Impact of Out-of-Pocket Expenditure on Physical Therapy Utilization for Nonspecific Low Back Pain: Secondary Analysis of the Medical Expenditure Panel Survey Data

Janet Dolot, Deborah Viola, Qiuhu Shi, Matthew Hyland

Background. Physical therapy decreases low back pain, improves function, and may lead to decreased use of medical services. However, factors predicting physical therapy utilization for patients with low back pain are not well understood.

Objectives. The purpose of this study was to identify the impact of out-of-pocket expenditure on physical therapy utilization for US adults with nonspecific low back pain.

Design. This study was a secondary analysis of retrospective Medical Expenditure Panel Survey data.

Methods. The participants were US adults with nonspecific low back pain. The outcome variable was the number of visits per episode of care. The research variable was out-of-pocket expenditure. Covariate variables were Medical Outcomes Study 12-Item Short-Form Health Survey (SF-12) component scores. Descriptive statistics and multiple linear regression analyses were performed.

Results. Three hundred fourteen adults met the inclusion criteria and submitted SF-12 scores, representing nearly 4 million adults. Out-of-pocket expenditure, physical component score, and the age-insurance category “18–64 years with public coverage only for all of the year or uninsured all of the year” negatively predicted visits per episode of care in the final regression model.

Limitations. Limitations of the study included use of a nonexperimental design, lack of information about symptom severity and content of physical therapy, and SF-12 scores were not taken coincidental with the episode of care.

Conclusions. Out-of-pocket expenditure negatively predicts physical therapy utilization. More research is needed to identify all factors influencing physical therapy utilization so that effective health policies may be developed.

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People with musculoskeletal low back pain represent a significant portion of patients receiving physical therapy, and back problems are the sixth most costly health condition in the United States at nearly $86 billion annually. Related expenses continue to grow due, in part, to increased use of prescription, emergency, and inpatient care.

Consumer-directed health care is a strategy used by third-party payers to reduce health care costs by encouraging patients to seek care from low-cost providers and discouraging utilization of low-value services, where value is defined as outcome per dollar spent. Specific tactics include high deductibles, health savings accounts, high visit co-payments, high coinsurance rates, and offering different rates for in-network and out-of-network providers. A deductible is the dollar amount paid by patients for covered health care services before their health insurance begins to pay. A health savings account is an account for beneficiaries in high-deductible health insurance plans. This money is not subject to federal income tax and must be used for qualified medical expenses. A co-payment is the patient’s fixed share of a covered service, and coinsurance is the patient’s share determined as a percentage.

Research supports the success of consumer-directed health care strategies to reduce short-term health care costs. These tactics, however, may cause patients to delay or forgo high-value services and may result in poorer long-term health outcomes. One-third of US adults with private health insurance report delaying treatment for a health condition because of cost concerns. The average annual deductible in 2014 for people with employer-based health insurance plans was $1,217, an increase of 147% compared with 2009. Adults with high health care deductibles are more likely to delay or abstain from medical care than those with lower deductibles. This delay or abstention is most pronounced for people whose annual deductible equals 5% or greater of their income. Patients who pay a greater share of drug costs demonstrate increased rates of prescription nonadherence. Medication nonadherence can lead to increased hospitalization rates and health care costs for people with diabetes, hypertension, and hypercholesterolemia. Thirty-three percent of admissions to a university hospital due to adverse drug reactions were because of patient nonadherence to prescribed medications. Encouraging appropriate use of health care services is an important priority as attempts are made to control expenditures.

Recent consumer-directed health care efforts have explored value-based health insurance as a means to control health care expenditures while encouraging appropriate use. Such programs utilize high out-of-pocket spending for low-value health care services to discourage use while reducing out-of-pocket spending for high-value health care services to encourage use. Most consumer-directed health care initiatives in the United States are used by private insurers and are aimed at prescription drugs, preventive care, and use of preferred providers. Early evidence demonstrates a positive effect of value-based health insurance on appropriate use of health care and mixed effects on cost savings. Some experts are concerned that value-based insurance programs could exacerbate health inequities. A review of the literature failed to uncover research addressing the effect of consumer-directed health care tactics or value-based insurance strategies on physical therapy utilization. However, it is likely that third-party payers will use such strategies for physical therapist services, as the Affordable Care Act allows insurers to develop value-based insurance plans to encourage use of high-value services.

Physical therapy may be a high-value intervention for people with musculoskeletal low back pain. Adults with low back pain are more likely to report physical functioning limitations and social limitations than those without low back pain and score worse on the Physical Component Score (PCS-12) and Mental Component Score (MCS-12) of the Medical Outcomes Study 12-Item Short-Form Health Survey (SF-12). Physical therapy is associated with decreased pain and improved function for people with low back pain. Initiation of physical therapy early within an episode of low back pain is associated with decreased utilization and cost of medical services. Factors predicting physical therapy utilization for US patients with low back pain are not well understood but likely include variables at the patient, therapist, clinic, and environment levels. The effect of out-of-pocket expenditure on physical therapy utilization has not been identified.

Most people with musculoskeletal low back pain have nonspecific low back pain. Outcomes are affected by patient socioeconomic status, health-related quality of life, and coping style. It is likely that not all factors related to utilization of physical therapy care for US adults with nonspecific low back pain have been identified, including the impact of out-of-pocket payment. Elucidating these factors is necessary to develop an effective value-based health care system that minimizes the risk that high out-of-pocket costs will result in patients delaying or forgoing high-value care.

The objective of this study was to identify the impact of out-of-pocket expenditure on physical therapy utilization for US adults with nonspecific low back pain. This work is significant because physical therapy has the potential to decrease use of medical interventions, including medications, imaging, injections, and surgery, and decrease the rate of treatment cost growth for low back pain, but there is a dearth of research examining the effect of out-of-pocket expenditure on physical therapy utilization.

Method

Research Design
This study was a secondary analysis of retrospective data.

Data Source
We utilized the database of the Medical Expenditure Panel Survey Household Component (MEPS-HC) and Self-Administered Questionnaire (SAQ), sponsored by the Agency for Healthcare Administration Questionnaire (SAQ), sponsored by the Agency for Healthcare Research and Quality.
Research and Quality. The Medical Expenditure Panel Survey (MEPS) was first conducted in 1996 and collects data from a nationally representative sample of United States households, with oversampling of blacks and Hispanics, through an overlapping panel design. Sampling weights are used during analysis of MEPS data because most participants represent more than one US resident, but individual participants may not represent the same number of US residents as other participants. Mathematical adjustments are made to obtain accurate population-level estimates. A new panel of sample households is selected each year, and 2 calendar years of data are collected for each panel. This approach provides estimates of health care expenditures at both the person and household levels for 2 panels for each calendar year.

The 2 years of data for each panel are collected in 5 rounds of interviews. A reference period is the interval for which health care information is collected for each round. The specific dates of each household’s reference periods vary. The reference period for each round 1 begins on January 1 and ends on the date of the round 1 interview. All round 1 interviews occur between February and June of the first year. The reference period for round 2 begins following the round 1 interview and ends on the date of the round 2 interview. All round 2 interviews are completed within the first year. The reference period for round 3 includes the interval between the round 2 and round 3 interviews, which may span years 1 and 2. The reference period for round 4 includes the interval between the round 3 and round 4 interviews. Round 4 reference periods are contained wholly within the second year of the panel. The reference period for round 5 begins following the round 4 interview and ends on December 31 of the second year.

The MEPS-HC collects data related to socioeconomic factors, health conditions, disability days, family income, use of medical providers, and health status of all household members, in addition to other information. One household representative provides all household data.

Outcome Variable

The outcome variable was the number of physical therapy visits per episode of care determined from the Office-Based and Outpatient Department sections of MEPS-HC. Household representatives reported physical therapy visits for household members. Eligible physical therapy visits began on or following the date of the round 2 SAQ and concluded on or before the date of the round 4 SAQ. These dates were used because the round 2 values of the covariate variables PCS-12 and MCS-12 were used. New values of these variables were obtained in round 4. A new episode of care was considered to begin if more than 30 days elapsed between consecutive physical therapy visits. Thirty days was chosen based on the data of Carey et al, who found that 95% of patients with acute low back pain returned to work within 4 weeks.

Covariate Variables

The covariate variables were PCS-12 and MCS-12 scores taken from the SF-12, which measures health-related quality of life. The range of possible scores for each component is 0 to 100. Higher scores...
equate to better quality of life. The SF-12 was constructed to have norm-based standardized scores for the PCS-12 and MCS-12, with means of 50 and standard deviations of 10 in the US population. Round 2 scores were used in the regression analysis.

### Confounding Variables
Potential confounding variables included: sex, marital status, age, insurance, race/ethnicity, education, family income, region of the country, functional status, and comorbidities (Tab. 1). These variables were obtained by household representative report and categorized similarly to MEPS categorization or previous research using MEPS data to investigate health care utilization. Marital status was reported at the end of the first year. Age and insurance variables were combined into the single variable of age-insurance. Family income was reported at the end of the year in which care was delivered. Functional status was determined based on the presence of disability days. A disability day was defined as a missed school day or workday. The MEPS tracks whether a medical condition is associated with at least one missed workday or school day but does not count the number of workdays and school days missed. Comorbidities were determined from a count of conditions reported in addition to the ICD-9 codes of 724, 846, and 847.

### Data Analysis
All analyses were performed using Stata 13 (StataCorp LP, College Station, Texas). Stata survey commands were used to account for MEPS sampling design by including weighting factors in the data analysis. Weighting factors enable conversion of the participant group into a nationally representative sample by accounting for sampling error to allow more accurate estimates of population parameters. Weighted descriptive statistics were used to present univariate level analysis. Multiple linear regression with sampling weights was used in bivariate and multivariate analyses. Values of mean physical therapy expenditure per visit greater than $1,000 were reset to $1,000 to offset the effect of extreme values on the accuracy of estimates. $1,000 was chosen because it represented the 99th percentile of values. Participants were excluded from analysis if covariate or confounding variable data were missing. Missing visit dates were replaced as described above to optimize the representativeness of our sample.

### Simple linear regression
Simple linear regression was used to examine the relationship among visits per episode of care, each covariate, and the research variable. Multiple linear regression was used to model the relationship between visits per episode of care and each covariate.
care and the covariate and research variables, adjusting for potential confounders. A backward selection process was used to build the final regression model. Linearity of continuous variables was assessed visually with scatter plots. The natural logs of visits per episode of care and out-of-pocket payment were used in the regression equations. Collinearity was determined by calculating the tolerances and variance inflation factors for the predictor variables. Variables were excluded from the final model if their variance inflation factor was greater than 10 or their P value was <.05.

Results
Three hundred fourteen people met the inclusion criteria, submitted PCS-12 and MCS-12 scores, and attended physical therapy between the collection dates of their SF-12 data, representing approximately 3,711,145 noninstitutionalized US adults aged 18 years and older (Figure). The participants’ mean age was 49.6 years (SD = 15.5; 95% CI = 47.2, 52.1), and 63.2% were female. A total of 63.8% were 18 to 64 years old with private health insurance coverage for some or all of the year, and 82.2% were white, non-Hispanic. The mean years of education was 13.9 years (SD = 2.3; 95% CI = 13.6, 14.2), and 62.5% reported at least some post-high school education. Mean family income was $78,954 (SD = $56,244.14; 95% CI = $68,691, $89,216), and 54.5% reported family income at or above 400% of the federal poverty level. A total of 80.8% reported not missing any work or school days because of low back pain, and 86.0% reported more than 2 comorbidities. The mean PCS-12 score was 45.2 (SD = 11.3; 95% CI = 43.7, 46.8), and the mean MCS-12 score was 50.4 (SD = 9.1; 95% CI = 49.1, 51.7). See Tables 1 and 2 for descriptive statistics of people who attended physical therapy for nonspecific low back pain and submitted PCS-12 and MCS-12 scores.

The mean physical therapy out-of-pocket payment per visit was $26.78 (SD = $42.41; 95% CI = $21.74, $31.82), the mean expenditure per visit was $117.64 (SD = $138.64; 95% CI = $96.29, $139.00), and the mean expenditure per episode of care was $590.86 (SD = $998.53; 95% CI = $477.40, $704.33) (Tab. 2). Out-of-pocket expenditure differed significantly by strata of age and insurance (P = .001) and region (P = .02).

The mean number of physical therapy visits per episode of care was 5.1 (SD = 7.8; 95% CI = 4.2, 6.0). Episodes of care with more than 6 visits were associated with a lower initial PCS-12 score than episodes of care with fewer visits (P = .004). Table 3 displays values of visits per episode of care for all participants and by strata delineated by confounding variables.

Predictor Variables of Visits per Episode of Care
The final regression equation (Tab. 4) yielded $R^2 = .079$ (P < .001). Significant predictor variables of visits per episode of care included out-of-pocket expenditure, PCS-12 score, and membership in the category “age 18–64 years with public coverage only for all of the year or uninsured all of the year.” Our hypothesis was supported: out-of-pocket expenditure negatively predicted visits per episode of care.

The variables of MCS-12 score, sex, marital status, race/ethnicity, education, family income category, region, functional status, and comorbidity category were deleted from the final regression equation because they each had P values > .05. Interaction terms between out-of-

Figure.
Flow diagram (unweighted participants). NSLB = nonspecific low back pain, PCS-12 and MCS-12 = Physical Component Score and Mental Component Score, respectively, of the Medical Outcomes Study 12-Item Short-Form Health Survey (SF-12).
Impact of Medical Expenditures for Nonspecific Low Back Pain

Table 2.
Demographic, Outcome, Research, and Covariate Variables: Mean, Standard Deviation, and 95% Confidence Interval*

<table>
<thead>
<tr>
<th>Variable</th>
<th>( \bar{X} ) (SD)</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td>49.6 (15.5)</td>
<td>47.2</td>
<td>52.1</td>
</tr>
<tr>
<td>Education (y)</td>
<td>13.9 (2.3)</td>
<td>13.6</td>
<td>14.2</td>
</tr>
<tr>
<td>Family income</td>
<td>$78,953.91 ($56,244.14)</td>
<td>$68,691.38</td>
<td>$89,216.44</td>
</tr>
<tr>
<td>Comorbidities (n)</td>
<td>7.9 (5.0)</td>
<td>7.1</td>
<td>8.6</td>
</tr>
<tr>
<td>PCS-12 score</td>
<td>43.2 (11.3)</td>
<td>43.7</td>
<td>46.8</td>
</tr>
<tr>
<td>MCS-12 score</td>
<td>50.4 (9.1)</td>
<td>49.1</td>
<td>51.7</td>
</tr>
<tr>
<td>No. of physical therapy visits/episode of care</td>
<td>5.1 (7.8)</td>
<td>4.2</td>
<td>6.0</td>
</tr>
<tr>
<td>Out-of-pocket payment/physical therapy visit</td>
<td>$26.78 ($42.41)</td>
<td>$21.74</td>
<td>$31.82</td>
</tr>
<tr>
<td>Mean expenditure/physical therapy visit</td>
<td>$117.64 ($138.64)</td>
<td>$96.29</td>
<td>$139.00</td>
</tr>
<tr>
<td>Physical therapy expenditure/episode of care</td>
<td>$590.86 ($599.53)</td>
<td>$477.40</td>
<td>$704.33</td>
</tr>
</tbody>
</table>

* PCS-12 and MCS-12 = Physical Component Score and Mental Component Score, respectively, of the Medical Outcomes Study 12-Item Short-Form Health Survey (SF-12).

Discussion
This study revealed findings not reported previously in the physical therapy literature (eg, for US adults with nonspecific low back pain, out-of-pocket expenditure was predictive of the number of visits per episode of care). This is a critical finding to consider as health care policy makers seek to decrease excess health care spending.

Visits per Episode of Care
This study’s estimated value of 5.1 visits per episode of care corresponds with values of 5 to 12.3 determined by other investigators examining physical therapy utilization for low back pain.1,51,53,54 We found visits per episode of care to vary based on out-of-pocket expenditure. This finding has not been reported previously and has implications for health care policy related to appropriate use of high-value physical therapy.

Predictor Variables
The findings demonstrate that out-of-pocket payment and PCS-12 score negatively predict physical therapy visits per episode of care (\( P<.001 \) and \( P=.002 \), respectively). Independent of out-of-pocket expenses, type of insurance also was related to number of visits. Privately insured and Medicare-insured people were more likely to have more visits relative to those publicly insured/uninsured (\( P=.04 \)).

Swinkels et al53 used multilevel regression analysis to identify predictors of visits per episode of care at the patient, therapist, and practice levels. They identified private health insurance as a significant negative predictor of physical therapy visits per episode of care compared with public health insurance. This finding appears to contradict our finding. During data collection, public insurance was regulated nationally in the Netherlands, reimbursing 9 physical therapy sessions per episode of care.53 The people included in our category “age 18–64 years with public coverage only for all of the year or uninsured all of the year” either had no insurance or had public coverage regulated at the state level with variable coverage and reimbursement rates that were likely less generous than private insurance. Interestingly, the authors’ calculated mean number of visits per episode of care was similar to the number of visits per episode that were reimbursed by public health insurance in the Netherlands and beyond which required private health insurance or out-of-pocket expenditure.53 This outcome supports our finding that out-of-pocket expenditure predicts physical therapy utilization for adults with nonspecific low back pain.

Other significant factors identified by Swinkels et al53 were at the patient level (age, sex, chronicity, previous physical therapy, and referral by specialist) and therapist level (age, hours worked per week, content of therapy session, and training). The present study did not have access to therapist-level factors, nor to all patient-level factors that were collected by these researchers. These researchers did not collect information about the patient’s severity of presentation, race/ethnicity, or out-of-pocket expense.53

Jette et al1 identified predictors of episode intensity, not visits per episode of care. They defined intensity as the total number of visits divided by the number of weeks in the episode of care and found 2 factors that significantly predicted intensity of care: duration since onset of symptoms and region. We did not have access to duration of symptoms and did not find region to predict significantly the number of visits per episode of care.

Our model explained 7.9% (\( P=.001 \)) of the variance. This \( R^2 \) value for the final regression equation is similar to those of previous researchers analyzing similar relationships.1,53,55 Jette et al1 examined factors determining intensity per episode of physical therapy care for people with low back pain with an equation that explained 11% of the total variance. Swinkels et al53 identified factors that determine number of physical therapy sessions per episode of care.
visits per episode of care with an equation that explained 13% of the variance. Dunlop et al. describing factors related to one or more visits to a specialty medical physician, constructed equations that explained approximately 12% of the variance. Regression models that include out-of-pocket expenditure with environment-level, therapist-level, and other patient-level factors would be expected to explain a greater proportion of the variance in visits per episode of care.

**Health Services Utilization and Physical Therapy**

This study demonstrates that out-of-pocket expenditure and PCS-12 score predict visits per episode of physical therapy care. Episodes of care with more than 6 visits were associated with a lower initial PCS-12 score than episodes of care with fewer visits. This finding is important for payers to consider as they design policies to encourage appropriate use of physical therapy by patients with nonspecific low back pain.

We calculated the out-of-pocket expenditure associated with one less visit for patients at the mean number of visits (5.1), after controlling for health-related quality of life, age, and insurance. To do this, we back transformed the log-transformed cost and visits variables that were utilized in the regression models and used the following formula to estimate: natural log (at physical therapy visits per episode /1at physical therapy visits per episode) = 0.122 × natural log (cost at one visit increase/cost at visit). The model shows that compared with a patient with OOP expenses of $26.78 and 5 visits, a patient with OOP expenses of $49.09 per visit would have one less visit, and a patient with OOP expenses of $73.15 would have 2 fewer visits. This is due to the logarithmic nature of the equation and the variability of deductibles across the population. These costs illustrate the disincentives that patients face when considering physical therapy if enrolled in high-deductible health insurance plans with high co-payments and coinsurance rates.

Physical therapy reduces pain and improves functional outcomes for peo-

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**Table 3.**

Visits per Episode of Care by Strata: Mean, Standard Deviation, and 95% Confidence Interval

<table>
<thead>
<tr>
<th>Variable</th>
<th>Visits per Episode of Care</th>
<th>Mean (SD)</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>5.1 (7.8)</td>
<td>4.2</td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male*</td>
<td>4.2 (5.6)</td>
<td>3.2</td>
<td>5.1</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>5.7 (8.7)</td>
<td>4.4</td>
<td>7.0</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married*</td>
<td>4.8 (7.9)</td>
<td>3.6</td>
<td>5.9</td>
<td></td>
</tr>
<tr>
<td>Otherwise</td>
<td>5.6 (7.5)</td>
<td>4.2</td>
<td>7.0</td>
<td></td>
</tr>
<tr>
<td>Age-insurance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–64 y with private coverage for some or all of the year*</td>
<td>5.1 (8.1)</td>
<td>4.0</td>
<td>6.2</td>
<td></td>
</tr>
<tr>
<td>18–64 years with public coverage only for all of the year or uninsured all of the year</td>
<td>5.0 (9.0)</td>
<td>2.4</td>
<td>7.6</td>
<td></td>
</tr>
<tr>
<td>≥65 y</td>
<td>5.2 (6.1)</td>
<td>3.4</td>
<td>7.1</td>
<td></td>
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<tr>
<td>Race/ethnicity</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic*</td>
<td>7.5 (17.4)</td>
<td>3.2</td>
<td>11.8</td>
<td></td>
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<tr>
<td>Black, non-Hispanic</td>
<td>9.8 (15.2)</td>
<td>3.0</td>
<td>16.5</td>
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<tr>
<td>White, non-Hispanic</td>
<td>4.7 (6.3)</td>
<td>3.8</td>
<td>5.6</td>
<td></td>
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<tr>
<td>Other (non-Hispanic)</td>
<td>4.0 (7.3)</td>
<td>2.3</td>
<td>5.6</td>
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<tr>
<td>Education</td>
<td></td>
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<tr>
<td>&lt;12 y*</td>
<td>4.8 (6.7)</td>
<td>2.7</td>
<td>6.8</td>
<td></td>
</tr>
<tr>
<td>12 y</td>
<td>6.4 (11.2)</td>
<td>4.4</td>
<td>8.3</td>
<td></td>
</tr>
<tr>
<td>&gt;12 y</td>
<td>4.7 (6.2)</td>
<td>3.7</td>
<td>5.6</td>
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<tr>
<td>Family income</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low*</td>
<td>6.2 (10.8)</td>
<td>4.1</td>
<td>8.3</td>
<td></td>
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<tr>
<td>Middle</td>
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<td>4.2</td>
<td>7.1</td>
<td></td>
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<tr>
<td>High</td>
<td>4.6 (6.0)</td>
<td>3.5</td>
<td>5.7</td>
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<td>Region of United States</td>
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<td>Northeast*</td>
<td>5.4 (8.5)</td>
<td>3.0</td>
<td>7.7</td>
<td></td>
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<tr>
<td>Midwest</td>
<td>5.1 (6.9)</td>
<td>3.7</td>
<td>6.5</td>
<td></td>
</tr>
<tr>
<td>South</td>
<td>5.2 (7.3)</td>
<td>3.4</td>
<td>7.1</td>
<td></td>
</tr>
<tr>
<td>West</td>
<td>4.8 (7.1)</td>
<td>3.3</td>
<td>6.3</td>
<td></td>
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<tr>
<td>Functional status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not limited*</td>
<td>4.7 (7.2)</td>
<td>3.8</td>
<td>5.6</td>
<td></td>
</tr>
<tr>
<td>Limited</td>
<td>6.9 (10.0)</td>
<td>4.2</td>
<td>9.6</td>
<td></td>
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<tr>
<td>Comorbidities</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>≤2*</td>
<td>4.4 (13.9)</td>
<td>2.2</td>
<td>6.6</td>
<td></td>
</tr>
<tr>
<td>&gt;2</td>
<td>5.2 (7.0)</td>
<td>4.3</td>
<td>6.2</td>
<td></td>
</tr>
</tbody>
</table>

* Asterisk indicates reference category for regression equations.
ple with low back pain,\textsuperscript{24–29} and recent evidence demonstrates that early physical therapy for adults with low back pain results in decreased subsequent use of health care services and decreased costs compared with delayed physical therapy.\textsuperscript{30–32} Adults with private health insurance who received early physical therapy for low back pain compared with delayed physical therapy had substantially reduced utilization of advanced imaging; additional physician visits, lumbar spine surgery, and lumbar spine injections for 18 months following their initial physician visit\textsuperscript{31}; and approximately $4,000 in total health care savings.\textsuperscript{31} Out-of-pocket payments that are too high may result in delayed or reduced access to physical therapy, leading to decreased health-related quality of life and increased downstream costs related to utilization of medical interventions and chronicity.

Physical therapists, as well as other clinicians and professionals who refer patients for physical therapy, must be aware that patients are sensitive to out-of-pocket expenditures. Clinicians must educate each patient about the value of physical therapist services in terms of present and future outcomes, including future use and costs of medical services. Physical therapists must similarly educate referral sources, payers, and legislators at the grassroots and professional association levels so that each understands patients’ sensitivity to out-of-pocket expenditures and their role in crafting effective public health policies that will encourage appropriate use of physical therapy while limiting excessive utilization of medical services. Physical therapists must participate in health policy development at local and national levels so that meaningful policies can be developed that ensure access to high-value physical therapy.

The next steps in clinical and population-based physical therapy research should include identifying all important predictors of physical therapy utilization that may occur at the patient, therapist, clinic, and environment levels; identifying mediating variables for out-of-pocket expenditure that may occur at the patient, therapist, clinic, and environment levels, such as condition severity, type of insurance, annual income, therapist postgraduate training, proportion of treatment time spent with direct supervision of the therapist, and geographical area; and identifying out-of-pocket expenditure “tipping points” that prohibit appropriate use of physical therapy. As data collection becomes more comprehensive at the clinical and national levels, such efforts will be more feasible.

### Limitations

There are several limitations to this study. We utilized a nonexperimental design, so causal inferences may not be drawn. The study design lacked information about the patients’ presentation to therapy, including severity of symptoms. Severity of symptoms likely influences the number of visits per episode of care.\textsuperscript{56} The study design also lacked information about the therapist, clinic environment, content of physical therapy care delivered, and timing of therapy delivery. Care that is adherent to evidence-based low back pain guidelines is likely to yield better outcomes.\textsuperscript{57} Early therapy is associated with better outcomes for people with low back pain.\textsuperscript{30–32} Our calculated expenditures may be conservative, as MEPS has been shown to underestimate health care expenditures.\textsuperscript{47–49} The PCS-12 and MCS-12 scores were not taken coincident with the start of the physical therapy episode of care, so they may not reflect the actual health-related quality of life at the time care was delivered. The data files indicated whether physical therapy was provided but not by whom it was provided (eg, physical therapist or other provider), which may affect volume and quality of services. Additionally, more than one medical condition may be treated during a visit, so all costs may not be specific for low back pain. Missing visit dates were replaced by the 15th day of the month. As a new physical therapy episode of care began if more than 30 days elapsed between consecutive visits, this change should not significantly affect the mean total visits per episode of care. The study population comprised patients with nonspecific low back pain, so the results may not apply to patients receiving physical therapy with other health conditions.

In conclusion, health services utilization research is lacking in the US physical therapy literature, and there is a dearth of research examining the effect of out-of-pocket payment on physical therapy use. However, co-payments for physical therapy in the United States are reported to be as high as $50 to $100 per visit.\textsuperscript{58,59} This study identified out-of-pocket expenditure as a predictor of physical

<table>
<thead>
<tr>
<th>Variable</th>
<th>Regression Equation: $R^2=.079$, $P&lt;.001$</th>
<th>95% Confidence Interval</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>2.03</td>
<td>1.57</td>
<td>2.49</td>
</tr>
<tr>
<td>Natural log of out-of-pocket expenditure</td>
<td>-0.122</td>
<td>-0.190</td>
<td>-0.055</td>
</tr>
<tr>
<td>HRQL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCS-12</td>
<td>-0.015</td>
<td>-0.024</td>
<td>-0.005</td>
</tr>
<tr>
<td>Age-insurance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\geq 65$ y</td>
<td>-0.243</td>
<td>-0.531</td>
<td>0.046</td>
</tr>
<tr>
<td>18–64 y with public coverage only for all of the year or uninsured all of the year</td>
<td>-0.311</td>
<td>-0.606</td>
<td>-0.015</td>
</tr>
<tr>
<td>18–64 y with private coverage for some or all of the year</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

\textsuperscript{6} PCS-12 and MCS-12—Physical Component Score and Mental Component Score, respectively, of the Medical Outcomes Study 12-item Short-Form Health Survey (SF-12); HRQL—health-related quality of life. Asterisk indicates significant at $P<.05.$
therapy visits per episode of care. This finding is critical for public health policy makers and payers to investigate and consider as they design policies to encourage appropriate use of high-value physical therapy because out-of-pocket payments that are too high may result in reduced access to physical therapy by patients with nonspecific low back pain; reduced health-related quality of life; and increased downstream costs related to utilization of medical interventions, chronicity, and disability.

Future physical therapy health services utilization research efforts should include identifying all variables that influence physical therapy utilization; identifying mediating variables for out-of-pocket expenditure that may occur at the patient, therapist, and clinic levels; and identifying out-of-pocket expenditure “tipping points” that prohibit appropriate use of physical therapy, particularly for people whose deductibles represent a large proportion of their annual income.

In addition to building a base of health services utilization research in physical therapy, it is essential that more physical therapists participate in public health and health care policy development at the local, state, and national levels. This participation is necessary to eliminate the silos in which health care providers reside and promote collaborative health care teams that maximize patient outcomes through effective communication and use of high-value care.

Dr Dolot, Dr Viola, and Dr Shi provided concept/idea/research design. Dr Dolot and Dr Viola provided writing. Dr Dolot and Dr Shi provided data analysis. Dr Dolot and Dr Hyland provided project management. Dr Viola and Dr Hyland provided consultation (including review of manuscript before submission).


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