Relation Between Payer Source and Functional Outcomes, Visits and Treatment Duration in US Patients with Lumbar Dysfunction

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Abstract

Background: The differences in the utilization of healthcare services and resultant charges for symptoms like back pain has necessitated payers of healthcare services in the United States (US) to make efficient decisions relative to resource utilization. Studies involving both public and private payers of healthcare services in the United States have shown that payer source makes a difference in utilization of resources and patient outcomes. With the current focus on efficient and effective treatment, further research is needed on the relationship between payer source and patient outcomes. **Purpose:** To examine the association between payer source and number of visits, duration of treatment, and discharge functional status (FS) for patients with lumbar dysfunction who received physical therapy (PT) services. **Methods:** This retrospective study used secondary analyses of the Focus On Therapeutic Outcomes, Inc. (Knoxville, TN, USA) database that contained FS measures, number of visits, and treatment duration. Data were analyzed from 16,977 patients who received PT for lumbar dysfunction. Patient self-report surveys were used to estimate risk-adjusted FS at discharge. Therapists reported number of treatment visits and calendar days of treatment duration. **Results:** Patients receiving benefits from indemnity insurance and managed care plans (private funding) reported the highest risk-adjusted discharge FS measures. Patients receiving benefits from Medicaid (public funding) reported the lowest discharge FS measures and least number of visits. Patients receiving benefits from Workers' Compensation and patients involved in litigation had the longest treatment duration and highest number of visits. **Conclusion:** Results suggest that patients receiving benefits from different payers of healthcare services may differ in utilization of resources and outcomes. Further study is needed across a variety of diagnoses and payer sources to investigate the effect of payer source on utilization of physical therapy services and patient outcomes.

Introduction

Eighty percent of people suffer from back pain at least once in their lifetime, making the back pain one of the most costly "diseases" affecting the United States (US) population.[1] A study of outpatient physical therapy provided to US patients with spinal impairments examined the therapy provided based on source of payment. It concluded that receipt of benefits from fee-for-service insurance plans was associated with increased use of services compared to services provided to patients compensated by managed care.[2] A study of outcomes and costs of care for patients with acute low back pain concluded that charges by orthopedic surgeons and chiropractors were higher than charges by general practitioners working for health maintenance organizations (HMO).[3]

In general, there is evidence that payer source impacts the nature of care provided and thus patient outcomes. US studies in the area of maternity and cardiac services

indicated that services vary widely by payer source.[4-6] Studies involving both public and private payers of US healthcare services have shown that payer source affects utilization of resources and patient outcomes.[7,8] Other studies have concluded that US patients with public funding or no insurance receive fewer healthcare resources than those covered by private payer sources.[9,10]

In the US, public and private payers have begun using functional status (FS) outcomes data to assist in making effective (as reflected by patient outcome) and efficient (as reflected by utilization of resources) healthcare decisions for their clients.[11,12] FS instruments are increasingly being used by providers and payers to evaluate the outcome of patients with lumbar impairments and assess the effect of physical therapy services.[1, 13-17]

With the current focus on effective and efficient treatment, research is needed on the relationship between payer type, patient outcomes, and utilization of resources. Therefore, the purpose of this study was to examine the relation between the payer source, number of visits, duration of treatment, and change in self-reported functional status for patients with lumbar dysfunctions who received outpatient PT services. Payer source was defined as the primary source of payment for the patient's physical therapy.

Methods
Design
We conducted a retrospective study by using a secondary analysis of an existing database from Focus On Therapeutic Outcomes, Inc. (FOTO) (Knoxville, TN, USA), a medical rehabilitation data management company.[18] The Nova Southeastern University's (Ft. Lauderdale, FL) Institutional Review Board for the protection of human subjects approved the study.

Subjects
We analyzed a sample of convenience selected from 39,164 patients in the FOTO database who received outpatient PT for lumbar dysfunction in 2001 and 2002. Patients were treated in 331 outpatient clinics in the US, participating with the FOTO outcomes system in 37 states. From this sample, we selected 16,977 patients who were 18 years of age or older, completed both intake and discharge outcomes surveys, and had complete data for analyses (See Appendix for patient characteristics). There were no clinical exclusion criteria.

Data Collection
Patients completed self-report FS surveys before initial examination and at the time of the last visit (discharge). Patient demographic data were collected at intake. Clinicians entered number of visits and intervention dates at discharge. Clinic staff was trained in data collection processes and instructed to survey all adult patients who could communicate in English at intake and discharge from rehabilitation. Data from paper surveys were checked manually for completeness and entered into a computer database where computer programs checked data ranges. Data identified as incomplete was returned to the clinic for correction where staff at the clinics filled in the missing data by comparison to the medical record and other clinic documents. Corrected data underwent the same data quality screening upon resubmission. A description of the data collection procedures has been published.[13]

Outcome Measures
Duration of the episode of care was calculated electronically from dates of intervention. Visits were counted as the number of times the patient saw the physical therapist for treatment. Payer source was the primary source of the payment for the patient's physical therapy (coded as indemnity, litigation, Medicaid, Medicare B, patient private pay, health maintenance organization (HMO), preferred provider organization (PPO), Workers' Compensation, or other).

The FS measure was calculated using the 24 patient self-report FS items, which have previously been described.[13,19,20] FS was operationally defined as the patient's perception of their ability to perform functional tasks and perception of well-being described in the FS items. FS measures were calculated at rehabilitation intake and discharge. Items included questions from the acute version (one week recall) of the SF-36 and SF-12 and items developed for use in rehabilitation. FS measures were calculated by averaging scores from 8 constructs: general health (one item from SF-12), physical functioning (13 items: 10 from SF-36 physical functioning scale, PF-10, and 3 items that have been shown to improve assessment of physical functioning), and bodily pain (two items from SF-36).[20,22,24]

Additionally items included physical role (two items from SF-12), vitality (one item from SF-12), mental health (two items from SF-12), emotional role (two items from SF-12), and social functioning (one item from SF-12).[22] Scoring of item responses followed published algorithms, and raw ordinal scores were transformed to values varying from 0 (low) to 100 (high functioning) for each question.[20, 21, 24] Transformed item values were grouped by construct and averaged to obtain a score for each of the 8 scales, which were averaged to produce the FS measure.

The FS was chosen because 1) internal consistency of items in the FS constructs with 2 or more items has been reported as good (α=.57-.91), 2) test-retest reliability of the FS measure was strong (ICC(2,1)=.92), 3) validity of FS measures discriminated among patients with different levels of functional change following rehabilitation, and 4) responsiveness (described as the ability of a scale to detect change) of FS measures was good for patients with lumbar dysfunctions (effect size=0.83).[13, 19, 20, 23]

Statistical Analysis
Risk adjustment is a statistical process used to control

effects of confounding variables.[25,26] Previous studies have demonstrated effects of certain patient characteristics on rehabilitation outcomes, which support the need for risk-adjusted outcomes. For example, age, acuity of symptoms, intake FS, history of prior exercise, employment status at intake, payer type, and history of surgery have been associated with change in FS in patients receiving rehabilitation.[13, 20, 27]

Control of variables that could affect dependent variables is necessary before comparing patient outcomes across payer sources. For this study, we used an approach to risk adjustment similar to the one used by other researchers.[13,27] Univariate analyses were used to identify possible confounding variables among patient characteristics available in the data. All independent variables listed under Patient Characteristics (see Appendix) were analyzed to determine if any independent variable affected any dependent variable. For categorical variables, we used one-way analyses of covariance with intake FS measures as the covariate. For the continuous variable age, we used a Pearson product moment correlation to correlate age with each dependent variable.

For each significant (α=0.05) finding, differences in levels of factors of each categorical variable were assessed using Scheffe analyses. Data were fit to three multivariate regression models using ordinary least squares estimation procedure to determine if any of the dependent variables (discharge FS, number of visits, duration of treatment) were associated with any of the independent variables found to be significant in the univariate analyses.[28] The effect of payer source on dependent variables was conducted while controlling for effects of the independent variables found in Patient Characteristics (see Appendix). If significant, the effect of each payer source was assessed using Scheffe analyses to determine which payer sources were associated with different levels of each dependent variable. Because sample size was large, α was set to 0.01 for regression and post hoc analyses.

Independent Variable Definitions
The following independent variables were controlled for: age, severity, sex, acuity of symptoms, number of surgeries for condition, payer source, exercise history, region of the country where the clinic was located, type of referring physician, ownership of clinical facility, and employment status. Age (in years) was collected as a continuous variable, which was transformed to a categorical variable for the analyses. Severity of the condition was a continuous variable represented by the intake functional status measure, which functioned as the covariate for the analyses of covariance. Acuity of symptoms represented the number of days from onset of symptoms until beginning intervention. Number of surgeries represented number of surgeries for the low back. Payer source was the primary source of the payment for the patient's physical therapy (including indemnity, litigation, Medicaid (public funding), Medicare B (public funding), patient private pay, health maintenance organization (private funding), preferred provider organization (private funding), workers' compensation, and other). Exercise history was a measurement of the patient's self-reported exercise frequency prior to the episode of physical therapy care. Employment status represented the patient's employment status at intake to physical therapy. Type of physician who referred the patient to therapy included general practitioner, orthopedic surgeon, neurologist, occupational medicine physician, OBGYN physician, rheumatologist, physiatrist, and other. Ownership of facility included payer owned, hospital owned, physician owned, therapist owned, corporate owned, and other. Region of the country where the clinic was located included New England, Middle Atlantic, South Atlantic, Mountain, North Central, South Central, and Pacific.

Results
Univariate Analyses
Variables used for the univariate analysis are displayed in Table 1. Age was weakly related (P<0.001) to intake FS (r=-0.059) and visits (r=0.064) but not to duration (r=0.017, P>0.05). Gender did not affect visits or discharge FS (P >0.01), but women were treated longer than men. As patients' symptoms became more chronic, or once patients received one or more surgical procedures, discharge FS decreased, and visits and duration increased. Patients who exercised at least once a week reported higher discharge FS and had more visits and a longer duration (P<.01).

Table 1: Univariate Results

Independent Variable	Dependent Variables*		
	Visits	Duration	Discharge FS
Age (continuous) [a]	<0.001	0.284	<0.001
Gender (2 levels) [b]	0.103	<0.001	0.959
Acuity of symptoms (3 levels) [b]	<0.001	<0.001	<0.001
Number of surgeries (3 levels) [b]	<0.001	<0.001	<0.001
Exercise history (2 levels) [b]	0.001	<0.001	<0.001
Region of country (7 levels) [b]	<0.001	<0.001	<0.001
Employment status at intake (8 levels) [b]	<0.001	<0.001	<0.001
Type of referring physician (8 levels) [b]	<0.001	<0.001	<0.001
Ownership of facility (6 levels) [b]	<0.001	<0.001	<0.001
Payer source (9 levels) [b]	<0.001	<0.001	<0.001

[a] Pearson product moment correlation. [b] ANCOVA used intake FS measure as covariate.
* All values are P values.   FS=functional status

Regression Analyses

Visits: The regression models containing the independent variables identified using univariate analyses (see Table 1) with intake FS measures controlled 14% of the variance of number of risk-adjusted visits (see Table 2).

Table 2: Multiple Regression Results

Variable	Discharge FS		Visits		Duration	
	Beta(CI)	Partial R^2	Beta(CI)	Partial R^2	Beta(CI)	Partial R^2
Intake FS	.57(.56,.59)	.323	-.05(-.05,-.04)	.029	-.19(-.21,-.16)	.019
Age	-.08(-.10,-.06)	.002	.02(.01,.03)	.001	-	-
Region	.26(.12,.39)	.001	-.18(-.23,-.13)	.003	-.58(-.83,-.34)	.001
Clinic	.62(.44,.80)	.003	.36(.29,.43)	.006	1.28(.96,1.60)	.004
Exercise	-.51(-.75,-.26)	.001	-.17(-.27,-.08)	.001	-1.43(-1.87,-.99)	.002
Surgery	-1.80(-2.24,-1.36)	.004	.78(.61,.95)	.005	2.57(1.77,3.56)	.002
Employment	-.66(-.77,-.56)	.009	.08(.04,.12)	.001	.07(-.24,.11)	.000
Acuity	-3.55(-3.85,-3.26)	.032	.73(.62,.84)	.009	4.54(4.01,5.07)	.016
Referral	-.81(-.95,-.66)	.007	-.12(-.18,-.07)	.001	-.54(-.80,-.27)	.001
Payer	-.39(-.50,-.27)	.002	.15(.11,.20)	.003	.14(-.06,.35)	.000
Gender	-	-	-	-	1.64(.77,2.51)	.001
Corrected Model		.412		.140		.085

FS=functional status. CI=95% confidence interval. Region=region of the country. Clinic=clinic ownership. Exercise=exercise history. Surgery=surgical history. Employment=employment at intake. Acuity=symptom acuity. Referral=type of referring physician. Payer=payer source.

All beta coefficients were significant (P<.01) except for employment at intake and payer source for treatment duration. All independent variable coefficients were significant (P<0.01), including payer source. Post hoc analyses demonstrated several patterns. Patients receiving benefits from indemnity plans, PPO plans and Medicare B had the same mean number of visits. Patients in litigation had the most visits and patients who were self-pay or Medicaid has the least number of visits (see Table 3).

Table 3: Effect of Payer Source on Visits and Discharge FS

Payer	Visits			Discharge FS		
	Mean	SE	N	Mean	SE	N
Indemnity	10	0.23	1510	68	0.61	1510
Litigation	13	0.49	161	63	1.31	161
Medicaid	8	0.34	402	61	0.91	402
Medicare B	10	0.22	3200	68	0.58	3200
Patient	8	0.52	135	65	1.41	135
HMO	9	0.20	3551	68	0.53	3551
PPO	10	0.20	4159	68	0.52	4159
WC	12	0.20	3318	61	0.53	3318
Other	11	0.30	541	66	0.80	541

Values from multiple regression models controlling for important independent variables following univariate analyses. Mean=adjusted least square means. SE=standard error of the mean. N=sample size for each level of payer source with clean data. Payer sources are listed as indemnity, litigation, Medicaid, Medicare Part B, patient private pay, health maintenance organization (HMO), preferred provider organization (PPO), workers' compensation (WC), or other.

Duration: The regression model containing the independent variables identified using univariate analyses (Table 1) with intake FS measures controlled 9% of the variance of duration of the PT episode in risk-adjusted calendar days (Table 2). All but two independent variable coefficients were significant (P values <0.01). Those not significant were payer source and employment at intake.

Discharge FS: The regression model containing the independent variables identified using univariate analyses (Table 1) with intake FS measures controlled 41% of the variance of risk-adjusted discharge FS measures (Table 2). All independent variable coefficients were significant (P values <0.01), including payer source. Post hoc analyses of payer source (Table 3) demonstrated several patterns. Patients covered by indemnity plans, Medicare Part B, HMOs or PPOs reported the highest discharge FS. Patients who received benefits from indemnity plans HMO or PPO plans reported similar (P values all 1.00) and the highest risk-adjusted discharge FS measures (Tables 1 & 2). Patients receiving benefits from Medicaid or Workers' Compensation reported similar (P=1.00) and the lowest discharge FS measures (Tables 1 & 2).

Effect of Payer
Although payer source controlled only 0.2% and 0.3% of the data's variance for discharge FS and number of visits, respectively, the beta coefficients were significant (P<.01). Post hoc analyses (Table 3) display the risk-adjusted range of visits (i.e., 8 to 13) and discharge FS (i.e., 61 to 68). Pairwise comparison probability values are presented in Table 4.

Table 4: Results of Risk-Adjusted Payer Source Analyses

Visits	Indemnity	Litigation	Medicaid	Med B	Patient	HMO	PPO	WC
Litigation	<0.01							
Medicaid	0.04	<0.01						
Med B	1.00	<0.01	0.07					
Patient	0.70	<0.01	1.00	0.78				
HMO	0.62	<0.01	0.44	0.86	0.97			
PPO	1.00	<0.01	<0.01	1.00	0.58	0.06		
WC	<0.01	0.34	<0.01	<0.01	<0.01	<0.01	<0.01	
Other	0.16	<0.01	<0.01	0.08	0.04	<0.01	0.15	0.05

N=16,977

FS	Indemnity	Litigation	Medicaid	Med B	Patient	HMO	PPO	WC
Litigation	0.03							
Medicaid	<0.01	1.00						
Med B	0.99	0.14	<0.01					
Patient	0.62	1.00	0.77	0.86				
HMO	1.00	0.04	<0.01	1.00	0.66			
PPO	1.00	0.01	<0.01	0.89	0.50	1.00		
WC	<0.01	0.99	1.00	<0.01	0.61	<0.01	<0.01	
Other	0.15	0.91	0.04	.59	1.00	0.14	0.04	<0.01

N=16,977
All values are P values from Scheffe post hoc analyses following regression analyses of payer source.
Payer sources are listed as indemnity, litigation, Medicaid, Medicare Part B, patient private pay, health maintenance organization (HMO), preferred provider organization (PPO), workers' compensation (WC), or other.

Discussion
Results supported discharge FS, as quantified using patients self-report, and service utilization, as quantified using number of treatment visits, were associated with payer source for patients with lumbar spine dysfunctions receiving outpatient PT. Our results were consistent with previous results that demonstrated payer source affected risk-adjusted discharge FS in patients with lumbar dysfunctions receiving PT and extended their findings by demonstrating payer was differentially associated with FS and service utilization.[13, 27] In previous studies and the current study, a large data set allowed control or risk-adjustment of important independent variables, which improved interpretation of results.[13, 26, 27] These studies controlled for intake FS, which has been successfully used as a measure of condition severity.[13, 27] Intake FS controlled the majority (20% to 78%) of the variance of the number of treatment visits and discharge FS in this study.[29] The results of this study contribute to the existing literature by 1) demonstrating payer was differentially associated with functional outcome and treatment visits, and 2) risk adjustment was important when assessing discharge FS and treatment visits.

Patients receiving Medicaid (public funding) had the lowest discharge FS measures and on average the least number of visits. This finding is consistent with other studies.[9,10] The low number of visits may be explained by the low ratio of collected revenue to cost of treating patients receiving Medicaid.[30] Medical providers may limit the number of visits for Medicaid patients because of the low reimbursement limit.

Some have suggested that payer source may represent a marker of socioeconomic status that may explain differences in type of treatment received and outcome.[4] The literature has reported that people with lower socioeconomic status are more likely to have poorer

health, greater healthcare needs, and receive fewer healthcare resources, despite their need for services.[10] The nature of these individuals having poor health and receiving few visits may explain the lower discharge FS measures reported by patients receiving Medicaid.[10] Further study is needed to determine if these patients present with higher risk profiles relative to their potential to obtain positive rehabilitation outcomes, or whether other characteristics affect improvement in FS.

The results of this study raise the question as to whether economic and/or legal considerations may have contributed to the differences seen across payer sources regarding number of visits, duration of treatment, and functional outcome. Patients whose payer source was Workers' Compensation or litigation had the highest number of visits compared to patients of all other payer sources. These payer sources may have greater risk relative to patient outcomes due to the nature of the clientele and the circumstances surrounding the need for intervention. The findings extend the direct comparison of outcomes and visits across payer sources such as workers compensation and no compensation groups.[31, 32]

Managed care plans (HMO and PPO plans) originally evolved with strong incentives to control services and reduce costs, and some have argued that reduction of service utilization might negatively affect outcomes.[3] Previous outcome studies involving managed care have shown that patients covered by managed care received a lower intensity of medical and rehabilitation services and had poorer patient outcomes.[7,8] A study using a sample of patients with low back pain showed that charges were higher for patients seen by orthopedic surgeons and chiropractors and lowest for patients seen by HMO physicians and other primary care providers. This suggests a difference in the healthcare services utilized by these groups and could account for differences in outcomes.[33]

Our results supported no difference in visits, duration or discharge FS between HMO, PPO, and fee-for-service plans. This study used a larger national database than previous studies looking at utilization rates. In this study, patients covered by indemnity, HMO, or PPO plans had similar numbers of visits and reported the highest risk-adjusted discharge FS measures. Patients who receive the greatest number of treatments (Worker's Compensation and litigation) did not show the greatest

FS at discharge. Conversely, patients on Medicaid received the lowest number of treatment visits and had the lowest discharge FS. This demonstrates that service utilization and functional limitations were differentially related to insurance source in this study.

This study used a retrospective analysis of a proprietary database, which may be influenced by missing data, patient selection bias, lack of control over data collection quality, and patient / clinician error in completing survey forms. Authors could not monitor the data collection process and adherence to data collection procedures. Another limitation was the different number of patients in each payer source, which may have affected the outcome. Additionally, differences in patient characteristics across payer sources may have influenced the results; despite efforts made to control for these differences using statistical risk adjustment, there may be unmeasured differences across payer sources. This sample also included only patients of therapists who participated in the FOTO database. Therefore, generalizability of the conclusions to a broader population of patients must be done with caution. The sample used may not be representative of PT practice in the US resulting in threats to external validity of the findings. However, because the sample was large and data were collected from hundreds of clinics across most of the US, the effect of errors related to missing data, patient selection bias, lack of control over data collection quality, and survey completion by patients or clinicians should be randomly distributed over the data set. Therefore, the effects of these potential threats to internal and external validity should be minimized, which tends to support the generalizability of the results.

Conclusion
To our knowledge, this is the second US study that has examined the effect of multiple payer sources on PT outcomes for patients with lumbar dysfunction and the first to compare the number of treatment visits and outcome to payer source. Results suggest that patients receiving benefits from different payers of healthcare services may differ in utilization of resources and outcomes. Payer sources may contribute to the variability of quality of care and number of visits. Further study is needed across a variety of diagnoses and payer sources to investigate the effect of payer source on utilization of PT services and patient outcomes.

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Appendix

Patient Characteristics (n=16,977)

Characteristic	%[a]	Mean	SD	Range
Age (y) (n=16,977)		49	16	18 - 97
Visits (n=16,977)		9	6	1 - 90
Duration of intervention (days) (n=16,977)		35	29	1-365[b]
Intake functional status measure (n=16,977)		52	19	0 - 100
Male (n=7,029)	41			
Symptom acuity (n=16,977)				
Acute (<22 days)	27			
Subacute (>22 to <90 days)	26			
Chronic (>90 days)	47			
Number of surgeries (n=16,977)				
None	82			
One	12			
Two or more	6			
Exercise history (n=16,977)				
At least 3x/wk or 1-2x/wk	61			
Seldom/never	39			
Region (n=16,977)				
Middle Atlantic	8			
Mountain	6			
New England	4			
North Central	45			
Pacific	3			
South Atlantic	13			
South Central	21			
Employment status (n=16,977)				
Employed/working full duty	40			
Employed/working restricted duty/not working	26			
Not working/receiving disability	1			
Unemployed/Retired	31			
Student	2			
Type of referring physician (n=16,977)				
General practice	44			
Orthopedics	25			
Neurology	7			
Occupational medicine	9			
Physiatry	7			
Other	8			
Ownership of clinical facility (n=16,977)				
Payer owned	6			
Hospital	67			
Physician's office	1			
Physical therapist private practice	11			
Corporate	11			
Other	4			
Payer source (n=16,977)				
Indemnity	9			
Litigation	1			
Medicaid	2			
Medicare Part B	19			
Patient	1			
Health Maintenance Organization	21			
Preferred Provider Organization	24			
Workers' Compensation	20			
Other	3			

SD=Standard deviation
n=number of patients with non-missing data
[a] %=Percent of nonmissing data
[b] Duration was limited to the range of 1 to 365 days (see text)