare expenses, more financial burden is shifted to patients in the form of co-insurance payments (co-pays) [15]. Very little current data is available on the exact number of patients who pay a co-payment in PT, but a 2015 retrospective study reported 54% of patients had a co-pay in PT [16], and with rising healthcare cost it can be assumed this percentage is much higher at this point. According to the American Physical Therapy Association, in most states, PT co-pays are in line with specialists and thus very expensive, with industry studies reporting an average copay ~$40/patient/visit for PT (www.apta.org). This number concurs with a slightly dated retrospective study-showing mean out of pocket expenditure for PT to be around $35/patient/visit for ambulatory PT services [16]. Anecdotally, it would make sense that high co-pays will also limit the number of visits and duration of care. Interestingly, this area of clinical practice is very under-studied. In a 2020 study, Dolot, et.al., showed that higher out of pocket payments by a patient was associated with fewer PT visits, concurring with a previous study by the same research group [17,18]. In a physician study, it was shown that patients attending care for knee osteoarthritis treatments were willing to pay more for treatments they deemed more effective, i.e., injections versus given a prescription for medication [19]. Given the limited studies on this topic, the aim of this study is to determine if higher co-pays in patients attending PT for LBP is associated with fewer visits and shorter duration of care (months). The secondary aim is to determine how co-pay insurance compares to other well-established variables that influence frequency and duration of care for LBP.

Methods

A PT outpatient therapy group in Kansas City – ARC+ Physical Therapy, was approached for this study and approved the study. In line with the goals of the study, de-identified data on patients with LBP was gathered for analysis. Institutional Review Board approval was obtained for this study at Southwest Baptist University.

A data collection sheet was developed in line with the aims of the study. Physical therapists at ARC retrospectively gathered a random sample of patients who attended outpatient PT for LBP. The intended sample size was 150 patient visits. No personal identifiable information was entered into the data collection sheets. Researchers receiving and analyzing the data were blinded in regard to individual patients and data provided. Data collected included start date of PT; end-date of PT; age; gender; body-mass index (BMI); co-pay dollar amount; PT units per visit; if the patient had undergone surgery or not; if the patient has had any imaging (radiographs [X-ray], computerized tomography [CT-scan] or magnetic resonance imaging [MRI]); the patient reports being a smoker; the patient reports being diagnosed with diabetes; the patient reports being diagnosed with depression; the patient reports being diagnosed with high blood pressure; the patient's work status (full-time; part-time or off work) and total number of PT visits for the episode of care.

Two outcome measures at their final visit were also recorded:
Self-Reported Pain Rating At Their Last Visit – Numeric Pain Rating Scale (NPRS): LBP was measured with the use of a NPRS, as has been used in various studies on LBP [20-23]. The NPRS has been shown to be a valid and reliable tool to measure pain intensity [24, 25].

Self-Reported Disability at Their Last Visit – Oswestry Disability Index (ODI): The ODI is a validated, extensively utilized questionnaire for people who suffer from LBP. It consists of 10 items representing different health constructs (i.e., pain intensity, physical functioning, sleep functioning, social functioning). Each section is scored on a 0 to 5 rating scale, where zero means 'No pain' and 5 means 'Worst imaginable pain'. The total score of the ODI is calculated by adding all scores of applicable items, dividing the obtained score by the maximal total score, and by multiplying the result by 100 to get a percentage score [26]. The higher the score, the higher the patient-determined disability [26,27].

Statistical Analysis

A random sample of patients who have attended PT for LBP between 2018 and 2019 (pre-COVID) was collected with a desired sample size of 150 to achieve adequate power of the results (effect size ≥ 0.8). Data was analyzed regarding the primary interest of this study with secondary analysis comparing results to other patient factors known to affect duration of treatment,

as demonstrated by the current literature. This relationship was explored using correlation coefficients ($\rho \geq 0.4$ taken to indicate moderate correlation) to examine relationship strength, multiple linear regression for assessing normality of the data and removal of outliers, as well as modeling the amount of treatment time, and Poisson regression for examining the relationship between total number of visits and other covariates in the dataset while accounting for total treatment time.

Results

Upon completion of the study, participant intake forms from pre- and post-intervention were collected for analysis. The original dataset after completion of the study contained 117 observations, and missing data values were imputed with the group mean, or majority response for binary variables. Summary statistics were generated for a wholistic representation of these 117 patients and are reported below (Table 1).

Table 1: Summary of Sample Prior to Analysis.

Variable (n = 117)	Value
Mean Age in years (SD)	53.65 (18.41)
Mean BMI (SD)	31.91 (15.70)
Mean Copay ($) (SD)	28.50 (33.04)
Mean Pain Duration (Months) (SD)	11.71 (23.01)
Mean Improvement in ODI (SD)	10.15 (17.29)
Mean # of Visits (SD)	7.69 (7.19)
Number of Females (%)	48 (41.03)
Employment	
Full-time Workers (%)	48 (48.98)
Part-time Workers (%)	5 (5.10)
Not Currently Working (%)	45 (45.92)
Imaging & Treatment	
Prior Surgery (%)	17 (14.53)
Prior X-Ray (%)	46 (39.31)
Prior CT Scan (%)	4 (3.42)
Prior MRI (%)	41 (35.04)
Pre-existing Conditions	
Prior Diabetes (%)	30 (25.64)
Prior Depression (%)	15 (12.82)
Prior High Blood Pressure (%)	53 (45.30)

The variables *Number of Visits, Duration of Treatment,* and *Copay Amount* were examined prior to any rigorous analysis through correlation coefficients to examine whether there was reason to believe any strong relationships existed among these three variables in isolation. With $\rho \geq 0.4$ taken to indicate moderate correlation, all three variables failed to have any meaningful correlation with any other covariates within the dataset. The correlation coefficient between *Number of Visits* and *Copay Amount* was ρ = -0.15. The correlation coefficient between *Duration of Treatment* and *Copay Amount* was ρ = -0.06. Each of these failed to have a significant correlation coefficient (ρ = -0.04).

A Shapiro-Wilk Test was performed to assess the normality of the variables *Number of Visits* and *Duration of Treatment* before any traditional methods of analysis were performed. Both variables deviated significantly from normality ($W_N = 0.79, p_N < 0.001$ and $W_D = 0.45, p_D < 0.001$) and the Box-Cox transformation was applied to *Duration of Treatment,* while *Number of Visits* was analyzed using non-Gaussian methods. After these transformations were applied, Multiple Linear Regression was used to assess normality of data through residual and QQ-plots, and normality was sufficiently achieved. Moreover, no individual covariate in the dataset was found to exceed the VIF threshold of being ≥ 10, so all variables could be examined in downstream analyses.

Number of Visits was analyzed using a generalized linear model from the Quasi-Poisson family with the offset of *Duration of Treatment* to account for the length of time spent in treatment and dispersion parameter taken to be 55.82. Twelve observations were found to be outliers in their number of visits, and were removed from the original dataset, rendering the sample size to be n = 105. The covariates and associated values from this analysis are reported below (Table 2). From this, we are led to believe that the number of visits a patient has during their course of treatment can likely be better explained by variables outside the scope of the factors included in this study.

Table 2: Poisson Model with Number of Visits as Response.

Variable	Value	Std. Error	*P*
(Intercept)	3.31	2.10	0.118
Copay ($)	0.01	0.03	0.684
Age	-0.032	0.025	0.206
BMI	-0.011	0.022	0.620
Female	0.586	0.743	0.433
Full-time Worker	-1.420	1.054	0.181
Part-time Worker	-1.287	2.217	0.563
No Work	-1.488	1.083	0.173
Change in ODI	-0.025	0.024	0.307
Previous Surgery	0.942	0.986	0.342
Previous X-Ray	-0.587	0.807	0.469
Previous CT Scan	-0.487	2.200	0.825
Previous MRI	-0.903	0.736	0.223
Tobacco Use	0.753	2.785	0.788
Diabetes	0.622	0.949	0.514
Depression	-0.070	1.290	0.957
High Blood Pressure	-0.180	0.812	0.825
Individual ID	-0.020	0.028	0.487

Duration of Treatment was analyzed using multiple linear regression. Fourteen observations were found to be outliers in their duration of treatment, and were removed from the original dataset, rendering the sample size to be n = 103. The covariates and associated values from this analysis are reported below (Table 3). The adjusted R^2 of the model was 0.259, indicating lack of fit and inability for the model to adequately capture the variation in response. From these analyses, we see that not only does copay amount fail to have a meaningful impact on the duration of treatment, but modeling the duration of treatment is not well-captured using the covariates in the given dataset.

Table 3: Linear Model with Log Duration of Treatment as Response.

Variable	Value	Std. Error	*p*
(Intercept)	0.326	0.632	0.607
Copay ($)	0.001	0.008	0.927
Age	0.005	0.007	0.487
BMI	0.010	0.006	0.103
Female	0.209	0.283	0.383
Full-time Worker	0.184	0.330	0.579
Part-time Worker	0.963	0.600	0.112
No Work	0.072	0.327	0.826
Change in ODI	-0.012	0.007	0.079
Previous Surgery	0.023	0.323	0.944
Previous X-Ray	0.099	0.231	0.670
Previous CT scan	0.991	0.630	0.120
Previous MRI	0.657	0.251	0.010*
Tobacco Use	-0.039	0.541	0.943
Diabetes	-0.738	0.268	0.007*
Depression	0.721	0.324	0.029*
Blood Pressure	0.016	0.243	0.949
Individual ID	-0.002	0.008	0.824
Number of Visits	-0.024	0.015	0.125

* Statistically significant

Discussion

The results from this study indicate that copay amount does not meaningfully impact number of visits or duration of care for patients being treated for LBP. Lack of fit in the modeling techniques employed indicates that the number of visits and duration of care for any given patient may not be well-explained by the covariates in the dataset. Though the given sample size was sufficiently large to achieve statistical power in hypothesis testing, it is likely that a larger and more diverse sample may provide insights which failed to be captured by the dataset at hand.

The results from this study, as it relates to co-pay is contrary to previous studies [17,18]. Anecdotally it would seem logical that patients who have higher out-of-pocket payments space appointments out further, more interested in strategies to do self-care or cut short PT visits, but this study failed to show this. In trying to understand this finding, a comparison of the most recent relevant study by Dolot et al., highlights some similarities and some differences [17]. Both studies are retrospective, pre-COVID, focusing on LBP attending PT, using a single PT practice group, and many patient factors are quite similar - copay ($27.67 versus $27.78), duration of care (7.73 visits versus 6.79) and mean age (52.98 versus 53.71). The Dolot, et al., study did exclude certain diagnoses (i.e., rheumatoid arthritis, fibromyalgia, polymyalgia, etc.), and showcased a larger female cohort (59.1% versus 40%). Also, important to note is the potential geographic location differences (Idaho, Oregon and Washington versus Kansas and Missouri) which may or may not have impacted the results. In fact, Johnson County KS, where the PT practice is located has an annual household income of $96 000, compared to the national average of $71 000 (U.S. Census 2022).

To explore the co-pay issue deeper, it must be understood why patients attend PT. This may include their own bias for (or against) attending PT, physician referral and more. First, it has been shown that previous medical experiences (surgery, rehabilitation, etc.) powerfully impact future experiences [28-30]. It is well established that some patients have positive experiences when attending PT, while others do not [31,32]. It can thus be argued those with positive experiences are more likely to attend PT again and complete a series of treatments to reach a certain functional level for discharge [32]. Likewise, poor experiences may likely cause patients to cut short PT attendance [31,32]. Fortunately, possibly in line with the observations of this study, patients seem to be highly satisfied with PT. A large scale study across PT clinics in northern Europe, North America, the United Kingdom, and Ireland showed that patients are highly pleased with PT [31].

Additionally, value of the care provided may also be a major factor determining if patients will attend PT, regardless of the co-pay dollar amount. High-value care has been described as evidence based, effective and safe, patient-centered, consistent, accountable, timely, equitable and allows easy interaction with healthcare providers and healthcare systems [33]. As shown in orthopedic literature, if patients see value in a treatment, they are more likely to pay for this, including higher co-pays. What this study shows is that regardless of the co-pay amount, it did not affect the number of visits. In line with the studies on patient satisfaction, it could be argued that patients see value in PT and thus do not mind higher co-pay amounts [34]. A third possibility influencing the decision to attend PT despite a higher co-pay is the influence of the referring physician. Most patients attending PT in the US are referred to PT by a physician and it can be argued that if a physician has very prescriptive instructions on the duration of the proposed PT treatment, patients may be more inclined to attend PT to ensure they complete the physician's orders. It is well established that patients listen to and abide by physician orders, underscoring the influence of a physician on patient behaviors [35,36]. This study contains various limitations including the relative small sample size compared to previous studies, and only including one practice group and one geographical location. Additionally, retrospective data regarding referral (self-referral versus physician) would have been helpful to ascertain the potential influence of the physician and gathering patient satisfaction may have been helpful to tie satisfaction to co-pay and PT attendance.

Conclusion

Higher co-pays for patients attending PT for LBP are not associated with fewer visits and shorter durations of care. The result from this study calls for more research into the relative importance PT copays, and what other factors determine patient attendance in PT.

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